Uncertain Supply Chain Management 11 (2023) 799–810

Contents lists available at GrowingScience

Uncertain Supply Chain Management

homepage: www.GrowingScience.com/uscm

Determinants of logistics effectiveness on port operational performance: Empirical evidence from Indonesia

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A B S T R A C T

Article history:
Received October 5, 2022
Received in revised format October 16, 2022
Accepted December 29 2022
Available online December 29 2022

Keywords:
Accessibility
Cargo Transport Regulations
Logistics effectiveness
Operational Performance
Port

This research aimed to know the influence of accessibility and cargo transport regulations on the operational performance mediated by logistics effectiveness in the Class II Port of Jayapura, Papua Province. Several main problems in the object of this research were the existence of operational hour limitation regulation which made cargo delivery not maximally run, limited road network and roads in the port area, as well as the occurrence of congestion if cargo ships and passenger ships arrived at the port at the same time. This research used Structural Equation Modelling with Smart3PLS-SEM. The sampling technique used probability sampling and was conducted in the Port of Jayapura. The respondents were as many as 250 people consisting of shipping business players, transportation service providers, Harbormaster's office, and the Port Authority. The result of the analysis and discussion indicated that logistics effectiveness was a reinforcing factor in the achievement of port operational performance. The existing obstacles could be overcome through road infrastructure improvement, traffic engineering, continuous policy improvement, and port facility and infrastructure improvement. The key finding was the necessity of an information technology system used for the ship's loading and unloading activities digitally to be utilized by the stakeholders, shipping companies, stevedoring companies, expedition companies, and cargo owners.

1. Introduction

A port has an important role in supporting distribution activities to accelerate the integrated development in Papua, providing efficient and effective access to transportation. The development in Papua Province can be classified as a high-cost development because the prices of construction materials and equipment are higher than those out of Papua Province. Most of the raw materials are sent from outside of Papua Province so the prices become higher. In addition to the high cost of raw materials and infrastructures, another determining factor is the high cost of transportation including the components of distribution cost incurred at the port and other destinations. The performance of Jayapura Port continues to improve every year, but this is contrary to the limited infrastructure of the stacking yard so a more effective and efficient cargo arrangement is necessary. Even though the Covid-19 pandemic hits Indonesia, the need for goods in eastern Indonesia keeps increasing every year. So, to avoid congestion of cargo distribution at a port it is necessary to develop the port at present and in the future.

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doi: 10.5267/j.uscm.2022.12.010

Congestion will affect the operational performance at the port. It can be seen when a container ship conducts loading-unloading activities and at the same time, a state-owned ship discharges the passengers. The limited port area and many car parking areas as well as traders doing selling activities make the port area crowded with people. In addition, the limited stacking yard which does not equal the increasing flows of cargo become a problem in the Class II Port of Jayapura, Papua Province. The problems frequently faced in the cargo distribution from the port to the hinterland are the road infrastructure and not maximal road network services that make the process of cargo distribution hindered and this affects the port performance in terms of the cargo that will exit from the port.

This research identifies the factors affecting the loading-unloading activities and how far the operational performance in the Class II Port of Jayapura can be affected by the implementation of Operational Hours for specific vehicles. Based on the Jayapura Mayor Regulation Year 2012 concerning Operational Hours for cargo vehicles and heavy equipment in the city of Jayapura and 20 feet container trailers and trucks or big vehicles, that are allowed to pass through the Protocol streets or National streets and Provincial streets in the city of Jayapura starting from 09.00 EIT (eat Indonesian Time) to 12.00 EIT and in the next operational hours from 15.00 EIT to 06.00 EIT. This regulation limiting the operational hours for specific vehicles is different from those of other cities that have a 24-operational hours. Based on the explanation, it is necessary to identify the factors that affect loading-unloading activities and how far the operational performance in the Class II Port of Jayapura can be affected by the implementation of Operational Hours Regulation for specific vehicles. In line with the development of sea traffic and the limitation of Operational Hours for the accessibility of land transportation and the operational activities in the Class II Port of Jayapura, improving the performance of the port operation is not only in the wharf facilities and stacking yard, but it also needs the availability of supporting facilities and infrastructures.

To support operational performance, a port needs favorable regulations that have positive impacts on the in/out flow of goods in the region. The implementation of operational hours in Jayapura becomes one of the factors that hinder cargo delivery activities because the truck carrying cargo should wait for the preset operational hours. Furthermore, logistics effectiveness also becomes a challenge for the Government or the existing Port Business Entities in the Class II Port of Jayapura. Based on the background described above, six problems in Class II Port of Jayapura are identified, namely; (1) the Highly increasing price of cargo delivery in the mountain area, (2) Fewer facilities and capacity of stacking yard in the port area, (3) Congestion if cargo ship and passenger ship arrive at the port at the same time, (4) Limited parking area for vehicles in the port area, (5) The existence of a regulation limiting the operational hours that makes cargo delivery run not maximally, and (6) Limited road network and roads in the port area. Will there be direct effects of accessibility and cargo transport regulations simultaneously on the logistics effectiveness of the Class II Port of Jayapura?

