

Model influence means operational performance on the port of Jayapura

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Model influence means operational performance on the port of Jayapura

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Abstract. The Port of Jayapura is located in Papua Province, including the Second Class Port within the Working Area of Indonesian Port IV, located between 02° 32' 30" LS and 140° 42' 30" BT. The position of Port of Jayapura is strategic and part of the sea toll road in Indonesia, as it faces the Pacific Ocean in the north. Areas have potential as hinterland harbour Jayapura. Almost all of the district needs logistics in the central mountains of Papua, which are served by the Port of Jayapura. Distribution patterns are long enough to cause the cost component on behalf of transportation components can reach Rp 1.1 million per sack of cement or the price can rise to 1200%. The means have a significant effect on the port's performance of 35.8%, meaning that every 100% increase in facilities will increase port performance by 35.8%. Infrastructure significantly affects the port's performance of 42.6%, meaning that every 100% increase in infrastructure will increase the port's performance by 42.6%. The Ulayat right has significant effect on the material of 38.9% with the negative direction that the increasing customary rights of the indigenous people will decrease the port performance. The increase of Ulayat rights by 100% will decrease the port's performance by 38.9%.

1. Introduction

Development of transportation has an important role in the development of a region in supporting the growth of other sectors. Transportation is categorised as the regional economic pulse [1]. Besides, the high accessibility of transportation will accelerate the equitable distribution of development between regions both in Papua Province and in the mainland of Papua. The provinces of Papua and West Papua are strategic areas in eastern Indonesia as they border with other countries and have enormous natural resource potential. The limited availability of transportation is the biggest obstacle for infrastructure development and other sectors so that a commitment and action plan of transportation development is expected to speed up development in Papua in an integrated manner. Development in Papua Province can be categorised as high-cost development due to the price of construction materials and construction equipment more expensive up to several times the price outside of Papua. Overhead is caused by high transportation cost factors, including the distribution of components that occur at the port and from the port to the project site. For the Jayapura region, the price of transportation component in one material price can range from 40 to 50% but for the inland can reach 100% while the mountains up to 2800%, this condition can be suppressed with the concept of Sea Toll including the improvement of port performance.



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On the other hand, the improvement of Jayapura port performance so far has constrained the ownership rights of the community of Pulau Kayu Pulo around the harbour, and the community has customary rights not only on the land but also on the sea channel which has been used by the port of Jayapura. This research is expected to contribute scientific thought in assessing the importance of improving port function in Jayapura as part of the Sea Tolerance program to accelerate infrastructure development in Papua to improve people's welfare soon to be realised by not ignoring the customary rights of local indigenous people.

2. Multivariate statistics approach, structural modeling

The PLS analysis is a multivariate statistical technique that performs the comparison between multiple dependent variables and multiple independent variables. PLPL is one of the variance-based SEM (Structural Equation Modeling) statistical methods designed to solve multiple regression when specific problems occur in the data, such as small sample size, the missing data, and multicollinearity. It statistical method is appropriately used in testing the effect of predicting relationships among variables in a model [2]. PLS can be run on small samples, does not require various assumptions, and can test research models on a theoretical basis the weak, and the information generated using PLS is more efficient and easy to interpret [2, 3]. See the internal consistency reliability of Cronbach's Alpha and Composite Reliability (CR) values. Composite Reliability (CR) is better at measuring internal consistency than Cronbach's Alpha in SEM because CR does not assume the boot similarities of each indicator [4]. Cronbach's Alpha tends to underestimate construct reliability over Composite Reliability (CR). The Composite Reliability (CR) formula is

$$CR = \frac{(\sum \lambda_i)^2}{(\sum \lambda_i)^2 + (\sum \epsilon_i)} \quad [1]$$

