

Oebobo Station Performance on the Pattern of Public Transport Movement in Kupang City

M. Manaf¹, B. Surya¹, Harmansyal¹

¹ City and Regional Planning Study Program, Faculty of Engineering, Bosowa University, Jl. Urip Sumohardjo KM. 4, Makassar, Indonesia 90231

*Corresponding email: uchalm@gmail.com

ABSTRACT

The development of Kupang City can be observed from the increase of activity or movement of society, so that city needs the existence of a system of transportation service and satisfied traffic. One of the facilities of urban transportation is a station that serves as a node point, can be considered as a tool to process loading and discharge passengers. Station has the complexity of the problem and affects the movement of public transport. The lack of public transportation operating at Oebobo Station is one of the phenomena in Kupang City. This research was conducted to examine the performance of the station to the movement pattern by reviewed at the location effectiveness, operational service, and transportation movement towards the pattern of public transportation movement in Kupang City. The purpose of research to see the effect of station performance on the pattern of movement and the influence of spatial structure on movement patterns by using quantitative approach. The data obtained through observation, survey and documentation are analyzed by using path analysis, and then tested simultaneously and partially. The results show that the performance of the station in supporting the movement of Kupang City is a sufficient. Location effectiveness, service operation, and transportation movement have significant effect simultaneously to movement pattern in Kupang City. Partially shows that the movement of transportation (destination, transportation route, and passenger safety) and the insufficiency of public transportation operating at Oebobo Station have an impact on the reduction of station performance grade.

Keywords: Station performance, public transport, the pattern of movement, path analysis, operational services

1. INTRODUCTION

The development of the city can be seen from the increased activity or movement of people in the region with various supporting aspects directly related to the existing facilities, in order to meet the needs of the people in the city. Transportation is one aspect that supports the development of a city. Thus the development of the city requires the existence of a system of transportation and adequate traffic.

Station function as a place to raise and lower people or goods and arrange the arrival

and departure of public transport is a form of transport network node. To support population mobility and traffic order, the Station must be able to work optimally and efficiently. Station also serves as a means of supporting the increase in local revenue from the sector of restricts. Station serves as a place of moving passengers or goods of one type of transport to other types of transportation mode. Based on these demands then a station must be able to accommodate, organize and control and serve

all activities so that run smoothly, orderly, regular, safe and comfortable [1].

Likewise with the pattern of movement is interpreted as a one-way movement from a zone of origin to the destination zone, including pedestrians [2]. The emergence of movements due to the fulfillment of needs that can not be met in place of origin, this gives a contribution to the rise of movement. A spatial movement is divided into three groups, namely first, internal movement is the movement that takes place within a region [3]. Internal movement is done with the starting point and purpose of trip within a region. Second, the external movement is the movement from outside the region to a particular region or otherwise. Third, movement through is a movement that passes only through a region without stopping in the region.

People need public transportation to reach workplaces, to shop, trip, or to meet other socio-economic needs [3]. According to Levinson in [3], the public transport request is generally influenced by the characteristics of the population and land use in the region. High demand occurs in areas with high population density such as industrial areas, offices, and education, as well as and areas with low private vehicle ownership. The transportation service system in Kupang City is one of the components in the transport movement system that is characterized by the Station's existence.

Oebobo Station located in the city center is able to provide services in Kupang City as a transportation node that contributes to the movement pattern. The lack of public transportation operating at Oebobo Station is

one of the phenomena in Kupang City. Therefore, this study was conducted to assess the performance of the Station against the movement pattern by analyzing the location effectiveness, operational service and movement of transportation to the pattern of movement of public transport in Kupang City.

Several previous research results related to the effect of Station performance on movement patterns, among others (a) optimization of station space with case study of Station Palembang. Station representative and most influential is transportation cost factor (b) result of performance research and technical service of public transportation Station of Sibolga City about service user satisfaction level to Station service due to maximum delay of two vehicles during 15 minutes [4], (c) Leuwipanjang Station performance analysis on the movement of Bandung City, in supporting the movement in Bandung is considered adequate, because the route of urban transportation and Damri bus which is connected directly to Leuwipanjang Station [5], (d) The influence of station location is developing due to location strategy so that Giri Adipura Station is less developed compared with and Sub Station of Krisak [6], (e) Analysis of the need for general vehicle service at Palembang Alang-Alang Station that the waiting time is shorter and the queue is not long, which means the number of vehicles is too much so there is no need to increase the public transport fleet [7]. To some research on station performance terminology, more emphasis on cost, service operational and influence of

location which influence to station performance. So in this study more emphasis on the effectiveness of location, service operational and transportation movement in seeing the effect of Station performance in Kupang City that contribute to the pattern of movement of public transport.