Cargo transportation using containers has become the main cargo transportation since the 1960s, forming places in port cities to be distribution centers (Cidell, 2012). The proposed performance of the port supply chain is not only determined by the ability of each partner from upstream to downstream but also improves the performance of business players involved in the supply chain (Gayathri et al., 2021; Macário, 2013; Nuzzolo & Comi, 2013). The result of the research by Munim and Schramm (2018) explains that better logistics performance in the port related to the improvement of port infrastructure quality is very important for developing countries. In the opinion of Meersman et al. (2012) congestion in the port causes the loss of time and money as well as undermines the competitive position of the port and maritime logistics chain. Lin and Tseng (2007) add that in port management it is very important to establish a competitive strategy and increase resource utilization as well as continuous improvement in operational efficiency. Moreover, Paing and Prabnasak (2019) explain that port effectiveness depends on the best services for containers and cargo. Another study by Essel et al. (2022) indicates that government policy does not give too significant and direct effects on the output of the port and the utilization of port resources.

2. Theoretical Basis

2.1. Port Operational Performance

Port conceptualization through the approach of logistics and supply chain management is much related to port performance (Bichou & Gray, 2004). Moreover, to improve operational performance needs periodic preventive maintenance of the loading-unloading equipment as well as training for the loading-unloading personnel (Vicrihadi et al., 2021). A study by Nwaogbe et al. (2019) states that the improvement of port operational performance is needed to achieve a level of operational efficiency to avoid congestion in the national port. Finally, the most important factor according to some researchers Sunitiyoso et al., (2022) is generally the port performance that supports the service system related to infrastructure development, including information and communication technology, service procedures, and human resources. Some other relevant studies also support the variable of port operational performance (Chinna, 2022; Fahim et al., 2022; Frazzon et al., 2019; Jeevan et al., 2018; Nanyam & Jha, 2022; Telemaque, 2022; Barata et al., 2022). Any performance measurement used by the port authority can lead to the estimated operational performance of the Lepo terminal (Lorenčič et al., 2022). Port operational performance can be synthesized as the result of measurable work obtained by the port in performing ship and cargo services as well as in utilizing facilities and equipment in a certain period and unit. Port performance can be measured by using nine variable dimensions included in the calculation of Structural Equation Modelling such as (1) Waiting Time,

(2) Approaching Time (3) Effective Time compared to Berth Time, (4) Work Productivity, (5) Container Receiving/Delivery, (6) Berth Occupancy Ratio, (7) Shed Occupancy Ratio, (8) Yard Occupancy Ratio, and (9) Equipment Operation Readiness.

2.2. Accessibility

According to Litman (2017), the factors that affect accessibility are the mobility or physical movement of the vehicle, the quality of transportation options reachability, the connectivity of the transportation system, substitute mobility, and the pattern of land use. The findings of Guo and Yang (2019) and Wang and Cullinane (2008) show that higher accessibility in the port will give an impact on higher demand and it correlates positively with the accessibility to delivery. The finding of Chen et al. (2022) shows that accessibility is very influential to the factor of environmental cost. On the contrary, accessibility from the port to the downtown becomes a priority and is related to transportation resources and cargo flow (Clott & Hartman, 2016; Wan et al., 2018). However, the finding of Syafiq and Purwoko (2022) states that accessibility does not so significantly affect the development of ports in Indonesia. Some relevant studies also support the variable of accessibility such as concerning sea freight Cargo, structure, and port infrastructure (Bernacki & Lis, 2016; Bono & Gutiérrez, 2011; Ducruet & Itoh, 2022; Giuffrida et al., 2020; Hou & Li, 2011; Van der Horst & Van der Lugt, 2011). Accessibility can be synthesized as an activity of a transportation network system using analytical relations among the system components to analyze the strong effect that will happen to understand the work method of that system. Accessibility in this research can be measured by six variable dimensions included in the calculation of Structural Equation Modelling namely: (1) Distance, (2) Traveling time, (3) Vehicle frequency, (4) Transportation services, (5) Cost, and (6) People income.