The Interpretation of Composite Reliability (CR) is the same as Cronbach's Alpha. Limit value > 0.7 is acceptable, and value > 0.8 is very satisfactory. Another measure of convergent validity is the Average Variance Extracted (AVE) value. The AVE value describes the variance or variability of the variable manifest that the latent construct can have. Thus, the greater the variant or diversity of the manifest variables that the latent constants can represent, the greater the representation of the manifest variables to their latent constructs. The use of AVE for a criterion in assessing convergent validity. AVE values of at least 0.5 indicate a good convergent validity measure. It is latent variables can explain an average of more than half the variants of the indicators. The AVE value is derived from the sum of the squares loading factor divided by the error. The Formula Average Variance Extracted (AVE) is:

$$AVE = \frac{\sum \lambda_i^2}{\sum \lambda_i^2 + \sum \epsilon_i} \quad [2]$$

The size of AVE can also be used to measure the reliability of component score latent variables and the results are more conservative than composite reliability (CR). If all indicators are standardised, then the AVE value will be equal to the average block value of communalities. Discriminant validity of the reflective model is evaluated through cross-loading, then compared the value of AVE with the square of the correlation value between the constructs (or comparing the square root of AVE with the correlation between constructs). The size of cross-loading is to compare the correlation of the indicator with the construct and the construct of the other block. If the correlation between the indicator and the construct is

higher than the correlation with the other block constructs, it indicates that the construct predicts the size of their block better than the other block. Another measure of discriminant validity is that the AVE root value must be higher than the correlation between constructs with other constructs or AVE values higher than the quadratic correlation between constructs

2.1 Evaluation of research hypotheses model

Evaluation of the model in the PLS is done by evaluating the outer model and inner model. Outer model is a model of measurement to assess the validity and reliability of the model. While the inner model is a structural model to predict the causality relationship between variables [1].

2.2 Evaluation of outer model (measurement model)

The measurement model is used to test variable validity and indicator reliability. Validity test is conducted to determine the ability of research indicators to measure what should be measured [5]. The validity test in SmartPLS is of two kinds: (a) Convergent Validity Test: relates to the principle that the measurements of a variable should be highly correlated. Convergent validity occurs when scores obtained from two different instruments that measure the same variable have a high correlation. The rule of thumb used for convergent validity is outer loading > 0.7; AVE and communalities > 0.5. (b) Test of Discriminant Validity: relates to the principle that different variable measures should not be correlated with high. Discriminant validity occurs when two different instruments that measure two predicted variables do not correlate produce a score that is not correlated. Discriminant validity test is assessed based on cross loading > 0.7 and AVE root > correlation of latent variables [1]. While test reliability used to measure the consistency of measuring instruments in measuring a concept. The reliability test is a measurement showing the extent to which the measurement is unbiased (error-free error) and therefore ensures consistent measurements across time and multiple items in the indicator. In PLS this test can be done using two methods, namely: (a) Cronbach's alpha: measures the lower limit of the reliability value of a variable and is acceptable if its value > 0.6. (b) Composite reliability: measures the true value of a variable's reliability and is acceptable if its value > 0.7 [1].

Tabel 1. Parameter of Validity Test and Reliability in the PLS measurement model.

Validity Test	Parameter	Rule of Thumbs
Convergent	Loading factor	More than 0,7
	The average variance extracted (AVE)	More than 0,5
	Communalities	More than 0,5
Discriminant	The root of AVE and correlation latent variable's	The root of AVE > correlation latent variable's
	Cross loading	More than 0,7 in one variable
Reliability Test	Cronbach's alpha	More than 0,6
	Composite reliability	More than 0,7

2.3 Evaluation of structural models

The structural model in PLS is evaluated by measuring the coefficient of determination or test of R2 and the coefficient of path or t-value by comparison of t-statistic and t-table. Here are the inner model measurement parameters in PLS:

2.3.1. Coefficient of determination (test r2)

The value of R² is used to measure the level of variation of the independent variable changes to the dependent variable, so it can illustrate how much the dependent variable can be influenced by the independent variable. The higher the R² value, the better the prediction model of the proposed research model [1].

2.3.2. Coefficient of path or t-values

The path coefficient value shows the significance of the variables in the structural model or hypothesis testing. The hypothesis used in this study is the one-tailed hypothesis. The hypothesis is accepted if the t-statistic value is greater than 1.64 which is the t-table value for testing with alpha 5 per cent [1].

