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The Determinants of Port Servqual and Their Implications on the Container Port Performance: An Empirical Study on Container Terminal Ports in Indonesia

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Abstract: *Container port service has been an important part of global competition today. This study aims to know the perspective of container port service users in the following variables: IT Application, Port Supply Chain Integration, Customer Relationship Management, Port Service Quality, and Container Port Performance. The samples used here are 250 companies using the services of the main container ports of Tanjung Priok Jakarta and Tanjung Perak Surabaya. The results of research show that IT Application negatively and unsignificantly influences Port Service Quality, Port Supply Chain Integration positively and significantly influences Port Service Quality, Customer Relation Management positively and significantly influences Port Service Quality, simultaneously IT Application, Port Supply Chain Integration and Customer Relationship Management positively and significantly influence Port Service Quality, IT application positively and significantly influences Container Port Performance, Port Supply Chain Integration negatively and unsignificantly influences Container Port Performance, Customer Relation Management negatively and significantly influences Container Port Performance, Port Service Quality positively and significantly influences Container Port Performance, simultaneously IT Application, Customer Relationship Management, Port Supply Chain Integration dan Port Service Quality positively and significantly influence Container Port Performance.*

Keywords*: IT application, port supply chain integration, customer relationship management, port service quality, container port performance*

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I. Introduction

Indonesia is known as the biggest archipelago country in the world and located in the strategic position between two continents, Asia and Australia, as well as between Indian Ocean and Pacific Ocean, which has abundant natural resources and human resources. It is a must that Indonesia has seaports as the gate for the international and interregional economic activities. With various natural resources, the coatal area of Indonesia has many strategic economic functions, such as for trade, transportation and harbour, industrial area, agrobusiness, agroindustry, tourism, business and residential area. Such a condition surely becomes a *key point* for the government to develop the marine sector as the *prime mover* of national development which one of them is seaport sector, where the infrastructure development in transportation sector, especially seaport, is very important and much prioritized. As stated by (Demirbas, Flint, & Bennett, 2014), the development of globalization has changed rapidly the need for container port development so as to fulfill the logistic need in every region.

Free trade in the globalization era has brought rapid changes with wide impacts on economy, both national and international (Tseng & Liao, 2015). One of the most perceived impacts is the increasingly tight competition in the industrial sector. This is related to the industrial competitiveness as an important factor for a country to survive, so this condition requires every business organization to make sustainable changes in management to enhance its competitiveness.

Indonesia as an archipelago country depends much on sea transport activities, in which more than 70% goods are distributed through seas and, with bigger load capacity, ship becomes a very important mode of distributing goods and services in the country. The availability of effective and efficient sea transport mode for economic activities in Indonesia is an urgent issue for the government to provide domestic shipping companies with opportunities to grow the domestic shipping business. (Hsu, 2013) states that the use of containerization after the World War II has brought significant changes in goods distribution; with containerization system,

goods will be safer from damage, easy to be packed, and will increase productivity. (Hsu, 2013) also says that the growth of containerization has changed the trade process to be faster and it is more effective in the goods delivery process. Port as the gate for trade and economy has a very important role in the economic movement. This is in line with (Pérez, Abad, Carrillo, & Fernández, 2007) that public service providers have significant roles in economy.

The role of seaport needs to be optimized as a node in the national transportation network, in addition to the other roles such as to be the gate of economic activities, supporting industrial and/or commercial activities, place for distribution, production, and consolidation of cargo/goods, as stated by (Panayides & Song, 2008; Woo, Pettit, & Beresford, 2013).

Yun and Choi (1999) state, today 90% of international cargo is served by shipping where 80% in the form of containeriztion. As a part of transportation system, seaport has important roles in economy. Sea port plays a role in stimulating the growth of economic and trade activities, the growth of service and non-service industries, and providing employment opportunities for local people. In the context of logistic system, seaport has a vital position and role to support the realization of national logistic effectiveness and efficiency.

Business players and other stakeholders in seaport (port operator, shipping companies, ship cargo expedition companies (EMKL), freight forwarders, and port regulator) are required to deliver optimal service to the consumers, so that the integrated port service can create an economical Supply Chain Management in managing seaport services. As stated by (Woo et al., 2013), the development of global economy has encouraged seaport to be integrated with SCM in order to improve the efficiency and effectiveness of port services. Thus, the changing role of port in SCM has become an interesting subject of in-depth study.

In order to manage the seaport services which satisfy all parties, it needs a sinergy of all parties, namely port operator, shipping companies, ship cargo expedition companies and freight forwarders. This is in line with the opinion of (Fearne, 2012) stating that a company can do *Value Chain Analysis* as a strategy to see the mistake/deviation in operational activities, resource fulfillment, and taking advantages of business opportunity which influences the sustainable increase of company's economic value. In the implementation, VCA is so important that it can be integrated to environment and people, which finally the company is able to continuously improve its performance and competitiveness.

Based on the *Logistics Performance Index* published by World Bank in 2016 (Arvis, Mustra, Panzer, Ojala, & Naula, 2016), today Indonesia occupies the 63rd rank, declining 10 points from 2014 where Indonesia's LPI occupied the 53th rank (Arvis, Mustra, Panzer, Ojala, & Naula, 2014). Despite rank increase from 2010 to 2014, it does not guarantee that seaport services have been better. So, it is necessary to study more deeply about how the value chain model of container port services in Indonesia. Well-managed logistic function will be able to improve the marketing function of container container, so that it will improve the produktifitas and efficiency (competitivenes) of container port (G.-T. Yeo, Roe, & Dinwoodie, 2011).