2. THE STUDY METHOD

A. Research Location Map

Research location of Oebobo-Kupang Station at eltari II street in East Nusa Tenggara Province. Basic consideration is the location of a strategic station because it is in the center of

the activity that is located close to the central office and trade center so as to provide mobility convenience for the community. Stations with a central terminating model can develop an integrated station in the center of the city that serves all types of transportation in Kupang City.

In general, the center of Kupang City is located in some areas of Alak District and Kota Lama Subdistrict that developed in the suburban area. The functions of settlements, trade and services as well as education (campus) provide the burden of movement from the city center to the periphery.

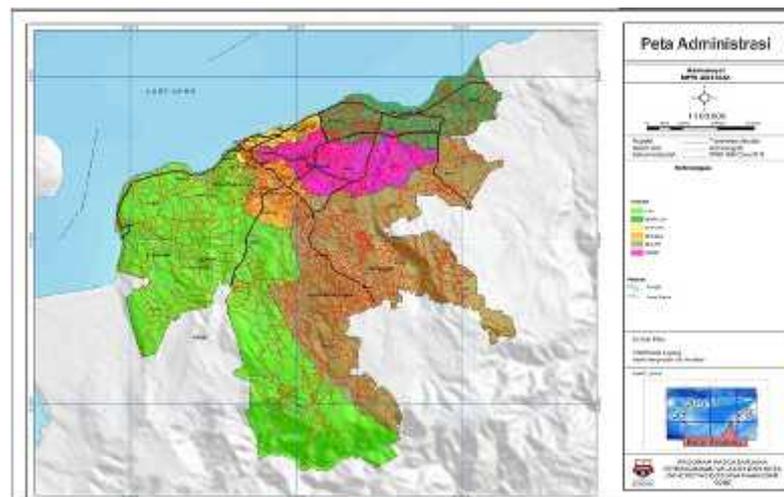


Fig. 1. Map of research location

B. Research Approach

Based on the research objective of analyzing the effect of service performance of Oebobo-Kupang Station on the pattern of movement of public transport as transportation movement system in Kupang City, the appropriate approach is the quantitative approach. Quantitative approaches can examine the theory, build facts, and show relationships between

variables, provide statistical descriptions, evaluate and estimated results.

The purpose of this study is to analyze the effect of Oebobo-Kupang Station service performance on the pattern of public transport movement, as a role of urban transportation in transportation movement system in Kupang City. The research approach chosen is a quantitative approach that aims to test theory and build facts, show relationships among

variables, provide statistical descriptions, assess and forecast the results. This type of research is an associative research that aims to see the effect of independent variables namely location effectiveness, service operational and transportation movement to dependent variable that is movement of public transportation, and variable that is strengthen or weaken influence of location, service operational and transportation movement toward to movement of transportation general or moderator variables.

C. Method of Collecting Data

Related to the type of research, the data collection method is (a) direct observation to the research location to identify the operational performance of the service, such as station capacity, Station facility condition and the pattern of public transport movement; (b) survey using questionnaire instrument with information gathering technique allows analysts to examine the attitudes, beliefs, behaviors, and characteristics of some of the people sampled in this study. Using the questionnaire, the analyst attempts to measure what is found in the interview, but also to determine how broad or limited the sentiments are expressed in an interview; (c) documentation of location data in

the form of images of the Station location and its surroundings as well as the writing or archive of information about Oebobo-Kupang Station and spatial planning documents that have been prepared by the government of Kupang City.

D. Data Analysis Technique

The data analysis process related to the effect of station performance on movement pattern is used path analysis. Path analysis is a technique of development of multiple linear regressions. This technique is used to test the amount of contribution shown by path coefficient on each path diagram of the causal relationship between variables X1, X2 and X3 to Y and its impact on Z (Figure 2). Path analysis is used to analyze the descriptive of the influence of Oebobo-Kupang Station's performance on the pattern of movement of public transport. As the development of multiple linear regression, before the first path analysis, the data are tested for validity and reliability, after which the regression normality test and the four classical assumption test are validity test, reliability test, multicollinearity test and heteroscedasticity test, then multiple regression analysis and path analysis.