3. Result and discussion

The development of a structural model based on functional-causality relationships is shown in Figure 1

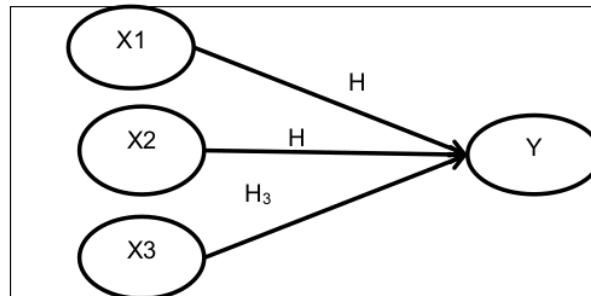


Figure 1. Conceptual Path Lines Diagram.

Information:

X1:Means

X2:Infrastructure

X3:UlayatRights

Y: Port Performance

Grouping of variables is done into two parts. Namely, variables that explain (exogenous) and the variables described (endogenous). The exogenous variables are Facilities (X1), Infrastructure (X2) and Hak Ulayat (X3), while endogenous variables are endogenous, the, ie performance of port (Y). Based on the conceptual framework of the research, the theoretical structural model construct variable or dimension of research variables and measurement scale is shown in Table 2 below.

Table 2. Theoretical Model Structure of Construction of **Research Variables and Measurement Scale**.

No	Type	Dimensions of Research Variable	Indicator	Measurement scale
1.	<i>exogenous</i>	Means (X1)	. Cranei (X1.2) . Container Truck (X1.3) . Forklift (X1.4) . Rubber Tyred Gantry (X1.5)	Likert, five option
2.	<i>exogenous</i>	Infrastructure (X2)	1. Dock (X2.1) 2. Field Stacking (X2.2) 3. Port Access Road (X2.3)	Likert, five option
3.	<i>exogenous</i>	Ulayat Right (X3)	1. Land Ownership (X3.1) 2. Local Wisdom (X.3.2)	Likert, five option
4.	<i>endogenous</i>	Operational Performance (Y)	. 1. Old exit (Y1) 2. Unloading (Y2) . 3. Pengangkutan (Y3)	Likert, 5 option

3.1. Mathematical modeling of sem and reduced form

Based on the framework of the structural model mentioned above and to see the magnitude of the effect of the functional relationship of each independent variable to dependent variable, then developed the following simultaneous function:

$$Y = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + u_1 \tag{3}$$

Where;

- Y = Performance
- X1 = Means
- X2 = Infrastructure
- X3 = Hak Ulayat

3.2. SEM-PLS analysis

Figure 2 shows the relationship between latent variables and the relationship between latent variables and indicators. The value between the latent variable and the indicator is the loading factor value used to test the validity of the indicator measuring the latent variable. The loading factor (outer loading) value less than 0.5 indicates that the indicator is invalid and should be issued in the model, then re-estimation. Therefore, before testing the hypothesis of relationships between latent variables first tested the validity, reliability and examination of model goodness [7].

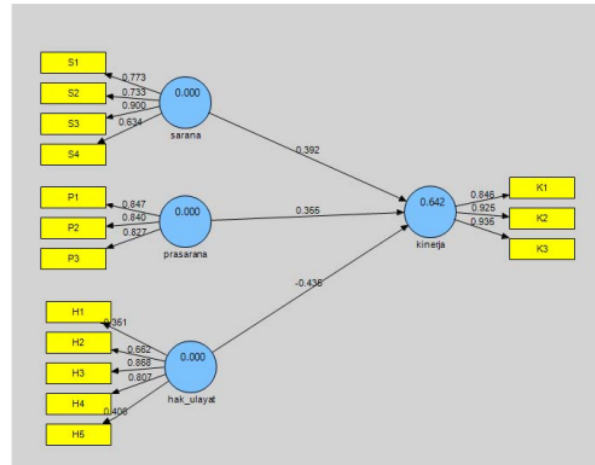


Figure 2. Port Performance Track Diagram.

Tabel 3. Outer loading.