2.3. Regulations on Cargo Transportation

The finding of a study by Saruchera (2020) explains the existence of the main influence to reform public policy, and logistics becomes a choice to compete in the world. The growth and increase in demand for cargo delivery using transportation should be supported by increasing transportation facilities and infrastructures to run efficiently and effectively in all the existing aspects (Humang et al., 2021). They add the increasing volume of general cargo and containers will possibly affect the need for port facilities. According to Meersman and Van de Voorde (2013), cargo transportation is a derivative of demand, cargo should be transported to a production unit whose output should be delivered to another production unit, distribution center, and consumers; commodity and cargo are transported throughout the supply chain. So, it needs to develop adequate infrastructures so that transportation and cargo delivery will be cheaper in all regions including Papua Province. Barros (2003) and Vrakas et al. (2021) propose a policy revision in the port to increase efficiency. Some studies also support the variable of regulations to develop and enforce effective international shipping regulations related to important logistics facilitators, and public authority governance (Acciaro et al., 2022; Munim, 2022; Sampson, 2022; Tovar & Wall, 2022). The government of Indonesia plays a significant role in establishing the legal and institutional frame, which is related to regulation, and infrastructure, and will respond the multimodal transportation that has not been well implemented (Budisiswanto et al., 2018; Ratnawati et al., 2021; Ricardianto et al., 2022a). The regulations on cargo transportation can be synthesized as the government policy to regulate cargo distribution from one location to another by using the transportation mode of road. The regulations on cargo transportation in this research can be measured by six variable dimensions included in the calculation of Structural Equation Modelling namely; (1) Driver's condition, (2) Rest time, (3) Facilities, (4) Provided equipment, (5) Bill of lading, (6) Age of vehicle.

2.4. Logistics Effectiveness

According to Sorooshian and Yin (2018), Supply Chain Management will be able to involve the relations between two or more organizations as well as the flow of resources, material, and information from upstream to downstream. Based on the result of research conducted by Puangchampee & Baramichai., 2012), to increase the competitiveness of management practices of the logistics industry in Thailand, it needs a Logistics Scorecard model to measure the effectiveness of logistics performance. Some relevant studies also support the variable of logistics effectiveness in the port (Chinna, 2022; Huang, 2022; Karatas-Cetin, 2021; Monteiro et al., 2021; Sarkar & Shankar, 2021; Song & Panayides, 2012). Some studies related to logistics effectiveness in Indonesia have been done (Kuncoro et al., 2021; Many, 2018; Setiawan & Koestoer, 2021; Subiyanto, 2021; Widiyanto et al., 2021; Wahyuni et al., 2022). Logistics effectiveness can be synthesized to fulfill the need for suitable goods in the right place, at the right time, and in the right condition. Logistics effectiveness in this research can be measured by five variable dimensions included in the calculation of Structural Equation Modelling namely: (1) Business strategy orientation, (2) Capacity planning and implementation, (3) Logistics efficiency and productivity, (4) Implementation of information technology, and (5) Supply chain collaboration.

Based on the description above this research will be able to know several things that can obstruct or even affect the port's operational performance. Efficient and effective operational performance needs adequate accessibility from various sectors and infrastructures, as well as support from stakeholders. Finally, this research aims to know the direct and indirect influence of accessibility and cargo transport regulations on operational performance mediated by the logistics effectiveness in the Class II Port of Jayapura.

Based on the literature review and previous research, the following hypotheses can be proposed (Fig. 1).

H1: *Accessibility partially affects logistics effectiveness*.
H2: *Cargo transport regulations partially affect logistics effectiveness*.
H3: *Accessibility partially affects operational performance.*
H4: *Cargo transport regulations partially affect operational performance*.
H5: *Logistics effectiveness partially affects operational performance*.
H6:*Accessibility simultaneously and indirectly affects operational performance through the mediation of logistics effectiveness*.
H7: *Cargo transport regulations simultaneously and indirectly affect operational performance through the mediation of logistics effectiveness.*