Until now Indonesia is in the world 5th rank in terms of export and import quantity using container through container seaport as shown in the following table:

Table 1: Rank of Containerized Cargo Export and Import

Top 10 Exporters of Containerized Cargo 2010, 2013 & 2014

Rank	EXPORTER	2014 TEUs (Millions)	2013 TEUS (Millions)	2010 TEUs (Millions)
1	China	36.0	34.2	31.3
2	United States	11.9	11.5	11.2
3	South Korea	5.93	5.79	5.20
4	Japan	5.28	5.20	5.74
5	**Indonesia**	**4.00**	**3.59**	**3.00**
6	Thailand	3.92	3.78	3.40
7	Germany	3.32	3.24	3.00
8	Taiwan, China	3.25	3.24	3.41
9	India	3.07	2.95	1.90
10	Vietnam	2.94	2.63	1.61

Top 10 Importers of Containerized Cargo 2010, 2013 & 2014

Rank	IMPORTER	2014 TEUS (millions)	2013 TEUs (Millions)	2010 TEUS (Millions)
1	United States	19.6	18.4	17.6
2	China	14.7	14.4	12.0
3	Japan	6.55	6.34	6.10

4	South Korea	5.09	4.80	4.50
5	**Indonesia**	**3.17**	**3.13**	**2.50**
6	Germany	3.00	2.78	2.80
7	United Kingdom	2.64	2.42	2.50
8	Taiwan, China	2.53	2.42	2.50
9	Australia	2.52	2.45	1.80
10	Vietnam	2.47	2.19	2.00

Source: *http://www.worldshipping.org/about-the-industry/global-trade/trade-statistics*

Port of Tanjung Priok, located in Jakarta as the nation's capital, is the biggest port and has become the barometer of port activities especially for container terminal in Indonesia. The challenge recently faced by container port of Tanjung Priok is that there is still high dwell time of container at the container terminal, reaching 6 to 7 days, as well as issues in infrastructure and access to the port which make slow movement of goods.

Dwell Time (waiting time) of container at the port is one of the main problem of port performance which attracts public attention and becomes a special phenomenon of port competitiveness (G. T. Yeo, Wang, & Chou, 2013). Today, the DT which has been targeted by the government to be less than 3 days, has not been realized yet. The realization at container port is on average between 3.5 to 6 service days, causing low competitiveness of the port. Quoted from Director General of Sea Transportation in August 2016, the Dwell Time based on the data from Directorat of Customs and Excise can be seen in the following table:

Table 2: Data of Average Dwell Time at Major Container Ports in Indonesia

BULAN / TAHUN	JAN	PEB	MAR	APR	MEI	JUN	JUL	AGT	SEP	OKT	NOP	DES
2014	8.03	7,42	5,93	6,46	6,04	6, 05	5,51	5,49	5,29	5, 40	5, 63	5, 69
2015	5, 97	5, 69	5, 42	5, 51	5, 87	5, 56	5, 65	5, 22	4, 14	4, 19	4, 29	4, 65
2016	5, 22	4, 51	3, 70	3, 68	4, 41	3, 99	3, 78	-	-	-	-	-

Source: Directorat of Customs and Excise

The government has made a public policy concerning customs and port services aiming to improve the smoothness of flow of goods and the performance of export-import services as the real form of Indonesia's commitment to running the global trade agreement in the regional level of ASEAN and international. The policy is the use of electronic system in the frame of Indonesia National Single Window (INSW). The other policy in electronic information is the issuance of regulation of the Minister of Transportation of the republic of Indonesia Number 157 year 2015 concerning INAPORTNET for Ship and Goods Services in the Port.

The implementation of policies on INSW and INAPORTNET is the instrument of government policy to integrate information that can be accessed by public users through internet (public network). The implementation of INSW is a *single submission of data and information*; *single and synchronous processing of data and information*, and *single decision making for customs clearance and release of cargoes* (Portal Nasional Republik Indonesia, 2015).

Whereas the implementation of INAPORTNET is an internet/web-based single electronic service system to integrate the customs information system which has a standard in serving ships and cargoes physically from all agencies and related stakeholders at the port.

The implementation of INSW and INAPORTNET is expected to reduce the container Dwell Time in Tanjung Priok which initially 9 to 10 days to be less than 3 days of DT in the port. However, the implementation of INSW and INAPORTNET has not been optimal, where the average container DT in big ports in Indonesia, namely Medan, Jakarta, Surabaya and Makassar which is targeted less than 3 days has not been achieved yet. With such a condition, the performance of Tanjung Priok port is considered as not optimal and it causes high cost of national logistic reaching 24.5 percents of Indonesia' GNP in 2014 (Statistical Year Book of Indonesia, 2014).

Another measure taken by the government, in this case the Ministry of Transportation, is issuing a policy on the Regulation of Director General of Sea Transportation number: HK.103/2/18/DJPL-16 on the Standard of Port Operational Service Performance for commercially-run ports. The standard measurement of the performance of port operational services established in that policy is the utility of container crane (CC) measured in the unit of Box Crane per Hour (BCH), where the standard established for each port is different from each other.

Furthermore, the other thing the government carries out to reduce dwell time and other congestions in the port is issuing the packet of economic policies XI (https://www.ekon.go.id/ekliping/view/paket-kebijakan-

ekonomi-xi.2347.html), which one of the policies is Risk Management for Accelerating Goods Flow in the Port (Indonesia Single Risk Management – ISRM). The objectives of that policy are: to accelerate the import/export services that can give business certainty, to be efficient in time and cost of clearance, as well as to reduce dwell time; to improve the effectiveness of supervision through integration of risk management among Ministries/Institutions; to enhance *high compliance* and courage business players to be obedient because of certainty in service time. The same treatment in service and clearance control from all Ministries/ Institutions toward any business players in accordance with the risk profile makes certainty in the process of export-import services.

Today Indonesia has entered the era of free trade for ASEAN by the end of 2015 (ASEAN Economic Community or MEA). One thing the government should improve is public service, especially the sector of trade service where the key is port service, mainly in container port. (Bagchi & Paik, 2001; K. Bichou & Gray, 2005; Demirbas et al., 2014; Laine & Vepsäläinen, 1994)

Based on the scope and problem formulation, this study focuses on the determination of Port Service Quality, including *IT Application*, *Port Supply Chain Integrity* and *Customer Relationship Managemen* which imply on the *Container Port Performance* of Tanjung Priok and Tanjung Perak, Indonesia.

