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# THE INFLUENCE OF SHIP SERVICE QUALITY AND LOADING-UNLOADING PRODUCTIVITY ON PORT PERFORMANCE AND ITS IMPLICATIONS FOR CUSTOMER SATISFACTION

(Study on Cigading II Terminal)

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***Abstract:*** This research aims to know the direct and indirect influences of Service Quality (X1) and Loading-Unloading Productivity (X2) on Port Performance (Y), and its implications for Satisfaction (Z). It was conducted at Cigading II Terminal, operated by PT Krakatau Bandar Samudera, using descriptive and inferential methods. The population comprises 62 respondents. The sampling uses non-probability sampling technique which does not give the same opportunity to each population member to be the sample. Data was collected by using questionnaire with likert measurement scale model. The result was analyzed using SmartPLS software with the significance α=0.05. The hypothetical testing indicates a positive and significant direct influence of ship service quality on port performance; a positive and significant direct influence of ship service quality on satisfaction; a positive and significant influence of loading-unloading productivity on port performance; no positive and significant influence of loading-unloading productivity on satisfaction; a positive and significant influence of port performance on satisfaction. The hypothetical testing of indirect specific effect shows a positive and significant influence of ship service quality on satisfaction mediated by port performance, a positive and significant influence of loading-unloading productivity on satisfaction mediated by port performance.

***Key Words: Service quality, productivity, port performance, satisfaction***

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## INTRODUCTION

Indonesia is a maritime country having 17,508 islands stretching from Sabang to Merauke. The distance among the islands surely makes it need connectivity to support the stability of national economy evenly. The connectivity between islands in Indonesia is supported among others by the existence of ports. According to Law of the Republic of Indonesia No 17 of 2008 on Shipping, Port is a place that consists of land and/or water with certain limits as the place for governmental and exploitation activities used for ship's berthing, passengers up and down, and/or loading-unloading of goods, such as terminals and berths equipped with the shipping safety and security facilities and port supporting activities as well as for the movement of intra-and-inter-mode transportation. Port has important roles to establish a stong maritime territory to stimulate the economic growth, such as industry, trade, tourism and facility to boost the increase of national income and to become the meeting point between transportation modes and the link of socio-economic interactions between islands/countries.

To support the growth of industries in Indonesia, a port holds important roles in the smoothness of goods in-flow (import) and goods out-flow (export) in accordance with the international standards and regulations. A port has four functions, namely as the Interface (meeting point) between two main transportation modes, both land and sea, to perform loading-unloading activities from ship to truck/train and vice versa; as the Gateway of a country, as an Industrial Entity which means that a port will facilitate industries in sending their products and in bringing in raw materials, and as a link in the transportation chain

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because some transportation modes meet and work at a port.

PT Krakatau Bandar Samudera is a company with the business orientation to port and logistic services. In 2011 PT Krakatau Steel through its subsidiary, PT Krakatau Bandar Samudera, built facilities and infrastructures dedicated to serve PT Krakatau POSCO in order to fulfill the need for the raw materials of steel production through Cigading II terminal equipped with two wharves at the capacity of 200,000 DWT and 12,000 DWT. The total steel raw materials unloading per year is as follows:

Table 1

| Tonnage 2018 - 2020 Cigading II | | |
|---|---|---|
| 2018 | 2019 | 2020 |
| 7,222,113 | 7,219,061 | 8,000,364 |

Source: Primary Data

The target in the unloading performance, types of cargo and ship's specifications to be served by the port operator to fulfill the steel factory's need is as mentioned in the table below:

**Table 2**

| Cargo/Goods | Vessel Requirements | | Minimum Discharging Rate (unloading) |
|---|---|---|---|
| | Type of Ship | Type of hatch | |
| Iron ore (pellet, Pellet Feed, Pellet Form, Lump Ore, run of Lime | Panamax (max Breadth 35 m), Capesize (max breadth 42 m) Handy max barge | Side sliding opening | SU & BC 36,000 tons per day (speed 2.25 m/s) HE 6,000-8,000 tons per day |
| Iron ore Fines | Panamax (max Breadth 35 m), Capesize (max breadth 42 m) Handy max barge | Side sliding opening | SU & BC 36,000 tons per day (speed 2.25 m/s) HE 6,000-8,000 tons per day |
| Cooking Coal, Non cooking coal, coal fine, lump, coke form, anthracite | Panamax Cape size handymax barge | Side sliding opening | SU & BC 23,000 tons/day (speed 4.5 m/s) HE 6,000 tons/day |
| Dolomite, Limestone, Manganese | Handymax Handysize Barge | Side sliding opening | SU & BC 30,000 tons/day (speed 4.5 m/s) HE 6,000 tons/day |

Source: Primary Data

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All the company's operational activities will ultimately be addressed to customer satisfaction value where the customer is the main focus of the company, and in this case is not only the satisfaction level of PT Krakatau POSCO but also all the companies having relationship and interaction with port services or operational performance at Cigading II terminal such as shipping agents, ship's crew, cargo owners represented by Raw Material Handling and Procurement Section of PT Krakatau POSCO. The quality of services being offered becomes a tool to achieve the company's competitive advantage. The improved quality of service will generate customer loyalty and make the service company better and more reliable.

The research is conducted on this port service company in its efforts to enhance the customer satisfaction by relying on the ship service quality, loading-unloading productivity, and port performance to meet the performance target mutually agreed.

## LITERATURE REVIEW

### Satisfaction

*"Satisfaction is a person's fellings of pleasure or disappointment that result from comparing a product or service's perceived performance (or outcome) to expectations"* Kotler & Keller (2016:153).

The indicators used in this research refer to (**duc nha le, horg thi nguyen, phuc Hoang truong, 2019) where there are 4 indicators,** namely *satisfaction when using services provided by cat lai port, organized and managed to provide services, satisfied with services provided and satisfied with cargo management procedure***.**

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## Port Performance

Lasse (2016:188): port performance indicators are the parameters/measurements of achieving the set target where port performance is divided into four categories, namely Service, Output, Utility, and Cost per handled ton of goods. The dimension of service is closely related to the length of ship service at the port, the dimension of output is the ratio of output to input (production) in a certain period where productivity means the comparison between output and input in the form of quantity or quality in performing the work. The dimension of utility measures how far the wharf facilities and supporting facilities are utilized effectively. And the dimension of cost per handled ton of goods is the cost of transporting the goods from the sender. The performance of port services is the customer's assessment on the reliability and superiority of the whole services, and port performance can affect customer satisfaction (Suryani, 2019). The indicators used in this research refer to Prakasa Eko Wibowo, 2015.

## Productivity

Productivity, in the context of forecasts for preparing port facility expansion plans, is "the total of Tons/Gang/Hour or *the number of tons each gang, crane, shipunloader, pump, etc., handled when it works for one hour without intruption"* (UNCTAD, 1978:48). With such a definition it is stated that the total of tons of goods served is determined by the strength of the gang including the mechanic/non-mechanic equipment used and the effective time with no operation stop called Idle Time. Loading-unloading productivity is the total of tons of goods unloaded/loaded in one hour work by each gang (group) of workers. The indicators used in this research refer to Frilia Esti Anggraeni, 2015.

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**Service Quality**

For service companies, service plays important roles to survive in the competitive era and to generate image in the consumer's mind. It cannot be denied that service is the central element to invite consumers to use the product and services offered by the company and becomes the trigger of positive reaction from market.

Kotler, 2016: Service is any action or activity that can be offered by a party to another, which is basically intangible and cause no ownership.

Parasuraman,2013: Service quality is how far the difference between the reality and customer expectation on the service they obtain or receive. Parasuraman (2011) mentions 5 basic dimensions of service quality, namely: (a) Reliability, (b) Responsiveness, (c) Assurance, (d) Emphaty, (e) Tangible. The indicators used in this research refer to Nunuk Widyawati Kusuma, 2015.