	ULAYAT right	Performance	Infrastructure	Means
H1	-0.35099			
H2	0.661891			
H3	0.868247			
H4	0.806528			
H5	0.405708			
K1		0.845599		
K2		0.924688		
K3		0.935492		
P1			0.846841	
P2			0.840493	
P3			0.826826	
S1				0.772643
S2				0.732681
S3				0.899584
S4				0.633628

Table 4. AVE Value and Commuality.

	AVE	Commuality
Ulayat Right	0.426047	0.426047
Performance	0.815077	0.815077
Infrastructure	0.702403	0.702403
Means	0.586134	0.58613

In Table 4, there are two indicators less than 0.5 of which are H1 and H4 so that these two indicators can not be included in the model if they remain incorporated in the model to be inconsistent. Similarly in Table 5 the value of AVE and Commuality is less than 0.5 so that in the ulayat rights variable there is an invalid indicator. Further re-estimation or re-estimation is required without including both indicators. The following results are obtained

Table 5. Outer loading after re-estimation.

	Ulayat right	Performance	Infrastructure	Means
2	0.737185			
3	0.909126			
4	0.874004			
1		0.839671		
2		0.928332		
3		0.937058		
1			0.847402	
2			0.839505	
3			0.827444	
1				0.775586
2				0.735864
3				0.89702
4				0.636898

Table 6. AVE Value and Commuality after re-estimation.

	AVE	Commuality
Ulayat Right	0.711278	0.711278
Performance	0.814975	0.814975
Infrastructure	0.702507	0.702507
Means	0.588328	0.588332

After re-estimation, Table 4.9 shows the AVE and commuality values for each variable is more than 0.5. Table 4.10 shows the value of outer loading on each indicator is more than 0.5. So it can be concluded that the variables and indicators used are valid convergent

3.3. Test discriminant validity

Parameter of discriminant validity test can be known from the result of the output of algorithm in the form of cross loading, AVE root and correlation of latent variable. On cross-loading indicator which measures latent variable has higher cross load value compared with another latent variable. For example, on the ulayat rights variable H2, H3, H4 indicator has a higher cross load value than the indicators that measure other variables.

Table 7. Cross loading.

	Ulayat right	Performance	Infrastructure	means
H2	0.737185	-0.2339	-0.18559	0.065802
H3	0.909126	-0.27079	0.104298	0.199594
H4	0.874004	-0.35602	0.065381	0.010127
K1	-0.40135	0.839671	0.447157	0.406648
K2	-0.31077	0.928332	0.596415	0.5657
K3	-0.24899	0.937058	0.663428	0.569349
P1	0.118576	0.471554	0.847402	0.618741
P2	-0.19496	0.591578	0.839505	0.467437
P3	0.142152	0.521827	0.827444	0.454424
S1	0.06656	0.24971	0.346028	0.775586
S2	0.280845	0.137261	0.271016	0.735864
S3	-0.00261	0.690751	0.653116	0.89702
S4	0.265877	0.188728	0.279034	0.636898

3.4. Test Reliability

The parameters used to assess reliability are Cronbach alpha and composite reliability. According states that an indicator is said to be reliable if the value of Cronbach's alpha is more than 0.6 and composite reliability is more than 0.7. Table 4.12 shows the value of Cronbach alpha over 0.6 for each latent variable and composite reliability exceeding 0.7 for all latent variables, so reliability is satisfied.

Table 8. Cronbach's Alpha and Composite Reliability / Consistent Values.

	Cronbach's Alpha	Composite Reliability
Ulayatht Right	0.797486	0.880002
Performance	0.885589	0.929491
Infrastructure	0.789498	0.876293
Means	0.832905	0.849218

3.5. Model Goodness

After passing the validity and reliability test, then the model evaluation. Parameter used for model evaluation in smart PLS is the determinant coefficient (Test R2) and the coefficient of path or t-value. R2 value is used to measure the level of variation of the independent variable change to the dependent variable [1]. In this research, the structural model in the form of regression model so that there is one coefficient of determination for the performance variable. The greatest coefficient of determination in this research is 61.02%. Meaning the variable of Sarana, Prasarana and Hak Ulayat able to explain the performance variable equal to 61.02% 38.08% is explained by variable others not included in the model.

