

DETERMINATION OF PORT FACILITIES AND CONTAINER FLOW GROWTH TOWARD THE DEVELOPMENT OF MAKASSAR PORT, INDONESIA

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ABSTRACT

The aim of this research is to know the determination of port facilities and container flow growth mediated by spatial regulation toward the development of Makassar Port in the South Sulawesi province. The main problem of Makassar Port is the capacity of wharf and terminal container yard Hatta which has been almost in the optimal condition due to the limited port land which is in the center of Makassar City and has not been integrated with the transportation modes in the port area. This research uses the path analysis, with sample as many as 133 persons from Makassar Main Port Authority Office, Local Government of Makassar City, Pelabuhan Indonesia IV, and Makassar Container Terminal as well as Port Directorate of Directorate General of Sea Transportation. The result of this research states that there is no determination of Spatial Regulation which neither strengthens nor weakens the relationship between Port Facilities and Port Development. It is expected that the preparation of Regional Spatial Plan pays attention to the need for space to build port facilities by providing a space for port development. The unavailability of space will force the optimization of port facilities in the existing port and become a negative determination to the need for port development. It needs coordination with the Local Government so that the spatial regulation supports the development of Makassar Port.

Keyword: Port Facilities, Container Flow Growth, Spatial Regulation, Port Development, Regional Spatial Plan

1. INTRODUCTION

Makassar Port in the province of South Sulawesi since then until now has a very important role in supporting domestic/national as well as international trade because of its strategic position in the midst of islands of the Unitary State of the Republic of Indonesia. Having a hierarchy as a Main Port, it is supported by the regulator with the establishment of Makassar Main Port Office and Makassar Main Port Authority Office, and operated by the expertised Pelabuhan Indonesia IV. The Port of Makassar consists of four General Terminals, namely: Soekarno Terminal, Hatta Terminal, Hasanuddin Terminal, and Paotere Terminal. Pelabuhan Indonesia IV has built the Container Terminal of Makassar New Port stage I starting from 2015 as a new terminal in the Port of Makassar.

Based on the loading-unloading flow in Soekarno Terminal, it is seen that the pattern of cargo movement in the period of 2013-2017 experienced a decrease with an average decrease of 7.8 percent over five years, where the biggest decrease can be seen in 2014 as many as 14 percent. From the table of loading-unloading flow in the Hatta Terminal, it is seen that the pattern of container movement in the period of 2013-2017 experienced a decrease with an average increase of 3.1 percent over five years, where the biggest increase can be seen in 2016 as many as 9.5 percent.

Based on the performance indicators of the operational services of Makassar Port in general it can be stated that they still fulfill the performance standard established by the Ministry of Transportation, except the value of approach time in the Hatta Terminal. However, regarding the Berth Occupancy Ratio and the stacking yard occupation in the Hatta Terminal it is seen to have approached the predetermined limit of berthing performance. The increase of global trend in the last ten years in the change of cargo delivery pattern from using conventional packaging to container is predicted to constantly increase the trend of container growth from year to year, including in the Port of Makassar, so the predicted increase of container flow in the future requires the port to be able to consistently adjust the port capacity.

Regional Spatial Plan is made as a direction of development in Makassar City implemented by taking advantage of territory space in effective, efficient, harmonious, aligned, balanced and sustainable ways to improve the society welfare and security defence, and it at once is the direction for investment in the location development to be implemented by the government, society and business circle (PDKM, 2015). Port zoning is established by considering the space utilization for the port operation and development in the future, provision for the prohibition of activities in the free air space above the water body which can affect and disrupt the sea transportation line, as well as the limitation of port space utilization in the work area or Daerah Lingkungan Kerja (DLKr) and interest area or Daerah Lingkungan Kepentingan (DLKp) of the port.

From the spatial regulation, based on the result of research (Akbar, 2018) in Makassar City, South Sulawesi, it can be concluded that the rapid city development really takes up space in Makassar City so that the supply of space cannot fulfill the demand, causing the development penetrate the areas that shouldn't be used as built areas and it gives impact on the increasing disorder of Makassar City. The procurement and operation of the port service facilities start to be done in a plan designed based on the data of the need for infrastructures and suprastructure (Lasse, 2016).

The 2017 Master Plan of national Port states that the growth of national cargo loading-unloading volume in the period of 2009-2014 is significant enough. The growth of container volume is driven by the pattern of cargo movement with the containerization growing up to 19.2 percent a year (from the growth of container in the period of 2004-2009 which was only 7.9 percent a year). The rate of container growth seems to fluctuate quite significantly with prominent difference between the cargo weight and the TEUs, which is probably due to the movement of empty containers although the averaged container weight per TEU does not change much, i.e. around 11.5-12.8 tons/TEU.