II. Literature Review

2.1. Definition of IT Application

The development of technology has advanced rapidly. Today, information technology has a very important role in enabling the access of finding information to fulfill the need for data easily and quickly (Kia, Shayan, & Ghotb, 2000) (Garstone, 1995). Information technology has influences in the Supply Chain Management because it can make people gather to share information together in the same time (Bienstock & Royne, 2010). With the improvement of the existing network, information can be accessed easily in various and different place or location around the world. Tseng (2015) explains that the role of IT can help the efficiency process in the Supply Chain Management. The types of IT used today are such as *e-commerce* and Electronic Data Interchange (EDI) system to make easier the quick exchange of information (Kia et al., 2000).

The main goal of IT in the Supply Chain Management is to connect the points of production with the points of delivery and purchase (Ha, Yang, Notteboom, Ng, & Heo, 2017) so it has passage and path of information concerning the product status. This includes planning, tracking, and predicting the production process based on the real and accurate data. The parties having interests in the existence of product should have an access to this information (Soni & Kodali, 2013).

Based on the literature review, it can be concluded that IT Application is an information technology system which can give contributions to Supply Chain Manajemen. By using IT application and the newest sophisticated technology system, the port supply chain system will run with efficiencies in time and cost, speed and accuracy of delivery process, avoidance from business risks, and be able to make better communication with the stakeholders.

2.2. Port Supply Chain Integration

Supply Chain Manajemen, Partnerships, and Shippers are a collaborative relationship of three parties which are communicate each other and mutually favorable (Cooper, Lambert, Pagh, & Ellram, 1997). The aim of this collaboration and cooperation is to make smooth business processes, prime service, while minimizing risks and reducing transport and inventory costs (Soni & Kodali, 2013).

Seaport is one of the very important link of the overall domestic and overseas trade process. As stated by (G.-T. Yeo et al., 2011) seaport is not only a place for loading and discharging goods or passengers but also a logistic chain in distributing services that have added value.

Seaport activities are the interface of two transportation modes: land and water/sea. The movement activities from those two modes should be done effectively and efficiently by creating alignment in an organized and quick work system which can reduce the time and cost at seaport. (Bagchi & Paik, 2001) state that seaport is a vital supply chain of a country where it is the place for ship berthing, goods and people movement. Likewise, (Mangan, Lalwani, & Fynes, 2008) states that port and sea transport play a very important role in the global trade today. So, the role of port should be able to give wide impacts on the international trade activities where the trend of increasing trade depends on the ability of the port itself. This is supported by the opinion of (Mangan et al., 2008) that the improvement of port service quality is specifically caused by the efficient service management, so it impacts on the world trade in general and especially on sea transport business. The implementation of SCM can increase the alignment between company's performance and excellence, Min et al (2005). In SCM there is a positive relationship between the degree of port integration and supply chain toward the port performance, (Panayides & Song, 2008). SCM is a strategy which can improve the company's performance but the impact of this strategy has not been widely studied, Pettit and Beresford (2009).

Based on the explanation above, it can be concluded that Port Supply Chain Integration (PSCI) is an integration developed by various stakeholders in seaport, namely shipping companies, agency companies, port operator, trucking companies, warehousing, and regulator (the government's role), where they are together and mutually integrated in an effort to achieve the port's competitive advantage. The indicators of PSCI (Panayides: 2008) are: *information and communication systems* (ICS), *value added services* (VAS), *multimodal systems and operations* (MSO), *supply chain integration practices* (SCIP).

2.3. Customer Relationship Management

The implementation of Customer Relationship Management (CRM) generally has been able to create competitive advantages of an organization which positively impact on the organization's performance, but there is a debate on understanding CRM itself (Sin, Tse, & Yim, 2005).

According to (Gebert, Geib, Kolbe, & Brenner, 2003), in order to integrate marketing, sales, and service activities, CRM needs a strong integration in business process by involving customers. CRM process is oriented to customers, generally unstructured and non-transactional, and their performance is more influenced by product knowledge, quantity of product supply, market size, and number of customers.

(Gebert et al., 2003) also states that CRM process can be considered as knowledge process which has orientation and characteristics:

- Deep knowledge - CRM process needs heterogeneous knowledge, not necessarily computational, source for achieving the goal of process.
- Complex process – most CRM processes have complex structures or even no clear structure at all. This means that it needs high level knowledge to run the process.

Rapid economic globalization has encouraged competition in container shipping meet customers' quick demand as well as quick supply (Tseng & Wu, 2014). Shipping companies as one of the stakeholders in seaport have important roles in the economic recovery entering the era of 2000. (Gopal & Cline, 2007) say that the success of a shipping company is not only obtaining short term profit, but the company must be able to build relationship with its customers. Shipping company as a service provider must be able to communicate well with customers and maintain them for a long term. The profit obtained in a short term must be retained by maintaining and developing customer loyalty. In the other hand, Meixell and Norbis (2008) say that one of the successes in logistic management is that a company can determine the right type of transportation mode in the process of transporting goods and people. Mode selection is very important because it will give impact on the issue of efficiency in all aspects: environment, energy utilization, security, integration among supply chains, information, and so on. CRM behaviour is a connecting integration of communication with customers which includes such things as data and information, internet, and customer service. Service and the data of customer service are documented, then the data helps the company understand the customer behaviour and loyalty in order to get a profit (Tseng & Wu, 2014). (Sin et al., 2005) state that in the Customer Relationship Management there are four dimensions/main components, namely Key Customer Focus, CRM Organization, Technology-based CRM, and Knowledge Management.

