

## The Contribution of Service Performance and Information Technology on User Satisfaction at Tanjung Priok Port

Prasadja Ricardianto<sup>1</sup>, Dedeh Suryani<sup>2</sup>, Honny Fiva Akira Sembiring<sup>3</sup>, Erni Pratiwi Perwitasari<sup>4</sup>, Tri Mulyani Setyowati<sup>5</sup>, Sri Mulyono<sup>6</sup>, Devi Marlita<sup>7</sup>  
Institute of Transportation and Logistics Trisakti, Jakarta, Indonesia<sup>1,3,4,5,7</sup>  
Akademi Maritim Nusantara, Cilacap, Indonesia<sup>2</sup>  
Institut Daarul Qur'an, Jakarta, Indonesia<sup>6</sup>  
Correspondence email: ricardianto@gmail.com  
ORCID ID: 0000-0002-4742-5677

### ARTICLE INFORMATION

**Publication information**  
Research article

### ABSTRACT

### HOW TO CITE

Ricardianto, P., Suryani, D., Sembiring, H. F. A., Perwitasari, E. P., Setyowati, T. M., Mulyono, S., & Marlita, D. (2022). The contribution of service performance and information technology on user satisfaction at Tanjung Priok Port. *International Journal of Applied Business and International Management*, 7(2), 105-115.

**DOI:**  
<https://doi.org/10.32535/ijabim.v7i2.1373>

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Published by IJABIM

This research aims to determine and analyze the contribution of port service performance and information technology to user satisfaction at Tanjung Priok Port, Jakarta. Several problems regarding the condition of Tanjung Priok Port are related to difficulties port service users, limited port services, and limited application of Indonesia Port Net information technology for service users. This research applied a quantitative method with a path analysis model involving 62 companies as the sample. The findings indicate that port service performance has a direct positive and significant effect. Port service performance indirectly affects the satisfaction of port service users through the information technology of Indonesia Port Net.



**Keywords:** Information Technology, Indonesia Port Net, Indonesian Ports, Port Service Performance, User Satisfaction

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Received: 15 June 2022  
Accepted: 24 June 2022  
Published: 20 August 2022

## **INTRODUCTION**

Water transportation is one of the essential elements of international economic exchange. Most international trade uses it as the cheapest mode of transportation and is an indispensable factor in meeting the demand for goods and services (Nicolae, Bucur, & Cotorcea, 2018). The key for the government is to make port development the leading sector for national development where the infrastructure development in seaports becomes critical. Osman, Nurettin, and Demirban (2014) stated that global trade and business have rapidly changed, and the demand for container terminals is exceptionally high to meet the need for logistics in every region. As a gateway for national trade and the economy, the port has a significant role in economic development. Robinson (2002) underlined that public service providers have a critical role in economic development. This suggests that the performance of the ports needs to be optimized to support trade activities such as distribution and cargo consolidation. Ports are the essential chains of all domestic (Grewal & Levy, 2005; Panayides, 2006). The current era of globalization rapidly develops container ports for the needs of performance and user satisfaction (Sahin, Can, & Demirbas, 2014).

Several problems regarding Tanjung Priok Port, Indonesia, are related to difficulties port service users, including limited port service and application of Indonesia Port Net information technology for the users. The current economic globalization calls for continual seaport development to maintain business people's global presence. The recent challenge is container terminals' long dwelling time of six to seven days. In addition, infrastructure and access are the subsequent issues leading to the slow movement of cargo.

In practice, international trade activity has some obstacles both in export and import. One of the obstacles is dwelling time. Dwelling time at a port can mean the time needed to stack containers at the container yard in the port area, which is counted since the import cargo are unloaded from the vessel until they are brought out of the container yard. Therefore, any problem in the dwelling time component can potentially increase dwelling time at the port.

The rapid economic globalization changes require business people to keep up with existing developments to maintain their presence in the world. The challenge faced by container terminals in Tanjung Priok today is that containers have a long dwelling time of six to seven days. The dwelling time deals with the time needed to stack containers at the container yard in the port area, which is counted since the import cargo are unloaded from the vessel until they are brought out of the yard. In addition, infrastructure and access are the following issues that cause the slow movement of cargo.