The high growth of loading-unloading volume indicates that sea transportation is still the main backbone of transportation. The change of cargo movement pattern from conventional packaging to container requires to plan the port facilities that can serve containers. Container depot becomes a must because if not prepared it will cause the container yard full of empty containers. Based on the 2015 Sea Highway Concept Implementation Report from the Transportation Directorate of Bappenas, it is stated that commercial ports in Indonesia have a limited depth around 6-10 meters so that they can only serve container vessels around 700-1600 TEUs. In addition, the utilization of modern equipment for loading-unloading such as container crane, lifting crane, JIB Crane, have been implemented only in a small number of ports.

2. LITERATURE REVIEW

Port Facilities

Port is a place consisting of land and/or water with certain boundaries as a place for government and business activities used as a place for ship's berthing, passengers getting on and off, and/or cargo loading-unloading, in the form of terminal and ship's berth place (UU RI, 2008). Some previous researches about research variables have been done. Research by (Siahaan, 2015) of the Container Terminal in Makassar to increase the wharf productivity was done through an approach to the quality of ship's service and the speed of ship's loading-unloading. In the study of Port Facilities, (Sinaga & Daud, 2014) say that the facilities in the Port of Sibolga exceed the maximum value of the predetermined Berth Occupancy Ratio. In the Port of Tegalsari, Tegal, according to (Nurdyana et al., 2013), an aggressive port development has been done by immediately adding

the basic, functional and supporting facilities which have not been fulfilled yet; increasing the number of fleets and developing basic, functional, and supporting facilities. The cargo loading-unloading services in the Port of Bungkutoko, Kendari, according to (Putra & Djalante, 2016), is still poor because the ratio between waiting time and service time is still very high.

Growth of Container Flow

The result of another research by (Ruslin, 2021) in the Soekarno-Hatta Container Terminal in the Port of Makassar indicates that the performance of container terminal wharf in the existing condition is stated as good because it is under the standard suggested by UNCTAD with the achieved Berth Occupancy Ratio of 56.4 percent. The same thing happens in the stacking yard where the value of YOR is 34.7 percent. In the research of Container Terminal in Makassar New Port, the results (Kasba & Paotonan, 2020; Wahida et al., 2019) indicate that there are many variables determining the Berth Occupancy Ratio, one of them is the duration of unutilized in the loading-unloading which significantly affect the wharf occupancy ratio. In addition, an imbalance of cargo flow happens in wide-scale small ports in Malaysia, so the decision maker and policy maker should identify the key factors that determine the business operation (Othman et al., 2020). In addition, (Solossa et al., 2013) in their research of the Port of Sorong, West Papua, it needs improvements in cargo loading-unloading service, passenger getting on and off, ship's call and container ship's call which have a direct impact on the performance of port facilities up to next 15 years.

Port Development

Port development in Indonesia, according to (Jansen et al., 2018) is to drive an inclusive growth, where partnership is the missing chain between the business strategies at micro level and macro level as the effect of port area and economy in general. Concerning the ports in Indonesia and Australia, in the research of (ALDaghlis et al., 2018), it is said that the industry must invest more on the importance of environmental sustainability and ensure that the regulations on environment are understood and well implemented. Dry port has emerged as an integral part of commercial facilities in China in the last decade and has played an important role in the regional and economic development (Beresford et al., 2012). The emergence of offshore port is partly driven by its closeness to the main population center or industrial area and partly by the need for supporting the fast-growing container flow. Another research of port development (Taneja et al., 2020) shows that in many port projects being planned in Indonesia, technical feasibility and mangrove as wave breaker which can improve the nature create environmental added value.

(Kartohardjono & Buwono, 2012) explains it is expected that the determination of the area of Sedau Terminal as the extension of Singkawang Port, West Kalimantan, can enhance the port activities because of the strategic role of port in the area development. The result of study in the Port of Sabang, Aceh, (Arahman et al., 2018) indicates that the main factor determining the selection of alternative location for the port development is the environmental condition. Whereas in the Port of Sibolga, North Sumatera, the long term development plan is prepared by zoning and layout through physical and operational separation between general cargo terminal, conventional container terminal, and passenger terminal (Ariyanto, 2017).

The aim of this research is to know the justification for the development of Makassar Port by developing the Container Terminal of Makassar New Port and determining the need for port facilities, container flow growth against the development of Makassar Port by considering the regional spatial suitability, whereas the projected target in the port master plan with the realization indicating a negative gap, meaning that the realization is under the projected port development plan and it is predicted to have an impact on the change of container handling plan in the Port of Makassar.

Therefore, the hypotheses are proposed as follows:

H1: The determination of Port Facilities (X_1) toward Port Development (Y)

H2: The determination of Container Flow Growth (X_2) toward Port Development (Y)

H3: The determination of Port Facilities (X_1) toward Container Flow Growth (X_2)

H4: The determination of Port Facilities (X_1) toward Port Development (Y) mediated by Spatial Regulation (X_3)

The determination of Port Facilities and Container Flow Growth in the Hatta Terminal through the Moderator of Spatial Regulation toward the Development of Makassar Port, systematically illustrates the

relationship between independent variables and dependent variable that can be depicted in a model of structural relationship among variables (Figure 1).