Based on the literature review, it can be concluded that Customer Relationship Management is a company's effort to continuously maintain good relationships with customers, by systematically utilizing all resources the company has through improving the standard of service quality, which ultimately aims to increase the company's profitability and customer satisfaction.

2.4. Port SERVQUAL

Every company will try to deliver its best services so that customers will be interested in the poduct or service offered and then buy it so as to increase the sales volume and the expected profit can be obtained. (Hertog, Aa, & Jong, 2010) say that building service quality is a huge investment and needs a corporate strategy to be implemented consistently. Furthermore, (Parasuraman, 2010) states that service quality is the core of service process delivered in a business process, where service quality is the main key to connect the company and customer's perspective.

(Pantouvakis, 2014) explains that a market-oriented service quality has a strong relationship with the improvement of company's performance. To respond the quality customer service, two basic things are needed: Marketing and Market Orientation. Market Orientation has been a reference for companies to run their marketing and has influenced the corporate marketing strategy. (Kunadhamraks & Hanaoka, 2008) state that service quality in transportation service industry has different dimensions, namely travel time (TM), Qualification (QF), Flexibility (FX), and Information System (IT). Service quality improvement in transportation is the impact of the increasing volume of international trade.

In the other hand (Hsu, 2013) states that to measure the port service quality (Port Servqual), especially in Container Terminal, the dimensions in service industry are the same as what (Parasuraman, 2010), explains. Subsequently, with the existing five dimensions (TERRA) it is developed to become several subdimensions:

Tangible consisting of physical facilities, equipment, availability of field, storage room, and information system; *Emphaty*, proactive attitude to give useful information to customers; *Reliability*, consisting of reliability in delivering the service in secure, consistent, and accurate/appropriate ways; *Responsiveness*, consisting of ability to help and respond customers quickly; *Assurance*, consisting of ability and desire to handle the problems occuring in the service process.

PORTSERVQ is a mesurement of service which has a certain standard to be delivered consistently by a company to customers/consumers to reach the expectation and customer satisfaction. The dimensions used are from (Parasuraman, Zeithaml, & Berry, 1988) in (Hsu, 2013) which are implemented in container terminal port service developed in the following subdimensions: consisting of physical facilities, equipment, availability of field, storage room, and information system; *Emphaty*, proactive attitude to give useful information to customers; *Reliability*, consisting of reliability in delivering the service in secure, consistent, and accurate/appropriate ways; *Responsiveness*, consisting of ability to help and respond customers quickly; *Assurance*, consisting of ability and desire to handle the problems occuring in the service process.

2.5. Container Port Performance

Seaport performance, especially in container terminal, is determined by many factors. According to (Feng, Mangan, & Lalwani, 2012), port performance may reflect four main aspects of economy. First, 90 percents of world trade is through seaport considering the huge volume and lower cost rather than other transportation (UNCTAD, 2010). Second, port is the key point of international trade supply chain, and seaport efficiency is the form of a country's competitiveness (Sanchez, R.J., Hoffmann, J., Micco, A., Zzolitto, G.V.P., Sgut, M.N. and Wilmsmeier, G. 2003). Third, port performance can enhance the environmental consciousness and can trigger demand for using water transportation where the fuel consumption is relatively less than train and road transportation (Wu and Dun, 1995). The last, seaport acts as an economic driver, income, and employment opportunity (Feng et al., 2012). The benchmark of port performance is determined by the weight in tonnage, speed, and operation time as the basic important indicator which measures the efficiency of operational activities, (Lasse, 2012). Furthermore, (Lasse, 2012) explains that the measurement of international port performance uses four indicators of stevedoring operation: flow of goods (*Output*), ship service time (*Service Time*), ratio of berth facilities utilization (*Berth Occupancy*) and cost of loading-discharging goods (*Cost per-Ton Handelled*), so the length of service time in the port will increase cost and inefficiency. Thus, port performance is said to be good if the total service time in the port decreases.

Container Port Performance is the ability of a seaport to deliver port services in the work territory of port starting from the gate, stacking yard, stevedoring, and vessel in/out service done effectively and efficiently.

III. Hypothesis and Conceptual Framework

Based on literature review, research hypothesis can be formulated as follows:

H1 : There is a positive influence of *IT application* on *port service quality*
H2 : There is a positive influence of *port supply chain integration* on *port service quality*
H3 : There is a positive influence of *customer relation management* on *port service quality*
H4 : There is a positive influence of *IT application, port supply chain integration,* and *customer relationship management* simultaneously on *port service quality.*
H5 : There is a positive influence of *IT application* on *container port performance*
H6 : There is a positive influence of *port supply chain integration* on *container port performance*
H7 : There is a positive influence of *customer relationship management* on *container port performance*
H8 : There is a positive influence of *port service quality* on *container port performance*
H9 : There is a positive influence of *IT application*, *customer relationship management* and *port supply chain integration* simultaneously on *container port performance* which is mediated by *port service quality.*

The conceptual framework in this study can be illustrated as follows:

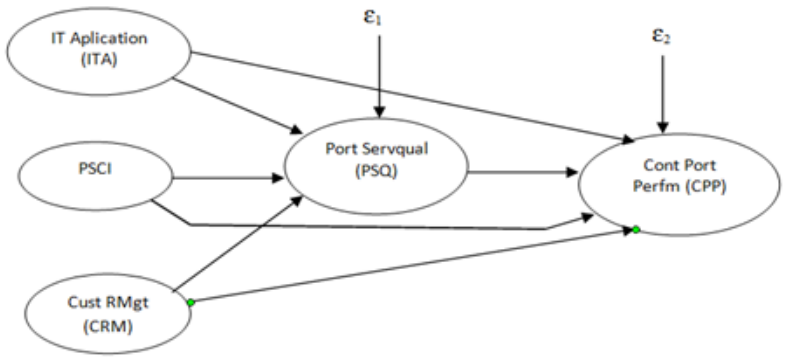

Figure 3.1 Conceptual Framework

IV. Research Design

This study refers to the previous ones carried out by (Woo et al., 2013), (Panayides & Song, 2008) and (Tseng et al., 2015). Based on the previous studies, the research that can be done is Testing Hypothesis, that is a research aiming to examine the interrelationship among variables studied.