## **LITERATURE REVIEW**

### **User Satisfaction**

Customer satisfaction deals with one's condition after comparing feelings with hopes (Kotler & Armstrong, 2018; Kotler & Keller, 2012; Oliver, 2010). Customer satisfaction is the result of consumers' responses based on the product or service features and specifications that have a level of consumer satisfaction. Customer satisfaction is customer response to the evolution of discrepancies/disconfirmations between previous expectations (or other performance norms) and the actual product performance after its use (Tjiptono, 2014). The dimensions of customer satisfaction consist of the suitability of expectations and the intention to give recommendations. Customer satisfaction is vital to producing business recommendations (Pandey et al., 2021). The service provided by the shipping service will lead to the fulfillment of customer satisfaction (Huang, 2010;

Basir, Modding, Kamase, & Hasan, 2015; Jones, Griffis, Schwieterman, & Daugherty, 2019). According to Bahadur, Aziz, and Zulfiqar (2018), customer satisfaction occupies a significant role. The satisfaction of port users is related to the performance of the container terminal through the levels of port efficiency, productivity, and activities (Caldeirinha, Felício, & Dionísio, 2013).

According to Yeo, Thai, and Roh (2015), the satisfaction of port users can be measured by the quality and quantity of services. Cho, Kim, and Hyun (2010) underlined a shift in cognitive service quality factors for customer satisfaction. Majid, Rahman, Thamrin, Adnyana, and Pahala (2019) explained that the customer satisfaction of Indonesia Port Net at Tanjung Priok Port Jakarta increases due to efficiency, trust, reliability, and the facilities that support the quality of e-government services. Chang and Thai (2016) and Setyawati and Assegaf (2015) found a direct positive contribution of port security quality to ship passenger's satisfaction. Based on the underlying theories and some research, it can be concluded that the satisfaction of port service users is the customers' response based on the maximization of service products.

### **Information Technology**

One of the goals of using the physical Internet is to overcome the inefficiency of the logistics chain, including underutilized transportation and distribution centers (Soedarno, Ranti, & Nugroho, 2020). Indonesia Port Net (Inaportnet) is one of the portals of Indonesia National Single Window (INSW), which also actualizes the National Logistic System that has global competitiveness (Majid, et al., 2019). Indonesia Port Net is an open and neutral electronic portal facilitating data and information exchange on port services. Inaportnet utilizes information and communication technology in the maritime domain conducted by the Ministry of Transportation (Mufidasari, Octavian, & Saragih, 2019). As an internet-based electronic portal, it integrates all the information systems for all stakeholders. An appropriate management system that processes information and communicates it to those who manage the port operation is crucial for efficient transportation (Kia, Shayan, & Ghotb, 2000).

The INSW and Indonesia Port Net are the instruments to integrate the information so that public users can access it easily through the Internet (public network). The Inaportnet is to improve the ship and cargo services to be fast, valid, transparent, and standardized to enhance the port's competitiveness at minimum costs. Aini, Sianturi, and Nofandi (2021) found that the use of Inaportnet is critical in ship docking services in terms of time, energy, and demurrage efficiency despite its system errors. The supply chain system could work efficiently, save costs, and facilitate the delivery process by using the most recent sophisticated information technology and technology system. This can avoid business risks and build better communication with the stakeholders.

Based on the underlying theories and some research, information technology is an the system that includes all instruments of keeping and processing operation systems and the application of various networks as well as database instruments to save important data.

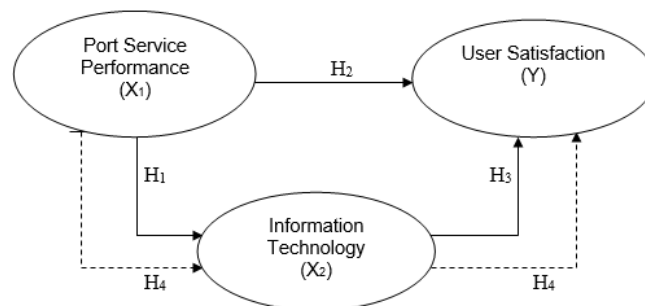
### **Port Service Performance**

Theoretically, performance refers to the achievement of quality objectives (Armstrong, 2010; Colquit, LePine, & Wesson, 2015). A group performing their job is expected to result in a measurable performance in service quantity, quality, and promptness (Schermerhorn, 2012). Felício, Caldeirinha, and Dionísio (2015) stated that performance measurement in ports with efficiency, activity, and customer satisfaction has five main characteristics that affect the performance of container terminals: regional and