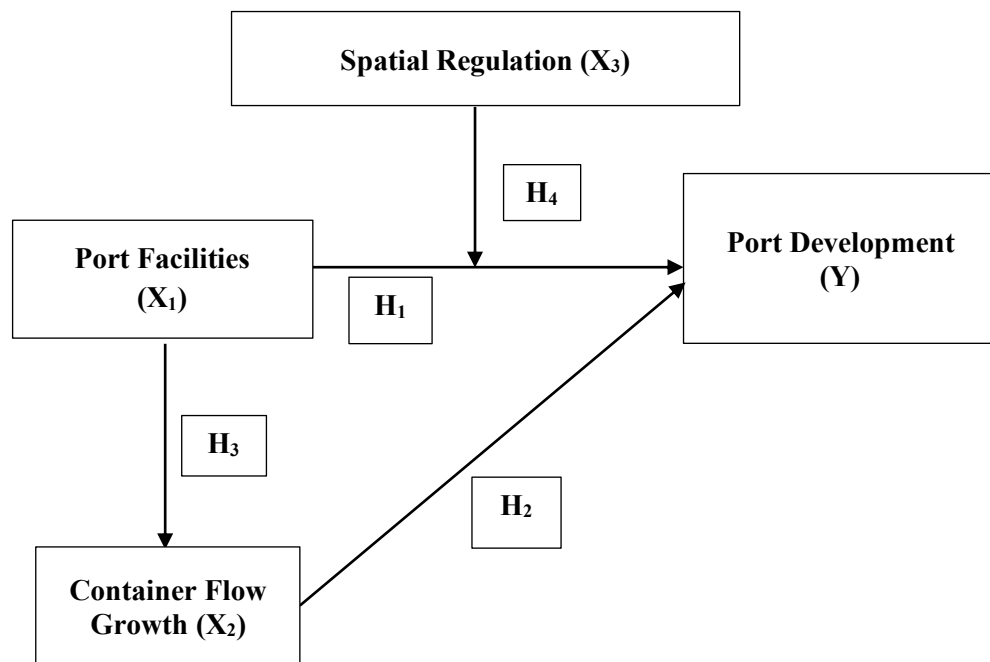


Figure 1. Research Model

3. METHODS

The researchers use path analysis method with the main instrument of questionnaire. The population in this research is all the parties related to the operation of Hatta Terminal. The population as many as 199 persons directly involved in the operation of Hatta Terminal are from Makassar Main Port Authority Office, Local Government of Makassar City, Pelabuhan Indonesia IV (Persero), and Makassar Container Terminal as well as Port Directorate, Directorate General of Sea Transportation as the concerned agencies. The research sample as many as 133 persons obtained by using the technique of stratified random sampling are directors, structural officials, and chosen related employees. Meanwhile, the variable of regulation will be used to explain the policies mentioned in the Regional Spatial Plan of Makassar City related to the port facilities and development in order to see the determination in strengthening or weakening the relationship among variables by using the data that can be obtained from the Local Governments of Makassar City and South Sulawesi Province. To strengthen the explanation concerning the result of analyzing the moderating variable, a cross check between the result of research and Makassar Port Master Plan is done so as to know whether the result of research is in line or contradicting with the port master plan where the data can be obtained from the Port Directorate, Directorate General of Sea Transportation.

Moderating variable is a variable that can strengthen or weaken the determination of independent variables toward a dependent variable. In the implementation of interaction test it will use the Moderated Regression Analysis (MRA), an application of multilinear regression in which the regression equation contains the element of multiplication interaction of two or more independent variables. Moderating variable acts as carrier variable that can strengthen or weaken the determination among variables. The testing stages go through assumption test in the beginning of this research, namely Validity test and Reliability test. After all the requirements for path analysis test are fulfilled, path analysis test, which is an extension of multilinear analysis, is done. Path analysis is the use of regression analysis to estimate the causality relationship among variables (causal model) that has been predetermined based on the theory. It is, then, followed by t test and F test. Some previous researches have used a path analysis method for shipping companies (Mahmoudi & Mollaei, 2014; Ricardianto et al., 2021; Shu et al., 2012).

4. FINDINGS AND DISCUSSION

Path Analysis Testing

The result of Anova test or F_{test} shows that the value of $F_{\text{statistic}}$ is 18.033 so the regression model is stated significant and can be used to predict among variables which all together have a determination toward Port Development (Y). Whereas in the Significance test of Partial Model or t Test, it indicates that Variable X_3 , that is Spatial Regulation, gives coefficient value as many as negative 0.207 at the significance level $0.812 > 0.05$. Thus, it can be interpreted that the Moderating Variable of Spatial Regulation (X_3) does not prove to be significant in determining the Port Development (Y). The negative value indicates that the effect of moderation tends to give weakening determination of Port Facilities toward Port Development. The insignificance of the Spatial Regulation coefficient with sig 0.812 indicates that the variable of Spatial Regulation (X_3) is a genuine moderating variable and cannot be placed as independent variable.