The population in this study is all service user companies in the container terminal port in the area of Tanjung Priok port Jakarta and Tanjung Perak port Surabaya. The number of population in the area of container port in Tanjung Priok and Tanjung Perak is more than 500 port service users consisting of shipping companies, freight forwarders, and ship cargo expedition companies.

Sampling taken is as many as 250 companies involved in the activities of container terminal port in the area of Tanjung Priok Jakarta and Tanjung Perak Surabaya as the two biggest and major ports in Indonesia. The analysis units of this study consist of shipping companies, ship cargo expedition companies and freight forwarders (Woo et al., 2013). While the categories of company number are as follows: shipping companies as many as 45 companies, freight forwarding companies (cargo owners) as many as 112 companies and ship cargo expedition companies as many as 93 companies. The sample data can be explained in Table 4.1 as follows:

Table 4.1. Sample Classification

Type of Company	Tj Priok port	Tj Perak port	Number of companies
Shipping Company (PP)	29	16	45
Freight Forwarder (FF) / Cargo Owner	76	36	112
Ship cargo expedition company (EMKL)	61	32	93
Total	166	84	250

The instrument used in this study is questionnaire. (Walliman, 2011) says that questionnaire is a method for collecting data which is frequently called survey.

The measurement of research instrument uses likert scale, i.e. Strongly Agree (SA) weighted 5 points, Agree (A) 4 points, Hesitate (H) 3 points, Disagree (D) 2 points, and Strongly Disagree (SD) 1 point, (Sekaran, 2003), (Sekaran & Bougie, 2010). Hyphotetical test is done using the technique of Multivariate analysis, namely *Structural Equation Modelling* (SEM) with Lisrel 8.8 software (Wijanto S.H., 2008). In addition, all the measured variables use interval scale. SEM can determine the strength of individual relationship, *model's goodness test of fit* and *various hypothesized paths*.

Instrument Quality Test

Table 4.2. Result of Instrument Reliability Test

Reliability Statistics

Variable	Item Valid	*Cronbach's Alpha*	*Cut_Off*	Decision
Information Technology Application (ITA)	9	0.809	0.70	Reliable
Port Supply Chain Integration (PSCI)	22	0.918	0.70	Reliable
Customer Relation Management (CRM)	18	0.941	0.70	Reliable
Port Service Quality (PSQ)	19	0.963	0.70	Reliable
Container Port Performance (CPP)	20	0.942	0.70	Reliable

Source: data processed

Table 4.2. shows that 9 items of *Information Technology Application (ITA)* variable have coefficient value of *Cronbach's Alpha* 0.809 > 0.70, 22 items of *Port Supply Chain Integration (PSCI)* variable have coefficient value of *Cronbach's Alpha* 0.918 > 0.70, 18 items of *Customer Relation Management (CRM)* variable have coefficient value of *Cronbach's Alpha* 0.941 > 0.70, 19 items of *Port Service Quality (PSQ)* have coefficient value of *Cronbach's Alpha* 0.963 > 0.70 and 20 items of *Container Port Performance (CPP)* have coefficient value of *Cronbach's Alpha* 0.942 > 0.70, thus, all of these are considered as reliable. Based on the result of validity test and reliability test above, it can be concluded that the instrument is feasible for use to drag or collect research data.

The evaluation on the conformity of all models is indicated by *Goodness of fit Index* (GOFI) from the result of measurement model processing in Table 4.3. as follows:

Table 4.3. *Goodness of Fit Index 1st Order IT Application*

GoFI Statistics	Result from Model	Criteria
χ^2/df (P)	39.66/20 (0.0055)	Bad fit
GFI ; AGFI	0.96 ; 0.91	Good fit
CFI; IFI	0.98; 0.98	Good fit
RMSEA	0.068	Good fit
NFI; RFI;	0.97; 0.94	Good fit

Source: Data processed using Lisrel 8.8

V. Results

5.1. Structural Model Test

The summary of evaluation on the *goodness of fit* value of structural model is presented in the following table:

Table: 5.1. Goodness of fit Index Full Model

GoFI Statistics	Result of Model	Criteria
χ^2/df (P)	303.74 /132 (0.000)	*bad fit*
GFI ; AGFI	0.89 ; 0.88	*marginal fit*
CFI; IFI	0.98; 0.98	*good fit*
RMSEA	0.078	*good fit*
NFI; RFI	0.96; 0.95	*good fit*

Source: data processed from Lisrel 8.8

Table 5.1 shows the objective estimation that all parameters of model compatibility fulfill the requirements of *goodness of fit* except *Chi-square* in *bad fit*.

5.2. Full Model Path Analysis

Full model path analysis uses *Latent Variable Score* (LVS). From the result of model test above, it is found a model based on parameter estimation (coefficient), the model which can explain the structural model relationship which can explain the structural model relationship. Latent variable score is a combination of scores in each dimensions in the factor analysis level two (*second order confirmatory*). The process of combining score uses the facilities SIMPLIS in *software* LISREL v 8.80.

Based on the result of model estimation, a *Structural Equations Model*, with *standard error estimated* (se) and *t-value*, is for variables on report as follows:

PSQ = – 0.02*ITA + 0.15*PSCI + 0.70*CRM, *Errorvar*= **0.37 , R^2 = 0.63**

(0.10) (0.090) (0.13) (0.0095)

-0.24 1.97 6.32 8.05

CPP = 0.98*PSQ + 0.65*ITA – 0.07*PSCI – 0.56*CRM, *Errorvar*= **0.05, R^2 = 0.95**

(0.075) (0.089) (0.068) (0.11)

13.15 8.29 -1.21 -5.66

The above *full model* structural equation shows that the variable of *Customer Relationship Management (CRM)* most dominantly influences *Port Service Quality (PSQ)* with path coefficient 0.81, and *Port Service Quality (PSQ) dominantly* influences *Container Port Performance (CPP)* with path coefficient 0.99, whereas *IT Application* (ITA) unsignificantly influences *Port Service Quality (PSQ)* and *Port Supply Chain Integration* (PSCI) unsignificantly influences *Container Port Performance (CPP)*.