The measurement of the port performance of Cigading II terminal which is built and managed by PT Krakatau Bandar Samudera to meet the target is conducted by comparing SLA (Standard Level Agreement) or PFSA (Port Facility Sharing Agrement) contract and the implementation in the field. According to Lasse (2016:188), the indicator of port performance is the parameter/measurement of achieving the set target where the port performance is divided into 4 categories, namely Service, Output, Utility and Cost per handled ton of goods. The dimension of service is closely related to the length of ship service at the port. The dimension of productivity is the ratio of output to input, that is production in a certain period where productivity means the comparison between the output and input in the form of quantity or quality in performing the work. The dimension of utility measures how far the wharf facilities and supporting facilities are utilized effectively. And the

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dimension of cost per handled ton ton of goods is the cost of transporting the goods from the sender. The performance of port services is the customer's assessment on the reliability and superiority of the whole services, and port performance can affect customer satisfaction (Suryani, 2019).

Today, however, the performance as targeted has not been optimal since there are still obstacles in the service process, namely the delay in the ship service due to several factors as mentioned in the journal of marine service division in 2020:

Table 3
Data of Guide Services & Delays

| Ships Services delay (Hours) | | |
|---|---|---|
| Berthing | Unberthing | Shifting |
| 66,63 | 63,11 | 25,66 |

The ship service at Cigading port has an impact on the ship service at Cigading II terminal, causing delays in the berthing process. Limited facilities and infrastructures and unconducive geographical condition at the port will lower the port performance so that the service is not maximal. Such a condition will cause a problem, namely the high waiting time at the port especially at busy times (Wibowo, 2010).

Likewise in the unloading target, there are delays so that the unloading productivity does not achieve the target per ship, as mentioned in the following table:

Table 5
Data of Unloading Delays

| Ship Unloading delay | | |
|---|---|---|
| 2018 | 2019 | 2020 |
| 10 ships | 26 ships | 21 ships |

The loading-unloading productivity to result in maximal unloading output affects the unloading performance at the port (Frilia, 2020). The smoothness of cargo and ship unloading at the port cannot be separated from the smooth movement of main equipment that unload

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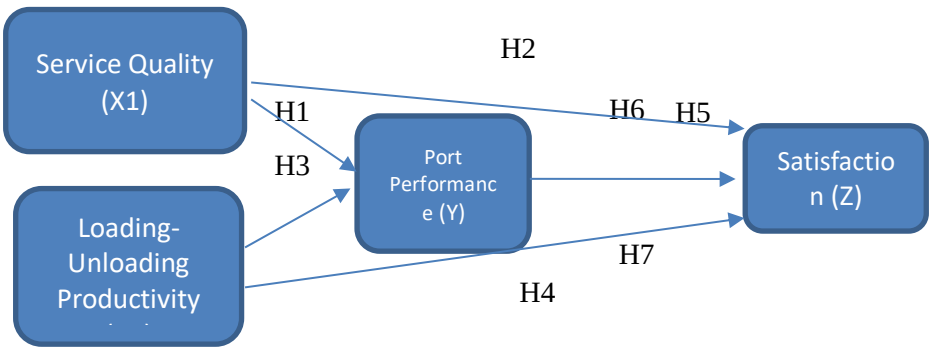
the goods/cargo. The loading-unloading productivity is influenced by several aspects such as the packaging of the goods loaded and unloaded, the skill of manpower, the readiness of loading-unloading. The loading-unloading productivity can lower the ship Turn Around Time at the port (Fitri, 2014).

Thus, for the success of supplying the raw materials of steel, the quality of ship service becomes an important thing to be maximally prepared and fulfilled. Likewise in the productivity of cargo/goods unloading, if one of the unloading facilities is broken, this will disrupt the unloading activity causing losses that affect the speed of loading-unloading and the targeted unloading productivity will not be achieved. Port congestion will happen if the port operation does not run as planned, making ships queues.

The above description or phenomena inspires and motivates the researchers to fulfill the customer need in the effort to enhance the their satisfaction by relying on the ship service quality, loading-unloading productivity, and port performance.