The interpretation is strengthened by the coefficient value of determination (R^2) from the calculation in the second regression equation after the Moderating Variable X_3 , namely spatial regulation, with the value of R^2 is 0.295, then the variable of Spatial regulation (X_3) as the moderating variable does not determine whether strengthening or weakening. Therefore, it can be stated that H_0 is accepted, so that the variable of Spatial Regulation does not have a determination for the variable of Port Facilities (X_1) toward Port Development (Y).

The calculation of correlation coefficient has resulted in the correlation value among variables as follows (Table 1).

Table 1. Matrix of Correlation Coefficient among Variables

Correlations		Port Development	Port Facilities	Container Flow Growth	Spatial Regulation
Port Development	Pearson Correlation	1	.543**	.383**	.044
	Sig. (2-tailed)		.000	.000	.617
	N	133	133	133	133
Port Facilities	Pearson Correlation	.543**	1	.444**	.103
	Sig. (2-tailed)	.000		.000	.236
	N	133	133	133	133
Container Flow Growth	Pearson Correlation	.383**	.444**	1	.130
	Sig. (2-tailed)	.000	.000		.137
	N	133	133	133	133
Spatial Regulation	Pearson Correlation	.044	.103	.130	1
	Sig. (2-tailed)	.617	.236	.137	
	N	133	133	133	133

** . Correlation is significant at the 0.01 level (2-tailed).

From Table 1 it can be seen that there is a medium correlation, with the value of Pearson Correlation between 0.41 to 0.60 in all the variables tested.

Calculation of Path Coefficient in Sub Structure 1

The causal relationship between the variables in sub structure 1 consists of one endogenous variable, namely Port Development (Y), and two exogenous variables, namely Port Facilities (X_1) and Container Flow Growth (X_2). The equation of sub structure 1 with causal relationship between variables is shown in Figure 2.

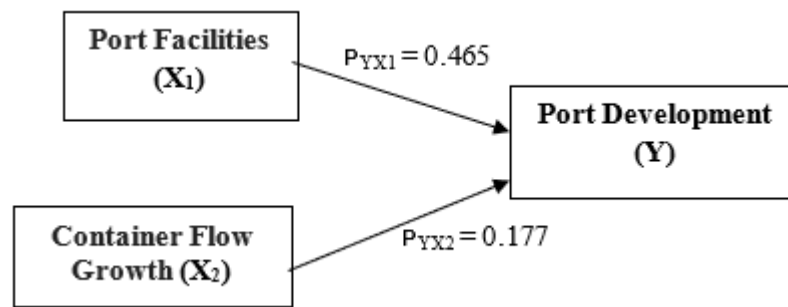


Figure 2. The Path Diagram of Sub Structure 1

Determination of Port Facilities (X_1) toward Port Development (Y)

Based on the calculation that has been done, it can be known that the value of path coefficient P_{YX1} is 0.465 with $t_{\text{statistic}}$ 5.757 and t_{table} 1.657. Therefore, the value of $t_{\text{statistic}}$ is $5.757 > t_{\text{table}}$ 1.657. The value of determination coefficient (R^2) is 0.295 which means that the determination contribution of port facilities to the port development is 29.5 percent, meaning that H_0 is rejected and the path coefficient is significant. Based on this result, it can be interpreted that Port Facilities (X_1) has a significant direct determination to Port Development (Y).

Determination of Container Flow Growth (X_2) toward Port Development (Y)

Based on the calculation that has been done, it can be known that the value of path coefficient P_{YX2} is 0.177 with $t_{\text{statistic}}$ 2.192 and t_{table} 1.657. Therefore, the value of $t_{\text{statistic}}$ is $2.192 > t_{\text{table}}$ 1.657. The value of determination coefficient (R^2) is 0.147 which means that the determination contribution of container flow growth to the port development is 14.7 percent, meaning that H_0 is rejected and the path coefficient is significant. Based on this result, it can be interpreted that Container Flow Growth (X_2) has a significant direct determination to Port Development (Y).

The causal relationship happening between variables in sub structure 1 consists of one endogenous variable, namely Y (Port Development) and two exogenous variables, namely X_1 (Port Facilities) and X_2 (Container Flow Growth). The value of path coefficient X_1 toward Y as big as P_{YX1} is 0.465 and X_2 toward Y as big as P_{YX2} is 0.177. The calculation of residual coefficient obtains the value of 0.825. The data processing result of the causal relationship in sub structure 1 shows that the value of the Determination Coefficient (R^2) of Port Facilities variable (X_1) toward Port Development (Y) is 0.295.