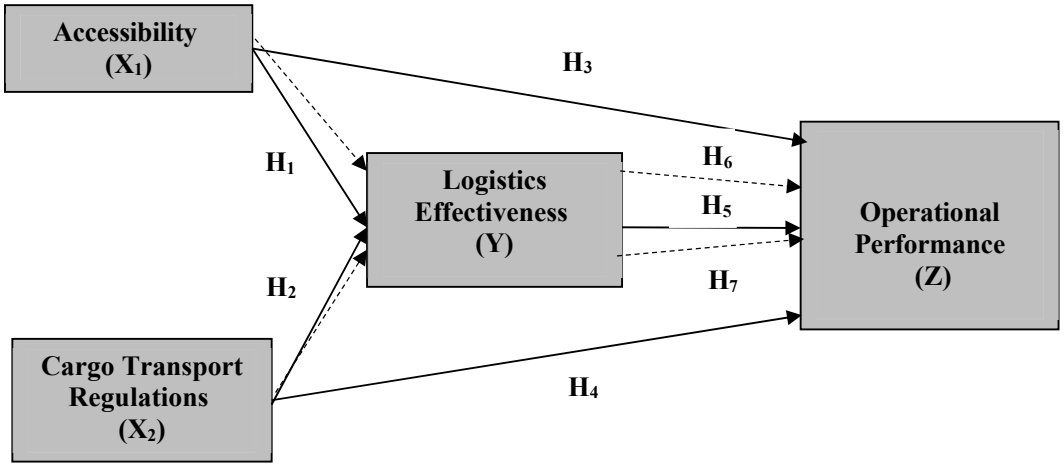

Fig. 1. Conceptual Framework

3. Research Method

This research used four variables, namely variables of accessibility and cargo transport regulations as independent variables, logistics effectiveness as mediating variable, and port operational performance as the dependent variable. The research was conducted in the Class II Port of Jayapura, Harbormaster Office, Class II Port Authority of Jayapura, shipping companies, TKBM (Stevedoring Manpower) Cooperative, Port Business Entities, and Service Providers for Transportation Arrangement in Jayapura. This research used probability sampling with a sample of as many as 250 people. The method of analysis used the Structural Equation Model with Smart3PLS. The criteria used in the Smart3PLS to assess the outer model was a validity test consisting of convergent validity and discriminant validity. The next test was the reliability test with Composite Reliability (CR). The convergent validity of the measurement model was assessed based on the correlation between the estimated value of the item or loading factor and the value of Average Variance Extracted (AVE). The next test was discriminant validity with the method of Heterotrait-Monotrait Ratio (HTMT) and Fornell-Larcker Criterion. In the inner model, the bootstrap technique was used in the analysis of this research structural model, which would result in a full research model both the outer model and inner model. The test of the structural model (inner model) was done in some steps through the R Square, Predictive relevance (Q^2), and F-Square (F^2) Evaluation. The next step was hypothetical testing by comparing $t\text{-}_{table}$ and $t\text{-}_{statistic}$.

4. Result of Research and Discussion

4.1. Outer Model Analysis

The criteria used to assess the outer model are a validity test consisting of convergent validity and discriminant validity and a reliability test with the measurement of Cronbach Alpha (CA) and Composite Reliability (CR). The convergent validity of the measurement model is assessed based on the correlation between the estimated item value (loading factor) and the value of Average Variance Extracted (AVE). Convergent Validity analysis gives information on the reflection of the indicator which has the closest relations with the research variables.

Table 1
Convergent Validity Test and Internal Consistency

Variable	Item	Loading Factor	VIF	AVE	CA	CR
Accessibility	Acc1	0.701	1.946	0.565	0.914	0.928
	Acc2	0.774	2.364			
	Acc3	0.776	2.350			
	Acc4	0.793	2.278			
	Acc5	0.673	1.865			
	Acc6	0.747	2.490			
	Acc7	0.759	2.071			
	Acc8	0.806	2.755			
	Acc9	0.749	2.043			
	Acc10	0.729	2.007			
Cargo transport regulations	Reg1	0.675	1.695	0.528	0.900	0.917
	Reg2	0.614	1.486			
	Reg3	0.680	2.128			
	Reg4	0.687	2.139			
	Reg5	0.721	2.054			
	Reg6	0.794	2.596			
	Reg7	0.770	2.195			
	Reg8	0.792	2.303			
	Reg9	0.712	1.812			
	Reg10	0.798	2.484			
Logistics Effectiveness	Log1	0.728	2.068	0.528	0.935	0.945
	Log2	0.638	1.688			
	Log3	0.715	2.068			
	Log4	0.636	1.606			
	Log5	0.759	2.400			
	Log6	0.751	2.329			
	Log7	0.783	2.841			
	Log8	0.717	2.487			
	Log9	0.736	2.656			
	Log10	0.787	3.121			
Port Operational Performance	Opr1	0.704	1.838	0.634	0.900	0.918
	Opr2	0.699	1.766			
	Opr3	0.807	2.705			
	Opr4	0.828	2.911			
	Opr5	0.777	3.644			
	Opr6	0.799	4.176			
	Opr7	0.833	3.338			
	Opr8	0.834	3.526			
	Opr9	0.837	3.705			
	Opr10	0.826	3.687			

Based on the result of the Convergent Validity test, it is proven that all the indicators in this research are valid. This is because all of the question items result in a loading factor value of more than 0.70 and the value of AVE (Average Variance Extracted) of more than 0.5. However, the fifth item in the variable of accessibility has a loading factor value of less than 0.70 which is 0.673. Subsequently, each of the first to fifth items in the variable of cargo transportation regulation, the second and fourth items in the variable of logistics effectiveness, and finally the second item in the variable of operational performance result in a loading factor value less than 0.7. Loading a factor value less than 0.7 is still considered valid in the indicator measurement because it has a value of AVE in each variable more than 0.5. The conclusion is that all the Convergent Validity tests are fulfilled.