continental location, sea and land access, maritime shipping services, port authority dynamism, and terminal organization and logistics integration. The framework and direct implementation at the port are the main parameters that port users consider when evaluating the components of port performance effectiveness (Vaggelas, 2019). Performance at the port can be double-checked through the technical efficiency and cost-effectiveness variables (Talley, 2006) in addition to factors of passenger satisfaction (Supriyatno & Widayanti, 2019) and the port marketing to provide customer satisfaction (Miremadi, Ghalamkari, & Sadeh, 2011). Port service performance is a comprehensive assessment by customers of the perceived services when receiving services from the service provider so that the service quality will be more appropriate and specific.

Based on the aforementioned discussion, below are our hypothesis and research framework (see Figure 1).

- H1: Port service performance contributes directly to information technology
- H2: Port service performance contributes directly to user satisfaction
- H3: Information technology contributes directly to user satisfaction
- H4: Port service performance dan information technology contributes indirectly to user satisfaction



**Figure 1.** Conceptual Framework of Research

## RESEARCH METHOD

This research applied a quantitative method with a path analysis model. The general population is all port service users at Tanjung Priok Port, whereas the target population is the companies of service users in container terminal operations. The research respondents are users in the container terminal, consisting of shipping lines, freight forwarders, and cargo ship expeditions. More than 166 port service users are established as a sample. This population number is obtained from shipping companies, freight forwarders or cargo owners, and marine freight forwarding. The sample was 62 companies of port service users. The statistical analysis was path analysis. In the path analysis, the contribution of independent variables to the dependent variable can be direct. The multiple regression analysis takes into account direct contribution. Hypothetical testing was performed using Sobel Test to determine the significance of indirect contribution.

## RESULTS

### **The Effect of Port Service Performance on Information Technology (Substructure 1)**

The result of the path analysis test on substructure 1 (X<sub>1</sub> on X<sub>2</sub>) is 0.729 and the residual coefficient of 0.469. The path diagram of substructure 1 is shown in Figure 2.

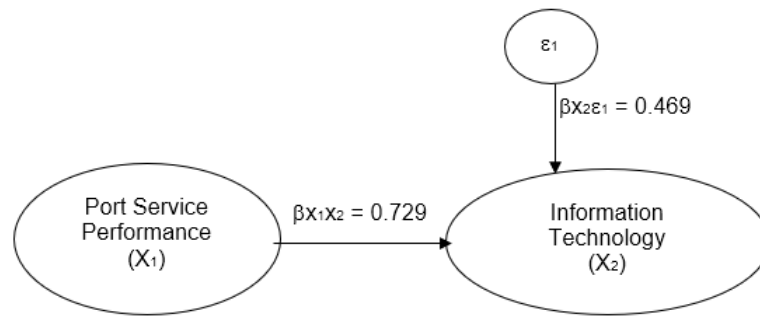


Figure 2. Substructure 1

**The Effect of Port Service Performance and Information Technology on User Satisfaction– Substructure 2**

The path diagram of port service performance and Information Technology to User Satisfaction is shown in Figure 3.

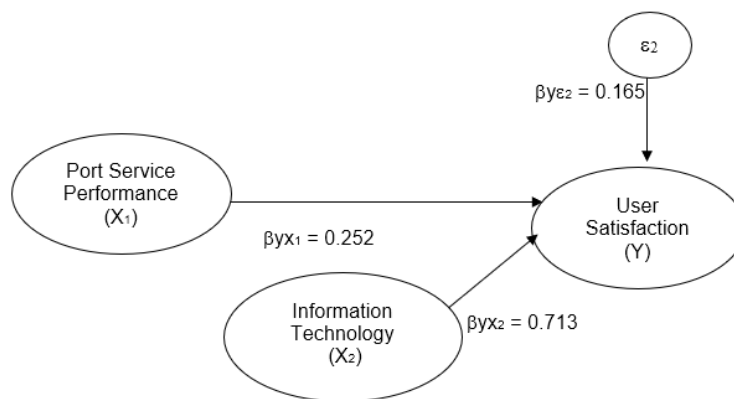


Figure 3. Substructure 2

Based on the path coefficient in substructure 1 and substructure 2, we depict the path analysis diagram of the contribution of port service performance to information technology and user satisfaction (see Figure 4).