Calculation of Path Coefficient in Sub Structure 2

The causal relationship happening between variables in sub structure 2 consists of one endogenous variable, namely X_2 (Container Flow Growth) and one exogenous variable, namely X_1 (Port Facilities). The causal relationship between variables in sub structure 2 is depicted in Figure 3.

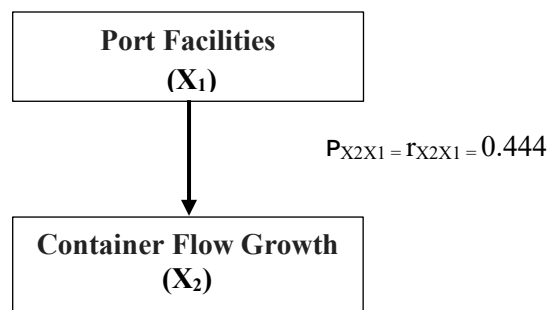


Figure 3. Path Diagram of Sub Structure 2

The causal relationship happening between variables in sub structure 2 consists of one endogenous variable, namely X_2 (Container Flow Growth) and one exogenous variable, namely X_1 (Port Facilities).

Determination of Port Facilities (X_1) toward Container Flow Growth (X_2)

Based on the calculation that has been done, it can be known that the value of path coefficient X_1 to X_2 as big as $P_{X_2X_1}$ is 0.444 with $t_{\text{statistic}}$ 5.671 and t_{table} 1.657. The value of determination coefficient (R^2) is 0.197 which means that the determination contribution of port facilities to container flow growth is 19.7 percent, meaning that H_0 is rejected and the path coefficient is significant. Based on this result, it can be interpreted that Port Facilities (X_1) has a significant direct determination to Container Flow Growth (X_2).

Calculation of Path Interaction Test on the Variable of Spatial Regulation

Variable X_3 (Spatial Regulation) is predicted to determine between Variable X_1 (Port Facilities) and Variable Y (Port Development), where the variable will strengthen or even weaken the determination between the variables moderated. In order to know the determination, it needs two steps of analysis by analyzing the determination of Variable X_1 (Port Facilities) to Variable Y (Port Development) so that how big the determination can be known, and further analysis by adding variable X_3 (Spatial Regulation) as a moderating variable so that from the two steps of analysis it can be known whether Variable X_3 (Spatial Regulation) will strengthen or weaken the determination between Variable X_1 (Port Facilities) and Y (Port Development).

Based on the path calculation in sub structure 1, sub structure 2, and the calculation of path interaction test of moderating variable X_3 , the whole path diagram of variables X_1 , X_2 , and X_3 toward Y can be depicted as in Figure 4.

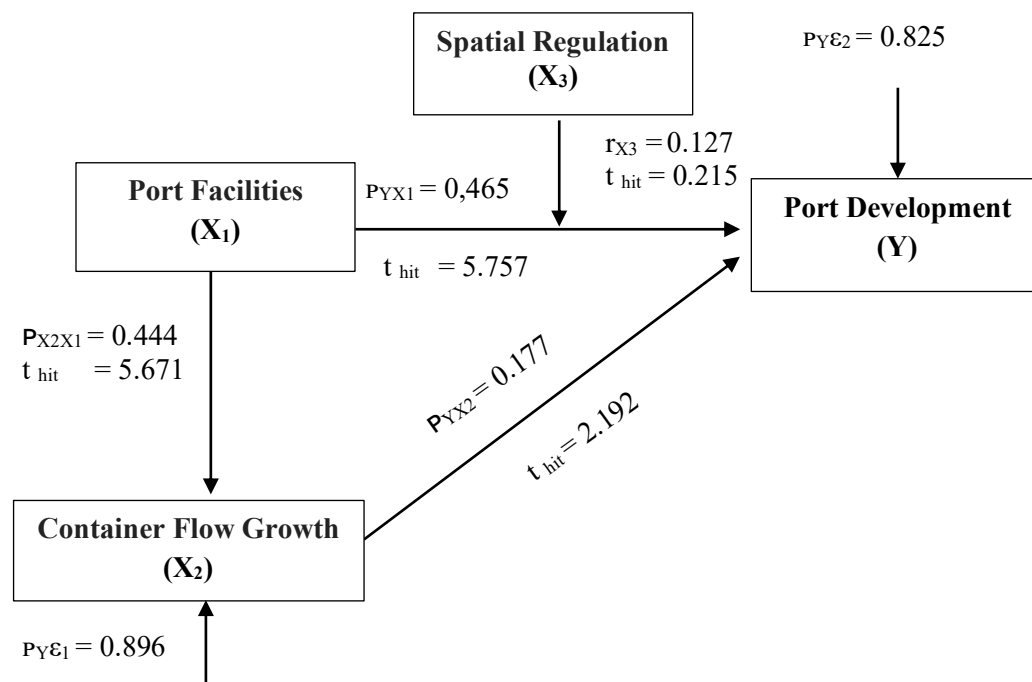


Figure 4. Path Diagram of Variables X_1 , X_2 , and X_3 toward Y

Determination of Port Facilities (X_1) toward Port Development (Y) mediated by Spatial Regulation (Y)