Subsequently, the indicator of depth reflects the strong indicator in explaining the variable of accessibility because it has the biggest loading factor value (0.806) among other indicators. The tenth indicator reflects a strong indicator in explaining the variable of cargo transportation regulation because it has the biggest loading factor value (0.798) among other indicators. The tenth indicator reflects a strong indicator in explaining the variable of logistics effectiveness because it has the biggest loading factor value (0.787) among other indicators. The last, ninth indicator reflects a strong indicator in explaining the variable of operational performance because it has the biggest loading factor value (0.837) among other indicators. The next step after the questionnaire items are stated as valid is the internal consistency test. Internal consistency test refers to the values of Cronbach Alpha and Composite Reliability.

From Table 2, it is seen that all the variables being studied have the values of Cronbach Alpha and Composite Reliability > 0.7. It can be concluded that all the indicators used in the questionnaire are stated as reliable or consistent in measuring the variable. Subsequently, the value of the Variance Inflation Factor (VIF) in Table 1 reflects that all the variables do not experience collinearity resulting in a value of VIF less than 5. The next test is the discriminant validity test using the method of the Heterotrait-Monotrait Ratio (HTMT) and the Fornell-Larcker Criterion.

Table 2
Discriminant Validity-Heterotrait-Monotrait Ratio (HTMT) Test

	Accessibility	Operational Performance	Logistics Effectiveness	Cargo transport regulations
Accessibility				
Operational Performance	0.606			
Logistics Effectiveness	0.664	0.745		
Cargo transport regulations	0.719	0.673	0.767	

The correlation value among variables in Table 2 is less than 0.9. It means, using the method of Heterotrait-Monotrait Ratio (HTMT) proves that all items fulfill the requirements of Discriminant Validity.

4.2. Inner Model

To ensure the relations among the construct, significant value, R-square (R2), relevance of Q-square (Q2) prediction, and the effective measurement of f-square (f2) of the research model, the structural model or inner model is tested. R-square for the dependent variable and the value of the path coefficient for the independent variable is used to assess the structural model. With a significance threshold of 0.05, the bootstrap technique is used in the structural model analysis of this research in SmartPLS. The structural model represents the relations among latent variables used in the research. The structural model in this research involves three exogenous latent variables, namely accessibility, logistics effectiveness, and cargo transport regulations, and one endogenous latent variable, namely operational performance. The following are the results of algorithmic calculation and bootstrapping for each variable in the structural model (Fig. 2 and Fig. 3).

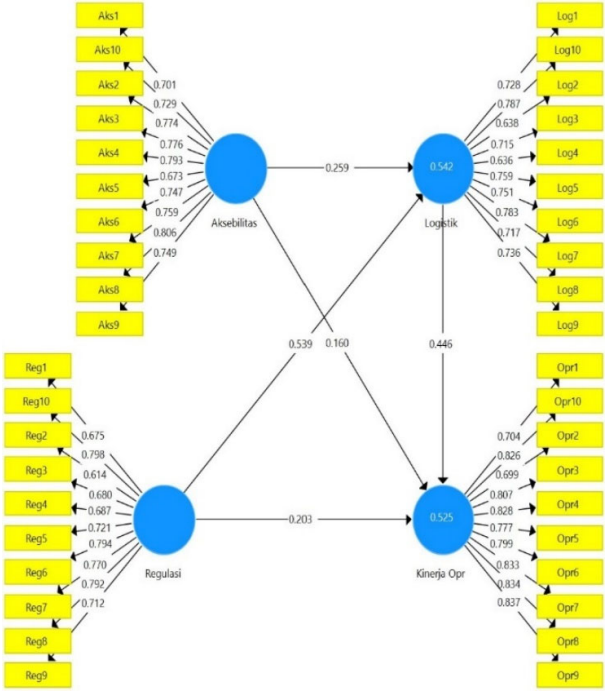

Fig. 2. Full Results of Research Model (Outer Model)