5.3. Partial Significance Test (Statistical test-t)

In the equation, the path coefficient is found having a positive mark showing the existence of positive influence of independent variable on dependent variable, whereas path coefficient has negative mark showing the existence of negative influence of independent variable on dependent variable. Hypothetical test is carried out through significance test on the path coefficient with T test at *alpha* α = 5%.

Table: 5.2. Result of Partial Hypothetical Test (t test)

Correlation	Path coefficient (γ)	t_{table}	t_{cal}	Decision
H1: ITA → PSQ	-0.02	1.97	-0.24	$\|t_{cal}\| < t_{table}$; **Not significant**

				H1 is rejected
H2: PSCI → PSQ	0.15	1.97	1.97	$t\text{-}_{cal} = t\text{-}_{table}$; **H2 is accepted**
H3: CRM → PSQ	0.70	1.97	6.32	$t\text{-}_{cal} > t\text{-}_{table}$; **H3 is accepted**
H5: ITA → CPP	0.65	1.97	8.29	$t\text{-}_{cal} > t\text{-}_{table}$; **H5 is accepted**
H6: PSCI → CPP	-0.07	1.97	-1.21	$\|t\text{-}_{cal}\| < t\text{-}_{table}$; **Not significant H6 is rejected**
H7: CRM → CPP	-0.56	1.97	-5.66	$\|t\text{-}_{cal}\| > t\text{-}_{table}$; **H7 is accepted**
H8: PSQ → CPP	0.98	1.97	13.15	$t\text{-}_{cal} > t\text{-}_{table}$; **H8 is accepted**

Source: LISREL Output processed

Table 5.2. shows the significance of partial test result. If the statistic value of $|t\text{-}_{cal}| > t\text{-}_{table}$ shows the existence of significant influence, then the statistic value of $|t\text{-}_{cal}| < t\text{-}_{table}$ shows the existence of unsignificant influence.

The hypotetical test reflecting the causal relationship in SEM model is basically examining the significance of path coefficient or Beta coefficient, so Ho is rejected if $t\_{cal} > t\text{-}_{table}$ =1.97 at α=5% and df: n-k-1=198 -3-1=194 or $t\_{cal} > t\text{-}_{table}$ = 1.97 at α=5% and df: n-k-1=198-4-1=193 meaning significant influence and the research hypothesis (alternative hypothesis) is proven.

5.3. Simultaneous Significance Test (F Statistic Test)

Simultaneous significance test is carried out to examine the influence of *IT Application*, *Port Supply Chain Integration*, and *Customer Relationship Management* simultaneously on *Port Service Quality.*

The summarized result is presented in the following table:

H4: There is an influence of *IT Application*, *Port Supply Chain Integration*, and *Customer Relationship Management* simultaneously on *Port Service Quality.*

Table : 5.3 Test Result of Substructure-1 Influence on PSQ

Exogenous Latent Variable	Coefficient of Determination (R^2)	$F\text{-}_{table}$	$F\text{-}_{cal}$	Decision
ITA , PSCI and *CRM* (simultaneously)	0.63	2.65	110.1081	$F\text{-}_{cal} > F\text{-}_{table}$. Ho is rejected. H4 is accepted

Note: F-table = 2.65 at α=5% and df: db1:k=3 ; db2:n-k-1=198-3-1=194

Source: Data processed by the researcher

Table 5.3 shows the influence of *IT Application, Customer Relationship Management,* and *Port Supply Chain Integration* simultaneously on *Port Service Quality* with the value of $F\text{-}_{cal}$ 110,1081> $F\text{-}_{table}$=2,65; this means the influence of *IT Application, Customer Relationship Management,* and *Port Supply Chain Integration* simultaneously on *Port Service Quality* is significant with coefficient of determination 63%. Thus, **H4 is accepted** or proven.

H9: There is an influence of *IT Application*, *Port Supply Chain Integration*, *Customer Relationship Management* and *Port Service Quality* simultaneously on *Container Port Performance.*

Table : 5.4 Test Result of Substructure-2 Influence on CPP

Exogenous Latent Variable	Coefficient of Determination (R^2)	$F\text{-}_{table}$	$F\text{-}_{cal}$	Decision
ITA, PSCI, CRM dan PSQ (simultaneously)	0,95	2,42	916,75	$F\text{-}_{cal} > F\text{-}_{table}$. Ho is rejected. H9 is accepted

Note: F-table = 2.42 at α=5% and df: db1:k=4 ; db2:n-k-1=198-4-1=193

Source: Data processed by the researcher

Table 5.4 shows the influence of *IT Application, Customer Relationship Management, Port Supply Chain Integration* and *Port Service Quality* simultaneously on *Container Port Performance* with the value of F_{cal} 916.75 > F_{table}=2.42; this means the influence of *IT Application, Customer Relationship Management, Port Supply Chain Integration* and *Port Service Quality* simultaneously on *Container Port Performance* is significant with coefficient of determination 99%. Thus, **H9 is accepted** or proven.

VI. Discussion

6.1. Analysis of Direct Influence and Indirect Influence

The steps of examining the mediating variable by calculating the value of direct influence and indirect influence as well as the value of significance probability are as follows:

1). Analysis of ITA's influence on CPP with mediating variable of PSQ.