Figure 1
Research Conceptual Framework



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## B. Research Method

The method used in this research is quantitative method and the data resulted from the research is analyzed using SmartPLS Software with the degree of significance at $\alpha = 0.05$. Meanwhile the sampling technique used here is Non-Probability sampling where it does not give the same chance or opportunity to each element or member of the population to be the sample. In this research, the population is all the service users at Cigading II terminal (Agents, Ship's Crew, Raw Material Handling team of PT KP and Procurement of PT. KP). The testing is analyzed using Partial Least Square (PLS) method and assisted by software SmartPLS software. In the PLS there are 3 testings; 1) Outer Model testing, 2) Inner Model testing, and 3) Hypothetical testing.

## C. Results and Discussion

1. Outer Model
    - **Convergent validity** refers to the degree of conformity by seeing the item of indicator indicated by the value of loading factor**.** ***Loading factor*** is a figure indicating the correlation between the score of a question item and the score of construct indicator which measures the construct. After the data processing is conducted, the value of loading factor is still above 0.5 so the loading factor of each construct indicator is valid and significant. The next validity test is **discriminant validity**, that is referring to the degree of nonconformity of the attributes that should not be measured by seeing the ***Average Variant Extract*** above 0.5. In addition to using *convergent validity* and *discriminant validity* to measure outer model, it can also be conducted by seeing the reliability of the construct or variable measured. Reliability test in the PLS can use two methods,

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namely *cronbach's alpha* and *composite reliability*. *Cronbach's alph*a measures the lower limit of reliability value of a construct whereas composite reliability measures the real value of a construct's reliability value. Construct is stated as reliable if the value of composite reliability is 0.7. The resulted output of *composite reliability* value shows:

**Table 5**

| | Cronbach's Alpha | rho_A | Composite Reliability | Average Variance Extracted (AVE) |
|---|---|---|---|---|
| Port Performance | 0.936 | 0.936 | 0.946 | 0.637 |
| Productivity | 0.938 | 0.943 | 0.945 | 0.535 |
| Satisfaction | 0.763 | 0.767 | 0.849 | 0.585 |
| Servqual | 0.933 | 0.945 | 0.942 | 0.526 |

2. Inner Model

Inner model can be evaluated by seeing the score of r-Square (reliability of indicator) for dependent construct and the value of t statistic from path coefficient testing. The higher the value of square means the better the prediction model of the research model proposed. The value of path coefficient indicates the degree of significance in the hypothetical testing. The value of R square and path coefficient can be seen as follow:

| | R Square | R Square Adjusted |
|---|---|---|
| Port Performance | 0.757 | 0.749 |
| Satisfaction | 0.647 | 0.629 |

Source: Processed data (SmartPLS 3.0), 2021

The value of r-square indicates that service quality and productivity are able to explain the construct variability of Port Performance as many as 75.7% and the rest of 24.3% is explained by other constructs not studied in this research. Whereas port performance, service quality and productivity are able to explain the construct variability of satisfaction as many as 64.7% and the rest of 35.3% is explained by

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other constructs not studied in this research.

3. Hypotheses

Hypothetical testing is conducted based on the result of Inner Model (structural model) testing including R-square output, coefficient of parameter and t-statistic. To know whether a hypothesis is acceptable or rejected it can be done among others by regarding the value of inter-construct significance, t-statistic and p-values. Hypothetical testing of this research is conducted using the assistance of SmartPLS (Partial Least Square) 3.0 software. Those values can be seen from the result of bootstrapping calculation. The rules of thumb used in this research are that t-statistic >2.00 (N=62) at the degree of significance of p-value <0.05 (5%), and beta coefficient with positive value. The values of hypothetical testings in this research are shown below:

| | Original Sample (O) | Sample Mean (M) | Standard Deviation (STDEV) | T Statistics (\|O/STDEV\|) | P Values |
|---|---|---|---|---|---|
| Port Performance -> Satisfaction | 0.734 | 0.719 | 0.174 | 4.229 | 0.000 |
| Productivity -> Port Performance | 0.581 | 0.580 | 0.117 | 4.972 | 0.000 |
| Productivity -> Satisfaction | -0.258 | -0.271 | 0.218 | 1.183 | 0.237 |
| Servqual -> Port Performance | 0.303 | 0.312 | 0.121 | 2.500 | 0.013 |
| Servqual -> Satisfaction | 0.951 | 0.979 | 0.188 | 5.059 | 0.000 |