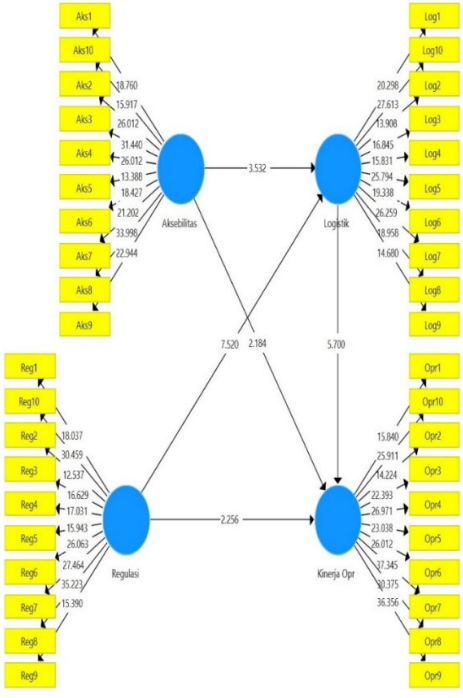

Fig. 3. Full Result of Research Model (Inner Model)

Testing steps of the structural model (inner model) (Table 3)

Table 3
R-Square Value

	R_{Square}	Decision
Logistics Effectiveness	0.542	Fair
Operational Performance	0.525	Fair

Based on the testing result in Table 3, the R_{Square} value of logistics effectiveness is 0.542. It means the variability of accessibility and cargo transport regulations explains 54.2% of the logistics effectiveness fairly. Subsequently, the R_{Square} of operational performance is 0.525. It means the variability of accessibility, cargo transport regulations, and logistics effectiveness explains 52.2% of the operational performance fairly. Besides, the value of R-Square < 0.67 means that it has a fair contribution in explaining the endogenous variable.

4.3. Predictive Relevance (Q^2)

The research model has a good predictive value if it results in the value of PLS-SEM < LM (Linear Modelling). This LM is to see the predictive strength of the indicator being used. From Table 4, it is seen that the value of Root Mean Square Error (RMSE) in the PLS-SEM-LM has a negative sign. It means the value of PLS-SEM is less than the Least Median of Square (LMS)-RMSE, so it can be concluded that the question items in each variable can predict its variables.

Table 4
PLS-Predict Value

Indicator	PLS-SEM		LM-RMSE	PLS-SEM – LM
	RMSE	Q^2_predict		RMSE
Opr1	0.559	0.138	0.573	-0.014
Opr2	0.597	0.206	0.653	-0.056
Opr3	0.547	0.273	0.579	-0.032
Opr4	0.558	0.333	0.57	-0.012
Opr5	0.551	0.232	0.599	-0.048
Opr6	0.549	0.307	0.600	-0.051
Opr7	0.523	0.296	0.568	-0.045
Opr8	0.539	0.282	0.571	-0.032
Opr9	0.527	0.295	0.552	-0.025
Opr10	0.563	0.282	0.610	-0.047
Log1	0.443	0.396	0.412	0.031
Log2	0.560	0.343	0.618	-0.058
Log3	0.468	0.340	0.457	0.011
Log4	0.539	0.376	0.550	-0.011
Log5	0.539	0.239	0.585	-0.046
Log6	0.575	0.230	0.637	-0.062
Log7	0.515	0.220	0.522	-0.007
Log8	0.521	0.137	0.499	0.022
Log9	0.531	0.171	0.551	-0.020
Log10	0.573	0.155	0.588	-0.015

Table 5
Result of F_{Square}

Path	F-Square	Effect Size
Accessibility → Logistics Effectiveness	0.083	Weak
Accessibility → Operational Performance	0.028	Weak
Cargo transport regulations → Logistics Effectiveness	0.359	Strong
Cargo transport regulations → Operational Performance	0.036	Weak
Logistics Cargo Transportation → Operational Performance	0.192	Fair

Based on the calculation result, it is seen that the path from the variable of accessibility to the variables of logistics effectiveness and operational performance has a weak influence (Table 5). Subsequently, cargo transport regulations have a strong influence when together with logistics effectiveness, whereas when operational performance brings about a weak influence. The last, logistics effectiveness has a fair influence on the operational performance in the structural model.

4.5. Hypothetical Test

In the structural model, the projected value of path relations must be significant and the bootstrapping process can be used to obtain a significant value. By using the value of the parameter coefficient and the significance value of the $T_{statistic}$ of the bootstrapping report, it will be able to determine the significance of the hypothesis. To know the significance or the insignificance it is seen from T_{table} at alpha 0.05 (5%) = 1.96. Then T_{table} is compared with the $T_{statistic}$ (Table 6).