3.6. Hypothesis testing

The hypothesis that will be used in this research is 1. The influence of facilities on the performance of the port of Jayapura 2. There is an influence of infrastructure on the performance of Jayapura port 3. There is an influence of Ulayat right on the performance of Jayapura port [7,8,9]

Table 9. Path coefficient and Hypothetical test criteria accept alternative hypothesis (H1, H2, H3) if t statistic > 1.64 (alpha, 0.05).

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics ((O/STERR))	Information
Means -> Performance	0.355553	0.354772	0.095409	0.095409	3.726629	Accepted H1
Infrastructure -> Performance	0.424701	0.441526	0.095617	0.095617	4.441676	Accepted H2
Ulayat Right -> Performance	-0.38944	-0.36566	0.082006	0.082006	4.748872	Accepted H3

Interpretation of hypothesis test results based on Table 9

- The t-statistical value on the effect of the facility on Jayapura port performance is more than 1.64 so Accept H1. It means that there is sufficient evidence to state that there is a significant impact on the performance of the port of Jayapura.
- The t-statistical value on the effect of infrastructure on Jayapura port performance is more than 1.64 to receive H2. It means that there is sufficient evidence to state that there is an influence of infrastructure on the performance of the port of Jayapura
- The t-statistical value on the influence of ulayat rights on Jayapura port performance is more than 1.64, so accept H3. It means that there is sufficient evidence to state that there is an influence of ulayat rights on the performance of the Jayapura port.

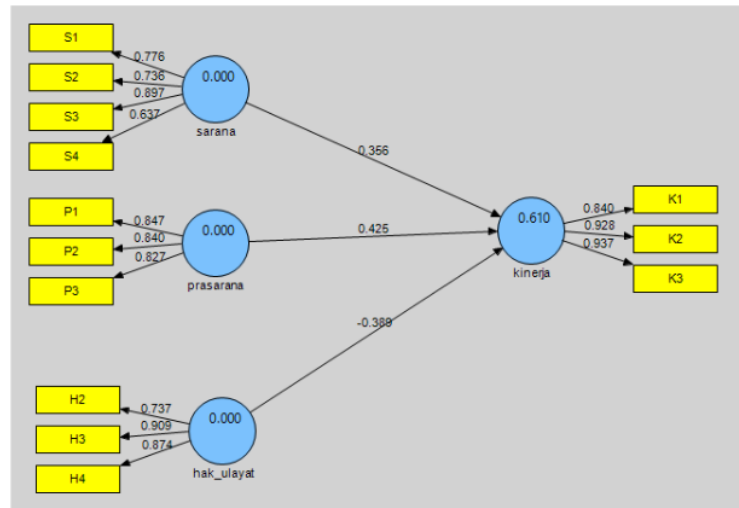


Figure 3. Map Performance Chart of Jayapura Port After re-estimation.

Figure 5 is the last model after re-estimation, showing the relationship between latent variables. Based on figure 4:24 can be written the structural equation as follows: Performance = 0.368 Means + 0.426 Infrastructure - 0.389 Ulayat Or $Y = 0.368 X1 + 0.426 X2 - 0.389 X3$ From the equation model above, it shows that the means have significant effect on port performance of 35.8%, meaning that every 100% increase in facilities will increase the port performance by 35.8%. Infrastructure significantly affects the port's performance of 42.6% meaning that every 100% increase in infrastructure will increase the port's performance by 42.6%. The ulayat right has significant effect on the material of 38.9% with the negative direction that the increasing customary rights of the indigenous people will decrease the port performance. The increase of ulayat rights by 100% will decrease the port's performance by 38.9%.

4. Conclusion

The means have a significant effect on the port's performance of 35.8%, meaning that every 100% increase in facilities will increase port performance by 35.8%. Infrastructure significantly affects the port's performance of 42.6%, meaning that every 100% increase in infrastructure will increase the port's performance by 42.6%. The ulayat right has significant effect on the material of 38.9% with the negative direction that the increasing customary rights of the indigenous people will decrease the port performance. The increase of ulayat rights by 100% will decrease the port's performance by 38.9%.

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