Source: Processed data (SmartPLS 3.0), 2021

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**Picture 1**

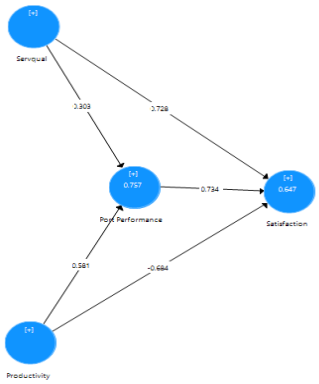


**Figure 2. Path Coefficient**

**Picture 2**

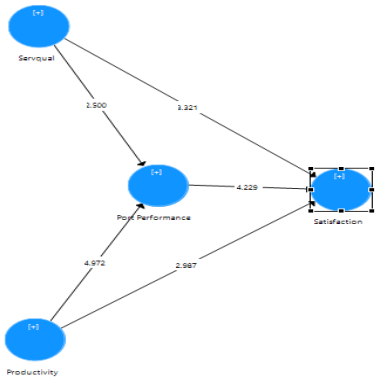


**Figure 3. Path Coefficient**

**Source: Processed Data (SmartPLS 3.0), 2021**

Meanings of the table:

1) Service quality proves to positively affect port performance based on the score of T-Statistic 2.500 bigger than 2.000 and P-Value 0.013 smaller than 0.05.
2) Ship Service quality proves to affect satisfaction based on the score of T-Statistic 5.059 bigger than 2.000 and P-Value 0.000 smaller than 0.05.
3) Productivity proves to positively affect port performance based on the score of T-Statistic 4.972 bigger than 2.000 and P-Value 0.000 smaller than 0.05.
4) Productivity proves not to positively and significantly affect satisfaction based on the score of T-Statistic 1.183 smaller than 2.000 and P-Value 0.234 bigger than 0.05.
5) Port performance proves to positively and significantly affect satisfaction based on the score of T-Statistic 4.229 bigger than 2.000 and P-Value smaller than 0.05.

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| | Original Sample (O) | Sample Mean (M) | Standard Deviation (STDEV) | T Statistics (\|O/STDEV\|) | P Values |
|---|---|---|---|---|---|
| Productivity -> Port Performance -> Satisfaction | 0.427 | 0.414 | 0.123 | 3.470 | 0.001 |
| Servqual -> Port Performance -> Satisfaction | 0.223 | 0.228 | 0.111 | 2.012 | 0.045 |

**Source: Processed Data (SmartPLS 3.0), 2021**

6) Ship service quality proves to directly affect port performance mediated by port performance based on the score of T-Statistic 2.012 and P-Value smaller than 0.05.
7) Productivity proves to indirectly affect satisfaction mediated by port performance based on the score of T-Statistic 3.412 and P-Value smaller than 0.05.

## D. Conclusion

Based on the hypothetical testings that have been conducted, it can be concluded that in partial there is a direct significant influence of ship service quality on port performance. The partial hypothetical testing indicates there is a direct significant influence of ship service quality on customer satisfaction. It also indicates there is an influence of loading-unloading productivity on port performance. The hypothetical testing on the direct influence indicates the influence of port performance on satisfaction whereas the partial hypothetical testing indicates no direct influence of productivity on customer satisfaction.

From the results of data analysis using SmartPLS Software there is an influence of loading-unloading productivity on satisfaction through the mediation of port performance. In line with the analysis above, port performance can become the mediator between loading-unloading productivity and satisfaction. Likewise, from the results of subsequent analysis the

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variable of port performance can become the mediator between ship service quality and customer satisfaction.

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