Table 6
Estimated Results of Path Coefficient and Statistical Test

	Standard	$T_{Statistics}$	P_{Values}	Result
Accessibility → Logistics Effectiveness	0.259	3.532	0.000	Confirmed
Cargo transport regulations → Logistics Effectiveness	0.539	7.520	0.000	Confirmed
Accessibility → Operational Performance	0.160	2.184	0.029	Confirmed
Regulations → Operational Performance	0.203	2.256	0.025	Confirmed
Logistics Effectiveness → Operational Performance	0.446	5.700	0.000	Confirmed
Accessibility → Logistics Effectiveness → Operational Performance	0.116	3.306	0.001	Confirmed
Cargo transport regulations → Logistics Effectiveness → Operational Performance	0.241	4.172	0.000	Confirmed

H1. The hypothesis of the influence of accessibility on logistics effectiveness is accepted. This is seen from the value of the accessibility path coefficient as big as 0.259 with a positive direction. Subsequently, the t_{value} is 3.532 > 1.96, and Sig. 0.000 < 0.05. It means accessibility positively and significantly affects logistics effectiveness.

H2. The hypothesis of the influence of cargo transport regulations on logistics effectiveness is accepted. This is seen from the value of cargo transport regulations path coefficient as big as 0.539 with a positive direction. Subsequently, the t_{value} is 7.520 > 1.96, and Sig. 0.000 < 0.05. It means cargo transport regulations positively and significantly affect logistics effectiveness.

H3. The hypothesis of the influence of accessibility on operational performance is accepted. This is seen from the value of the accessibility path coefficient as big as 0.160 with a positive direction. Subsequently, the t_{value} is 2.184 > 1.96, and Sig. 0.029 < 0.05. It means accessibility positively and significantly affects operational performance.

H4. The hypothesis of the influence of cargo transport regulations on operational performance is accepted. This is seen from the value of cargo transport regulations path coefficient as big as 0.203 with a positive direction. Subsequently, the t_{value} is 2.256 > 1.96, and Sig. 0.025 < 0.05. It means cargo transport regulations positively and significantly affect operational performance.

H5. The hypothesis of the influence of logistics effectiveness on operational performance is accepted. This is seen from the value of the logistics effectiveness path coefficient as big as 0.446 with a positive direction. Subsequently, the t_{value} is 5.700 > 1.96, and Sig. 0.000 < 0.05. It means cargo transport regulations positively and significantly affect operational performance.

H6. The hypothesis of the influence of accessibility on operational performance through logistics effectiveness is accepted. This is seen from the value of the indirect relations path coefficient as big as 0.116. Subsequently, the t_{value} is 3.306 > 1.96, and Sig. 0.001 < 0.05. It means logistics effectiveness can mediate the relationship between accessibility and operational performance.

H7. The hypothesis of the influence of cargo transport regulations on operational performance through logistics effectiveness is accepted. This is seen from the value of the indirect relations path coefficient as big as 0.241. Subsequently, the t_{value} is 4.172 > 1.96, and Sig. 0.000 < 0.05. It means logistics effectiveness can mediate the relations between cargo transport regulations and operational performance.

4.7. Discussion

Accessibility and Logistics Effectiveness

Accessibility has a one-way influence on logistics effectiveness or if accessibility increases then there will be an increase in logistics effectiveness and it statistically has a significant influence. This research is in line with the study of Lebedeva et al. (2022), stating that their study opens a new perspective to assess the accessibility of transportation in the port and enables it to work effectively in a competitive environment and to improve service quality. This research also supports some results of other studies on the factors related to accessibility and logistics effectiveness (Essel et al., 2022; Juntapoon & Chaoprayoon, 2022; Lorenčič et al., 2022; Suleiman & Usman, 2018; Ricardianto et al., 2022b; Setiawati et al., 2022). Thus, the result of this research is in line with the relevant research and theories. It means accessibility positively and significantly affects logistics effectiveness in the Class II Port of Jayapura.

Cargo transport regulations and Logistics Effectiveness

Cargo transport regulations positively and significantly affect logistics effectiveness. It means cargo transport regulations have a one-way influence on logistics effectiveness or if cargo transport regulations increases then there will be an increase in the effectiveness and it statistically has a significant influence. This research is in line with the studies of Sunitiyoso et al. (2022) stating that the policy stakeholders of Indonesian maritime cargo transportation must be involved in the implementation process, including port operators, the shipping industry, and the government as the regulator and infrastructure enabler. Other research related to Cargo transport regulations and Logistics Effectiveness has been done by some experts (Djunarsjah et al., 2021; Kuncoro et al., 2021; Setiawan & Koestoer, 2021). Thus, the result of this research is in line with the relevant research and theories. It means cargo transport regulations positively and significantly affect the logistics effectiveness in the Class II Port of Jayapura.