Based on the tests and analyses that have been done, the findings of this research indicate that spatial regulation is one of the variables that has no determination, neither strengthening nor weakening the relationship between port facilities and port development so that the research hypothesis H_0 is accepted, with the coefficient value negative 0.207 at the significance level $0.812 > 0.05$. Negative value indicates that the effect of moderation tends to give weakening determination for port facilities toward port development. The insignificant coefficient of Spatial Regulation (the *sig* is 0.812) indicates that the variable of Spatial Regulation (X_3) is a genuine moderating variable and cannot be placed as independent variable. The interpretation is strengthened by the coefficient value of determination (R^2) that has been calculated in the second regression equation after the

Moderating Variable of Spatial Regulation is included in the equation, with the value of R^2 is 0.295, so that the value is the same as the value of R^2 before the moderating variable is included.

To help determine a hypothesis, a test is carried out by comparing between the calculation statistic and the table statistic, in which to determine the value of t table in this research, distribution table of t is used to set the level of significance.

The calculation of path coefficient can be summarized in Table 2.

Table 2. Summary of Path Coefficient Calculation

Path	Path Coef	T _{statistic}	t _{table}	
			$\alpha = 0.05$	$\alpha = 0.01$
P _{YX1}	0.465	5.757	1.657	2.356
P _{YX2}	0.177	2.192	1.657	2.356
P _{X2X1}	0.444	5.671	1.657	2.356
r _{x3}	0.127	0.215	1.657	2.356

Result of Hypothetical Tests

Table 3. Recapitulation of the Hypothetical Test Results

No	Hypothesis	Sig.	Conclusion
1	Port Facilities toward Port Development	0.000	Having a direct determination (positive)
2	Container Flow Growth toward Port Development	0.000	Having a direct determination (positive)
3	Port Facilities toward Container Flow Growth	0.000	Having a direct determination (positive)
4	Port Facilities toward Port Development mediated by Spatial Regulation	0.812	Having no direct determination (negative)

Discussion

Port Facilities and Port Development

Based on the hypothetical tests, Port Facilities have a significant direct determination toward Port Development. Port facilities are a factor that has a positive direct determination toward port development, so that both the port administrator and port operator should pay attention to the availability, adequacy, and readiness of port facilities according to the level of operation that must be provided by the port as mentioned in the port development plan. The hypothesis in this research concerning Port Facilities and Port Development is in line with the study (Nurdyana et al., 2013; Widiyanto, 2019) in the Port of Sunda Kelapa, North Jakarta, and the Port of Tegal, Central Java, stating that some of the port facilities are in good conditions and satisfying but there are several service factors that must be improved such as the arrangement and condition of the temporary parking area, in-out accesss, wharf, warehouse, stacking yard. The result of another research (Farikin et al., 2015) mentions, that the condition of the facilities of Nusantara Fishing Port of Prigi is good enough because the facilities are well maintained and still in good conditions. Thus, the result of research based on this theory supports the result of the previous research. It means that Port Facilities have a significant direct determination toward Port Development.

Container Flow Growth and Port Development

Based on the hypothetical test, Container Flow Growth has a significant direct determination toward Port Development. Container Flow Growth is a factor that has a positive direct determination toward port development. It would be better that the rate of container flow growth becomes a factor to be taken into account in calculating the estimated sea transport services in the port development plan.

Related to the hypothesis in this research concerning Container Flow Growth and Port Development, evaluation has been done by projecting the growth of ship and container flows from 2018 to 2030 in the Container Terminal of Boom Baru Port, Palembang. According to (Situmorang & Buchari, 2015) the utilization of wharf is high enough and ships must wait for berthing at the wharf because the stacking yard can no more accommodate the flow of all containers. The result of another research in the Port of Biak, according to (Arianto, 2014), indicates that in 2030 until 2035 it will need an additional unit of new dock mooring as long as 130 meters, based on the predicted volume of container loading-unloading. Thus, the result of research based on this theory supports the result of the previous research. It means that Container Flow Growth has a significant direct determination toward Port Development.

Port Facilities and Container Flow Growth

Based on the hypothetical test, Port facilities have a significant direct determination toward Container Flow Growth. Port facilities is a factor that has a positive direct determination toward container flow growth so that the researchers recommend that the change of global trend in the cargo movement using containers must be supported and anticipated by providing port facilities that can serve the growth of container flow in accordance with the capacity to be served.