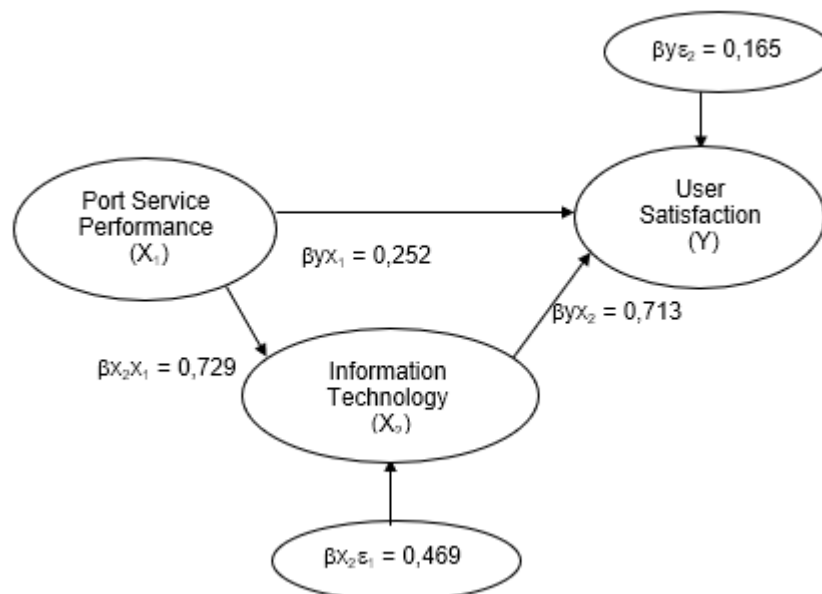


Figure 4. Combination of Substructure 1 and Substructure 2

Figure 4 illustrates the direct contribution, indirect contribution, and total contribution. The direct contribution comprises the contribution of port service performance to information technology of 72.9 percent, the contribution of port service performance to user satisfaction of 25.2 percent, and the contribution of information technology to user satisfaction of 71.3 percent (See Table 1). The Indirect contribution of port service performance to user satisfaction through information technology is 57.5 percent. Therefore, the total contribution is 1.249.

### Hypothetical Testing

**Table 1.** Research Result

Contribution	Contribution Percentage	Hypothesis	Results
The contribution of port service performance to information technology	72.9%	$t_{\text{statistic}} 8.245 > t_{\text{table}} 1.671$	Positive and Significant
The contribution of the port service performance to user satisfaction	25.2%	$t_{\text{statistic}} 3.260 > t_{\text{table}} 1.671$	Positive and Significant
The contribution of information technology to user satisfaction	71.3%	$t_{\text{statistic}} 9.224 > t_{\text{table}} 1.671$	Positive and Significant
The indirect contribution of service performance to user satisfaction through information technology	57.5%	$p\text{-value} = 0.000 < 0.05$	Positive and Significant

## DISCUSSION

The hypothetical testing was used to determine the significance of the independent variable's contribution to the dependent variable. The following discussion is based on the four hypotheses.

### **The Contribution of Port Service Performance to Information Technology (H1)**

Based on the calculation, the  $t_{\text{statistic}}$  value is 8.245, implying a significant direct contribution of port service performance to information technology. This suggests the better service performance, the better it improves information technology implementation of Indonesia Port Net. Based on Table 1, the contribution of port service performance to information technology is 25.2%, indicating that 25.2% of the information technology implementation is determined by port service performance.

The use of information technology in the digital era has proliferated based on usage intensity, usage frequency, and software. This is in line with Nurfina et al. (2016), Sitorus, Sitorus, and Ricardianto (2016) stating that port service performance affects Indonesia Port Net. The government can develop, monitor, and enforce laws for stakeholders. Anyadighibe and Awara (2014) underlined a significant relationship between operational automation and port performance and recommended operational automation adoption for performance improvement and port development. However, Sirajuddin, Zagloel, and Sunaryo (2019) stated that integrated information technology systems have no

significant impact on port performance. This highlights that service performance has become one of the dominant factors that contribute to information technology at Tanjung Priok Port, Jakarta.