Accessibility and Operational Performance

Accessibility positively and significantly affects operational performance. It means a change in accessibility has a one-way influence on the change in operational performance or if accessibility increases then there will be an increase in operational performance and it statistically has a significant influence. This research is in line with the studies of Sutanto (2021), Syafiq

and Purwoko (2022), Amelia et al. (2022), and Sunitiyoso et al. (2022), explaining that the internal accessibility from and to the port is very good in some ports in Indonesia, but it needs to improve the port infrastructures and loading-unloading facilities. This research is also in line with the studies of Başţuğ et al. (2022), Clott and Hartman (2016), Curtis and Scheurer (2017), de Almeida Rodrigues et al. (2022), Kang et al. (2022), Telemaque (2022), and Zhang and Yun (2019), stating that accessibility is very closely related to operational performance. Thus, the result of this research is in line with the relevant research and theories. It means accessibility positively and significantly affects the operational performance in the Class II Port of Jayapura.

Cargo Transport Regulations and Operational Performance

Cargo transport regulations positively and significantly affect port operational performance. It means a change in cargo transport regulations has a one-way influence on the change in port operational performance or if the quality of cargo transport regulations improves then there will be an increase in port operational performance and it statistically has a significant influence. This research supports the statement (Ha et al., 2019) that from the stakeholder's point of view, the port policy in the context of the container is very closely related to port performance. This research is also in line with some findings (Dong et al., 2019; Lirn & Ariyana, 2021; Wang et al., 2022), providing the management and policymakers with insights into a port with different levels of operational efficiency and environmental performance. This hypothesis is also in line with some research in Indonesia related to cargo transport regulations and operational performance (Amelia et al., 2022; Amin et al., 2021; Anas et al., 2022; Syafiq & Purwoko, 2022; Majid et al., 2022a). Thus, the result of this research is in line with relevant research and theories. It means cargo transport regulations positively and significantly affect the operational performance in the Class II Port of Jayapura.

Logistics Effectiveness and Operational Performance

Logistics effectiveness positively and significantly affects port operational performance. It means a change in logistics effectiveness has a one-way influence on the change in port operational performance in other words if logistics effectiveness increases then there will be an increase in port operational performance and it statistically has a significant influence. This research is in line with another study by Woo et al. (2011) stating that the port authority should try to maintain the balance between logistics effectiveness and performance management to fulfill the requirements of customers and other supply chain players. This research also supports the study of Chinna, 2022) stating that efficient and effective logistics will reach better port performance and supply chain management. The findings of this research are also in line with the study of Kuncoro et al. (2021) and Saruchera (2020), providing sufficient evidence to show that logistics effectiveness has a relationship with port performance. Thus, the result of this research is in line with relevant research and theories. It means logistics effectiveness positively and significantly affects the operational performance in the Class II Port of Jayapura.

Overall, the result of this research also indicates that the $F\text{-}_{Square}$ in the path between the variable of accessibility and the variables of logistics effectiveness and operational performance has a weak influence. Subsequently, cargo transport regulations have a strong influence on logistics effectiveness, whereas bringing about a weak influence on operational performance. The last, logistics effectiveness has a fair influence on operational performance in the structural model. The result of this research is consistent with other research related to port operational performance conducted by Caldeirinha et al. (2013), Felício et al. (2015), Majid et al. (2022b), and Nanyam and Jha (2022). Especially the research by Adjisasmita et al. (2020) discussing the operational performance in the Port of Jayapura is also studied using Structural Equation Model. Finally, by seeing the port condition then this research has several novelties compared with other research, such as the need for an information system of ship loading-unloading on the interests of the operator, shipping companies, transportation arrangement services, and the local Transportation Agency of Jayapura city.

5. Conclusions

The result of this research has indicated that the factor of logistics effectiveness was a reinforcing factor in the achievement of port operational performance. The existing obstacles could be overcome by improving road infrastructures, traffic engineering, sustainable policy improvement, increasing port facilities and infrastructures, as well as using an information technology system for ship loading-unloading activities. The achievement of port operational performance can be utilized by the stakeholders, shipping companies, stevedoring companies, expedition companies, and cargo owners.

The result of this research also indicates that the factor of accessibility is a reinforcing factor to improve the operational performance of the Class II Port of Jayapura. One step to be taken is improving road infrastructures, developing alternative roads to the port, and optimizing the traffic engineering to improve the port's operational performance. In addition, local wisdom, customary rights, geographical condition, and nature in the port area must be paid attention to. The implementation of a policy that limits the operational hours for special transportation will affect the operational performance to run not optimally. The quality of regulation is that the policy is executed and implemented by the stakeholders and business players in more effective and efficient ways. Thus, the sustainable success key of a policy is that the policy can respond to problems and improve operational performance.

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