The direct influence of ITA on CPP is positive as much as 0.65 and significant. The indirect influence of ITA on CPP through PSQ is negative as much as (-0.02 x 0.98) = -0.0196 and Not Significant. Based on the result of analysis, *Port Service Quality* (PSQ) is not the mediator for the influence of *IT Application* (ITA) on *Container Port Performance* (CPP) although direct influence > indirect influence. Based on the result of analysis, *Port Service Quality* (PSQ) is not the mediator for the influence of *IT Application* (ITA) on *Container Port Performance* (CPP) although direct influence > indirect influence.

2). Analysis of PSCI's influence on CPP with mediating variable of PSQ

The direct influence of PSCI on CPP is negative as much as -0.07 and not significant. The indirect influence of PSCI on CPP through PSQ is positive as much as (0.15 x 0.98) = 0.147 and significant. The total influence of PSCI on CPP is (-0.07 + 0.147) = 0.077. Based on the result of analysis, *Port Service Quality* (PSQ) is the *Full Mediator* for the influence of *Port Supply Chain Integration (PSCI)* on *Container Port Performance* (CPP) ehere direct influence < indirect influence, so the role of *Port Service Quality* as mediating variable increases the influence of *Port Supply Chain Integration* on *Container Port Performance.*

3). Analysis of CRM's influence on CPP with mediating variable of PSQ

The direct influence of CRM on CPP is negative as much as -0.56 and significant. The indirect influence of CRM on CPP through PSQ is positive as much as (0.70 x 0.98) = 0.686 and significant. The total influence of CRM on CPP is (-0.56 + 0.686) = 0.126. Based on the result of analysis, *Port Service Quality* (PSQ) is the partial mediator for the influence of *Customer Relationship Management* (CRM) on *Container Port Performance* (CPP) where direct influence < indirect influence, so the role of *Port Service Quality* (PSQ) as mediating variable increases the influence of *Customer Relationship Management* on *Container Port Performance.*

6.2. Discussion on the Result of Research

Hypothesis 1: The result of the first hypothetical test (H1) is not proven (is rejected) shown by *IT Application* having negative and not significant influence on *Port Service Quality.* This indicates that the relationship of port information technology implementation does not support directly the port service quality improvement. Oerall, based on the *full model* analysis, the dominant dimension of *IT Application* is *Web Site Service (WSS).*

Hypothesis 2: Hypothetical test H2 shows that *Port Supply Chain Integration (PSCI)* has a positive and significant influence on *Port Service Quality.* This indicates that the relationship of port supply chain integration really and directly supports the improvement of port service quality. Overall, based on the *full model* analysis, the dominant dimension of *Port Supply Chain Integration* is *Information and Communication Systems (ICS).*

Hypothesis 3: Hypothetical test H3 shows that *Customer Relation Management* has a positive and significant influence on *Port Service Quality.* This indicates that the relationship with customers in the container terminal really and directly supports the improvement of port service quality. Overall, based on *full model* analysis, the dominant dimension of *Customer Relation Management* is *Key Customer Focus (KCF).*

Hypothesis 4: Hypothetical test H4 shows that *IT Application, Customer Relationship Management,* and *Port Supply Chain Integration* simultaneously have a significant influence on *Port Service Quality*. This means the influence of *IT Application, Customer Relationship Management,* and *Port Supply Chain Integration* are simultaneously able to improve the *Port Service Quality* significantly.

Hypothesis 5: Hypothetical test H5 shows that *IT Application* has a positive and significant influence on *Container Port Performance.* This means that the implementation of *IT Application* really supports the improvement of *Container Port Performance.* The dominant dimension of CPP variable is *Effective Service Quality.*

Hypothesis 6: Hypothetical test H6 shows that *Port Supply Chain Integration* has a negative and not significant influence on *Container Port Performance.* This indicates that port supply chain integration at container terminal really does not support diretly the improvement of container port performance.

Hypothesis 7: Hypothetical test H7 shows that *Customer Relation Management* has a negative and significant influence on *Container Port Performance*. This indicates that *Customer Relation Management* really supports *Container Port Performance* but with negative influence.
Hypothesis 8: Hypothetical test H8 shows that *Port Service Quality* has a positive and significant influence on *Container Port Performance.* This indicates that port service quality really supports the achievement of container port performance. Overall, based on *full model* analisis, the dominant dimension of *Port Service Quality* is *Tangible (TAN).*
Hypothesis 9: Hypothetical test H9 shows that *IT Application, Customer Relationship Management, Port Supply Chain Integration* and *Port Service Quality* simultaneously influence *Container Port Performance*. This means the influence of *IT Application, Customer Relationship Management, Port Supply Chain Integration* and *Port Service Quality* simultaneously and significantly influence *Container Port Performance.*

VII. Conclusion and Limitations

IT Application has a negative and not significant influence on *Port Service Quality.* This result shows that better *IT Application* formed by *Web Site Service* (WSS) and *Technology Adoption* (TAD) has not really improved *Port Service Quality.* This proves that the influence of *IT application* on *port service quality* in the previous research by (Hsu, 2013) in fact did not significantly influence. The result of this research shows that the implementation of IT in container terminal port has not been able to improve the service quality of container terminal port.

Port Supply Chain Integration has a positive and significant influence on *Port Service Quality.* This shows that *Port Supply Chain Integration* as the integration of various elements such as *Information And Communication Systems, Value Added Services, Multimodal Systems And Operation* and *Supply Chain Integration Practices*, really improves *Port Service Quality*. It proves that the previous research explained by (Tseng et.al, 2015) is proven to have significant influence. The result of this research shows that the support of port supply chain management integration at container terminal is not separable from the manufacturing industry (factory), supplier, logistic service, service operation, shipping companies, ship cargo expedition companies, and terminal operator.