### **The Contribution of Port Service Performance to User Satisfaction (H2)**

Based on the calculation, the  $t_{\text{statistic}}$  is 3.260. Thus, there is a significant direct contribution of port service performance to user satisfaction. The contribution of port service performance to user satisfaction based on Table 1 is 72.9 percent. This indicates that 72.9 percent of user satisfaction is contributed by port service performance. The result explains that, customers take into account port service performance in exchange for costs incurred. Port authorities provide value to maximize user satisfaction and loyalty in the long run (Schellinck & Brooks, 2016). This aligns with Setyawati and Assegaf (2015), suggesting that port service performance affects satisfaction. Dawidowicz and Gajewsk (2018) revealed that port service performance affects customer satisfaction and shortens service time. Transportation cost and time are dominant factors of port competitiveness. The satisfaction, reputation, and flexibility used to measure the port performance are the other important decisive criteria (Rezaei, van Wulfften Palthe, Tavasszy, Wiegmans, & van der Laan, 2019). This highlights that port service performance becomes one of the dominant factors that contribute user satisfaction at Tanjung Priok Port, Jakarta.

### **The Contribution of Information Technology to User Satisfaction (H3)**

Based on the calculation, the  $t_{\text{statistic}}$  is 9.224. This highlights a significant direct contribution of information technology to port user satisfaction. The contribution of 71.3 percent indicates that 71.3 percent of user satisfaction is contributed by information technology. This implies that today's globalization requires companies to improve their service professionally according to their business. This is in line with Anyadighibe and Awara (2014), Nurfina et al. (2016), and Sitorus et al. (2016), finding a significant relationship between operational automation and customer satisfaction.

The satisfaction of Indonesia Port Net customers at Tanjung Priok Port increases due to the increase in efficiency, trust, reliability, and supporting facilities (Majid, et al., 2019). Conducting research at the port of Banjarmasin, Maryana, Ridhawati, and Astuti (2019) proved that the quality of the system and information affect user satisfaction. Lee, Tongzong, and Kim (2016) revealed that e-transformation at container ports affects customer satisfaction and port competitiveness through e-workplace. Container terminal management explains more about how e-transformation can result in customer satisfaction and competitiveness of port suppliers. This highlights that information technology contributes to user satisfaction at Tanjung Priok Port, Jakarta.

### **The Indirect Contribution of Port Service Performance and Information Technology to User Satisfaction (H4)**

Our hypothetical testing obtained  $F_{\text{statistic}}$  of 148.832, suggesting a significant direct contribution of port service performance and information technology to user satisfaction. This implies a significant simultaneous contribution of port service performance and information technology of Inaportnet to user satisfaction. Theoretically, Cronin and Taylor (2014) and Kotler (2012) stated that when performance is below expectations, customers are dissatisfied, and if performance exceeds expectations, customers are satisfied and happy. A study by Mlimbila and Mbamba (2018) recommended that the port consider utilizing and managing information systems more effectively and efficiently to improve its performance. This highlights that information technology and port service performance are the dominant factors of user satisfaction at Tanjung Priok Port, Jakarta.

### **Sobel Test**

The indirect contribution of port service performance to user satisfaction is through

information technology. The path analysis results show that port service performance directly contributes to information technology and user satisfaction. We also performed the Sobel test to determine the contribution of port service performance to user satisfaction through information technology. The Sobel test was previously used in some research (e.g., Caron, 2019; Fritz & MacKinnon, 2007; Preacher & Hayes, 2008; Zhao, Lynch Jr, & Chen, 2010). The test result concludes that service performance contributes to user satisfaction and is mediated by information technology. In line with the above analysis, information technology intermediates port service performance and user satisfaction.

## **CONCLUSION**

Customer satisfaction is affected by port service performance. This occurs because of the performance of the services. When the service provider delivers excellent port service performance, customers feel satisfied. It implies that the better port service performance, the higher the customer satisfaction. Port management in the past time was conventional. The information system-based technology could assist the activity of a port, such as information technology measurement based on the intensity and frequency of utilization. This could reduce the port sector's high cost and monitor the port activities. In short, the application of information technology of Indonesia Port Net successfully assists in making decisions and providing services to all port stakeholders so that they can realize innovative port management.

## **ACKNOWLEDGMENT**

The authors are grateful to Institute Transportation and Logistics (ITL) Trisakti, Akademi Maritim Nusantara, and Institut Daarul Qur'an for supporting this research through a research collaboration agreement between universities.

## **DECLARATION OF CONFLICTING INTERESTS**

The authors, in the preparation of this article, have stated that they have no conflict of interest in connection with the publication of this article.

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