The hypothesis in this research concerning port facilities and container flow growth supports the research done in the Container Terminal of Makassar New Port. According to (Amran, 2020) it needs additional loading-unloading equipment to be used for a long term in line with the need for container handling facilities. This hypothesis is also in line with the other study at the wharf of the Container Terminal of Makassar New Port (Wahida et al., 2019) which calculates the occupation rate of container yard and wharf as well as determines the facility planning in line with the need up to 2039. Thus, the result of the research based on this theory supports the result of the previous research. It means that Port Facilities have a significant direct determination toward Container Flow Growth.

Port Facilities, Port Development and Spatial Regulation

The hypothetical test gives the port facilities a weakening determination toward port development. Spatial regulation in this research does not prove to have determination for port facilities toward port development which is neither strengthening nor weakening and which tends to have a negative determination. It would be better that the development of Regional Spatial Plan considers the need for a space to build port facilities by providing a space for the port development. The unavailability of space will force the optimization of port facilities in the existing port and become a negative determination to the need for the port development. It needs a coordination with the Local Government in order that the spatial regulation supports the port development. The hypothesis in this research concerning Port Facilities, Port Development, and Spatial Regulation is in line with the result of previous research by (Putra & Djalante, 2016) which states that based on the condition of wharf facilities and stacking yard in the Port of Bungkutoko, Kendari, South-East Sulawesi, it needs a development strategy of extending the infrastructure development, that is developing one more unit of wharf. Thus, the result of research based on this theory supports the result of the previous research. It means that Port facilities have a negative direct determination toward Port Development because the port development does not always follow the Spatial regulation.

5. CONCLUSION

Based on the Makassar Port Master Plan, today Hatta Terminal has a container wharf as long as 850 meters which is intended to serve the vessels with capacity maximum 3000 TEUs. It has a container yard as wide as 11.4 Ha, with the maximum capacity of loading-unloading 800 thousand TEUs a year. This value is one of the parameters indicating the need for additional port facilities as one form of port development. The development of Makassar Port in the Makassar New Port by building port facilities is to anticipate the need for port facilities in the middle and long terms. Such an anticipation has been taken by building the container wharf in the Hatta Terminal, and based on the data from Pelabuhan Indonesia IV, the facilities can directly increase the growth of container flow in 1998 as many as 102 thousand TEUs at the growth rate up to more than 20 percent in the first two years and more than 10 percent in the next years and reach \pm 600 thousand TEUs in 2019. Meanwhile, in order to improve the performance and operation of Makassar Container Terminal, the readiness of discharging

equipment, especially Gantry Crane, becomes a key for the speed of cargo movement from and onto the ship and becomes a factor to reduce the Dwelling Time. Taking into account those thoughts, it needs other efforts to reveal several aspects related to the research, for example, a further study is expected to show the unrevealed things as new findings and can accomplish the result of this research.

REFERENCES

- Akbar, M. R. (2018). *Dinamika Aktor dalam Perumusan Peraturan tentang Tata Ruang dan Tata Wilayah di Kota Makassar*. The POLITICS: Jurnal Magister Ilmu Politik Universitas Hasanuddin, 4(1).
- ALDaghlis, H., Duffield, C., & Hui, F. K. P. (2018). The importance of environmental sustainability to obtain finance for port developments in Australia and Indonesia. 42nd AUBEA Conference 2018: Educating Building Professionals for the Future in the Globalised World, 156–165.
- Amran, A. (2020). Analisis Kebutuhan Fasilitas Penanganan Petikemas di Terminal Petikemas Makassar New Port. In Repository Unhas. (Doctoral dissertation, Universitas Hasanuddin).
- Arahman, A., Afifuddin, M., & Yusuf, S. (2018). Studi konservasi bangunan cagar budaya di dalam kawasan rencana pengembangan pelabuhan bebas Sabang. Jurnal Arsip Rekayasa Sipil Dan Perencanaan, 1(1), 43-52.
- Arianto, D. (2014). Kebutuhan Pengembangan Dermaga Petikemas (Studi Kasus: Pelabuhan Biak). Jurnal Penelitian Transportasi Laut, 16(3), 103-118.
- Ariyanto, D. (2017). Evaluasi Pengembangan Pelabuhan Sibolga. Jurnal Penelitian Transportasi Laut. Jurnal Penelitian Transportasi Laut, 19(1), 1–13.
- Beresford, A., Pettit, S., Xu, Q., & Williams, S. (2012). A study of dry port development in China. Maritime Economics & Logistics, 14(1), 73-98.
- Farikin, M., Boesono, H., & Wijayanto, D. (2015). Analisis pengembangan fasilitas Pelabuhan Perikanan Nusantara Prigi Kabupaten Trenggalek Jawa Timur ditinjau dari aspek produksi. Journal of Fisheries Resources Utilization Management and Technology, 4(4), 87-96.
- Jansen, M., van Tulder, R., & Afrianto, R. (2018). Exploring the conditions for inclusive port development: the case of Indonesia. Maritime Policy & Management, 45(7), 924-943.
- Kartohardjono, A., & Buwono, H. K. (2012). Analisis Pemindahan Lokasi Pelabuhan Singkawang Akibat Rencana Pengembangan Kawasan. Konstruksia, 4(1), 35–46.
- Kasba, P. S., & Paotonan, C. (2020). Analisis Tingkat Pemanfaatan Dermaga Terminal Peti Kemas di Pelabuhan Indonesia IV Cabang Makassar New Port. SENSISTEK: Riset Sains Dan Teknologi Kelautan, 159-167.
- Lasse, D. A. (2016). *Manajemen Kepelabuhanan (Edisi Dua)*. Jakarta: Rajawali Pers.
- Mahmoudi, M. M., & Mollaei, E. (2014). The effect of business process re-engineering factors on organizational agility using path analysis: Case study of ports & maritime organization in Iran. Asian Economic and Financial Review, 4(12), 1849.
- Nurdyana, E., Rosyid, A., & Boesono, H. (2013). Strategi Peningkatan Pemanfaatan Fasilitas Dasar dan Fungsional Pelabuhan Perikanan Pantai (PPP) Tegalsari Kota Tegal. Journal of Fisheries Resources Utilization Management and Technology, 2(2), 35-45.
- Othman, M. K., Rahman, N. S. F. A., Ismail, A., & Saharuddin, A. H. (2020). Factors contributing to the imbalances of cargo flows in Malaysia large-scale minor ports using a fuzzy analytical hierarchy process (FAHP) approach. The Asian Journal of Shipping and Logistics, 36(3), 113-126.
- PDKM. (2015). Peraturan Daerah Kota Makassar Nomor 4 Tahun 2015 tentang Tata Ruang Wilayah Kota Makassar Tahun 2015 – 2034.