Customer Relation Management has a positive and significant influence on *Port Service Quality.* The result of this research shows that *Customer Relation Management* which consists of *Key Customer Focus, Customer Relation Organization, Technology* and *Knowledge Management* really improve *Port Service Quality.* It proves that the previous research explained by (Sin et al., 2005) and (Hsu, 2013) stating that CRM has relationship with port service quality is significantly proven. The result of this research shows that the good relationship with customers is able to influence significantly the service quality of container terminal port, where the port management should be able to maintain good relationship with customers so that the port service quality will be better.

IT Application, Port Supply Chain Integration and *Customer Relationship Management* simultaneously have a positive and significant influence on *Port Service Quality*. The result of this research proves that the previous research explained by (K. Bichou & Gray, 2005) stating that seaport activities are very complex and dynamic. It shows that *IT Application, Port Supply Chain Integration and Customer Relationship Management* have roles that can significantly improve Port Service Qulity simultaneously.

IT Application has a positive and significant influence on *Container Port Performance*. The roles of *Web Site Service* and *Technology Adoption* can really improve *Container Port Performance*. As explained in the previous research by (Woo et al., 2013), container port is inseparable from supply chain management.

Port Supply Chain Integration has a negative and not significant influence on *Container Port Performance.* This finding states that *Port Supply Chain Integration* has not really been able to improve *Container Port Performance.* Between port supply chain integration and container port performance there has not really been a synchronization each other. It supports the researches done by (Panayides & Song, 2008), (Woo et al., 2013) and Tseng *et al.* (2015) proving that the implmentation of PSCI has not been able to infuence CPP significantly.

Customer Relation Management has a negative and significant influence on *Container Port Performance.* This finding needs to be studied further. The previous researches by (K. Bichou & Gray, 2005), (Khalid Bichou, 2006) explain that container port is very complex and dynamic. The researches by (Panayides & Song, 2008), (Woo et al., 2013) and Tseng *et. al* (2015) state that the relationship with customers can influence port performance positively and significantly, in fact in this research it influences negatively and siginificantly. This finding shows that the better customer relationship (CRM), where the container port performance (CPP) to be proxied is dwell time of port service, the more barriers in the process of goods in/out in the terminal will be reduced, vice versa.

Port Service Quality has a positive and significant influence on *Container Port Performance.* This result supports the researches done by (Hsu, 2013) and (Woo et al., 2013) stating that service quality should pay

attention to the aspects of customer satisfaction and container port operation, so that it will significantly improve port performance. It is the same as what (Pantouvakis, 2014) states that service quality which is market oriented has a strong relationship in improving company performance.

IT Application, Port Supply Chain Integration, Customer Relationship Management and *Port Service Quality* simultaneously influence significantly *Container Port Performance* (Hsu, 2013; Lirn, Jim Wu, & Chen, 2013; Thai, 2008; G. Yeo, Ng, Lee, & Yang, 2013). As a consequence, the effort to improve port performance must pay attention to many aspects, where the main aspects are information technology development, port supply chain integration, good relationship among stakeholders, and standardized service quality.

The limitation of this research is that the study is done in the major container terminal ports in Indonesia, namely Tanjung Priok Jakarta and Tanjung Perak Surbaya as the two major and biggest ports. A more extensive study needs to be done in other areas which have different characteristics, such as ports of Belawan, Makassar, Tanjung Emas Semarang, and so on. Thus, it still needs to involve more research subjects in further studies. The study uses 3 (three) exogenous variables, namely IT Aplication, Port Supply Chain Integration, and Customer Relationship Management, so further studies need to pay attention to other variables especially the aspect of public policy and the competence of human resources in the scope of sea transport service management, supply chain and logistics (port and shipping). It needs to involve more respondents in further studies in the level of decision makers.

VIII. Implication and Recomendation

The measure taken by the government to open the portasl of INSW and INAPORTNET is a right and strategic effort aimed at improving the service quality of container terminal port. However, it is not enough. It still needs a concrete measure in the form of strengthening an integrated information system by the government to all the service stakeholders in the port. So, this study supports the government policy, in this case the Regulation of The Minister of Transportation of the Republic of Indonesia number 157 year 2015 concerning INAPORTNET for determining the procedures of ship and goods service in the port especially container terminal port.

Effective and efficient container terminal port supply chain integration has proven, although not directly, to give impacts on the improvement of port service quality. So, it must be able to become a standard how port service quality is delivered to customers. It is necessary for the government to evaluate how the policy on the pettern of port service supply chain integration which is very complex can improve service quality and port performance.

The relationship among users of seaport service has been studied continuously as a part of improving port service quality and port performance in Indonesia. The involvement of many parties with the same interests in the port services has been paid special attention by the government in improving port service quality and port performance. The success in achieving standard container terminal port performance is not only determined by one party but many parties, namely the users of port services. Therefore, the government needs to pay attention again to the policy on port performance, by paying attention to the fast changing industrial environment in accordance with the customer demand, involving so many characteristics of port services (Tseng et al., 2015) and (Sudarmo, 2016) .

Port service quality has a very important role in the improvement of container terminal port performance, both directly and as mediator. Stakeholders of port management and users must have a same perception in determining the standard of port service quality by seriously paying attention to the criteria for determining the standard of servicing (Woo et al., 2013).

The government needs to continuously study the policies of the regulatory function and operator function which is still overlap, one of them is strengthening the function of port authority which now faces the challenge of bureaucratic reform (Sudarmo, 2016).

Port performance becomes an issue which is much paid attention by the government today where port performance, especially container terminal port as the economic gate, is still considered as not satisfying, due to the low port performance proxied with the high dwell time of ship and goods service in the port.

The government has issued packet of economic policy XI, that is Risk Control to Accelerate the Flow of Goods in the Port (*Indonesia Single Risk Management* - ISRM) which aims to improve port performance (reduce dwell time). The result of this research states that the research variables of IT application, port supply chain integration, port CRM, and Port Service Quality simultaneously can improve the service performance of container terminal port, so those variables are expected to be recommended to the government in the establishment of ISRM policies. Subsequently, it needs further studies on risk control to accelerate the flow of goods in the port.

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