- Putra, A. A., & Djalante, S. (2016). Pengembangan Infrastruktur Pelabuhan Dalam Mendukung Pembangunan Berkelanjutan. *Jurnal Ilmiah Media Engineering*, 6(1), 433–443.
- Ricardianto, P., Prastiana, R., Thamrin, M., Agusinta, L., Abdurachman, E., & Perwitasari, E. P. (2021). The Ship's Crew Performance of Indonesian National Shipping Companies. *International Journal of Research in Commerce and Management Studies*, 3(3), 52–66.
- Ruslin, R. (2021). Analisis Kinerja Pelayanan Operasional Terminal Petikemas Pelabuhan Soekarno Hatta. *JISIP (Jurnal Ilmu Sosial Dan Pendidikan)*, 5(2), 603–617.
- Shu, Y. Q., Daamen, W., Ligteringen, H., & Hoogendoorn, S. P. (2012). AIS data based vessel speed, course and path analysis in the Botlek area in the port of Rotterdam. *IWNTM 2012: Proceedings of the International Workshop on next Generation of Nautical Traffic Model*, Shanghai, China, (pp. 64-72).
- Siahaan, W. J. (2015). Kualitas Pelayanan Kapal dan Kecepatan Bongkar Muat Kapal Terhadap Produktivitas Dermaga Petikemas Pelabuhan Makassar. *Warta Penelitian Perhubungan*, 27(5), 369-380.
- Sinaga, B. P., & Daud, J. (2014). Kajian Berth Occupation Ratio di Dermaga Pelabuhan Penyeberangan Sibolga Kaitannya Dengan Perkembangan Pelabuhan. *Jurnal Teknik Sipil USU*, 3(2).
- Situmorang, A. M. M., & Buchari, E. (2015). Analisis Kapasitas Terminal Peti Kemas Pelabuhan Boom Baru Palembang. *The 18th FSTPT International Symposium August 28, 2015*.
- Solossa, A. Y., Paransa, M. J., Elisabeth, L., & Sendow, T. K. (2013). Perencanaan pengembangan pelabuhan laut Sorong di kota Sorong. *Jurnal Sipil Statik*, 1(10), 645–652.
- Taneja, P., van der Hoek, A., & van Koningsveld, M. (2020). A nature-based solution for sustainable port development in Port of Kuala Tanjung, Indonesia. *Coastal Engineering Proceedings*, 36v, 51-51.
- UU RI. (2008). Undang-Undang Republik Indonesia Nomor 17 Tahun 2008 tentang Pelayaran Pasal 1 butir 12.
- Wahida, J., Mappangara, A. S. C., & Idrus, M. (2019). Analisis Kebutuhan Fasilitas Pokok Terminal Peti Kemas New Port Makassar. *Prosiding Forum Studi Transportasi Antar Perguruan Tinggi*, (pp. 101-101).
- Widiyanto, Y. A. (2019). Evaluasi Fasilitas Eksisting Pelabuhan dan Rencana Pengembangan Pelabuhan Sunda Kelapa. (Doctoral dissertation, Universitas Gadjah Mada)..