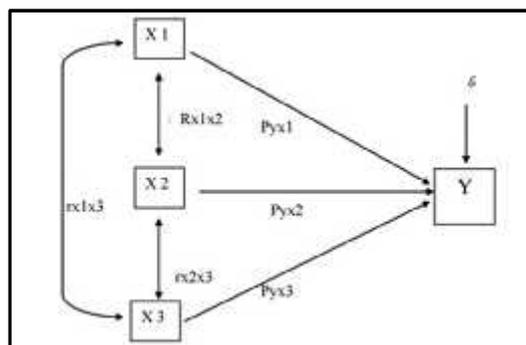


Fig. 2. Hypothetic proposition on channel of causal relation

In this research used path analysis to see the path of a relationship between location effectiveness variable, service operational, movement of transportation to movement pattern, and also variable that can give influence of positive and negative value so that can be known determinant factor through correlation of variables studied. Analysis of the path of this study provides an overview in the form of model to analyze the performance of the station to the pattern of movement through the variable location effectiveness, service operations, movement of transport to the pattern of movement so it can be concluded the value of influence with the relationship of variables directly or through other variables.

2. RESULT AND DISCUSSION

Public transport activities are always initiated and terminated at the station. The station is an integral part of public transport

operational planning. As a movement knot in Kupang City, there are five Stations including type B namely Oebobo and Type C Stations, namely Kupang Station, Tabun Station, Belo Station, and Alak Station. Kupang City's land transportation system is served by minibus of public transportation called bemo. While the taxi service and several routes are served by the city bus. Most of the inner city routes are served by bemos connecting several stations such as Kupang Station, Oepura Station and Oebobo Station. For the departure of a road to out of town served in Oebobo Station which is expected to meet the needs of public transport Kupang and surrounding areas. Much public transport doing their activities should stop inside the station and park in the parking, but more parking outside of the station or often referred to by the term "shadow station" by the people of Kupang City, resulting in the traffic jam.



Fig. 3. Condition of loading and discharging passenger in Station and the road

A total of 818 units of public transport passenger type of urban transportation have been able to meet the needs of the community. However, it is necessary to control the route in accordance with the prevailing procedures. Based on the survey results data in the field shows that several routes of public transport services tend to serve the route is not fixed so as to produce long trip time. Almost all roads in Kupang City through the route of city transportation as much as 15 routes. Route pioneer has developed local government as much as 9 routes to serve the suburban area of Kupang City.

Inter-city routes within the province have 4 routes spread across the west of Kupang

City such as Soe, Kefa, Atambua and Betun / Besikama districts, which are also loading and discharge at Oebobo Station. Based on the data of the urban transport network, city transportation within the province and government buses operating in Kupang City has a 36.94 Km length Kupang-Baumata trip. The route is through residential areas, commerce, shopping centers and traditional markets, office and education areas, namely schools and universities through Siliwangi - Sumba - Timor Raya - Adisucipto - Penfui - Baumata road, and turn by Adisucipto - Timor Raya - A. Yani - Urip Sumihardjo - Kupang Station.



Fig. 4. Map network of public transport.

A. Station Performance Analysis to the Pattern of Public Transport Movement

Before using path analysis, the first step is to test the validity of data, test reliability and test requirements.

Data Validity Test

Based on the analysis result that the whole item has corrected item-total correlation

$r\text{-count} > r\text{-table}$ it means the whole item has value more than 0,195. It can be analyzed that the whole item as many as 10 items is valid and able to produce the right data and give a careful picture about the performance of Oebobo Station in Kupang City. The ten items of the intended instrument are questions related to the research variables, both the dependent variable

(Y) in the form of movement patterns and unrestricted/free (X) variables, ie location effectiveness, service operations and transport movement.

Reliability Test

Reliability test aims to determine the consistency of measuring instruments, whether the measuring instruments used are reliable and remain consistent if the measurement is repeated. From the analysis above we get the alpha value of 0.806, while the r-table value (2-sided test) on the significance of 0.05 with the amount of data ($n = 100$), obtained by 0.196. So it is analyzed that the items of research instrument are reliable because of the value of $\text{Alpha} > \text{r-table}$. With the value of alpha of 0.806 it can be desirable that the level of instrument grain trust used to determine the performance of Oebobo Station by using three research variables, namely location effectiveness, operational services and transport movement is high enough so that this research is considered reliable and provide a precise and related performance of Oebobo Station. It is assumed that the ten items in the questionnaire can be trusted or reliable because the respondent's answer to the question is consistent and stable over time.

Test Requirements Analysis

This pathway through four classical assumption tests is regression normality test, multicollinearity test, linearity test and autocorrelation test.

Based on output the regression normality test, it is known that the significance value (Asymp.Sig 2-tailed) is 0.193. Due to the

significance of more than 0.05 ($0.193 > 0.05$), it is stated that the data is normally distributed. To know whether or not the deviation of classical assumption of multicollinearity is used multicollinearity test, that is the existence of a linear relationship between the independent variable in a regression model. It is known that the value of variance inflation factor (VIF) to location effectiveness variable is $1,496 < 5$, service operational variable has VIF value $1.593 < 5$ and variable of transport movement have value VIF $1,184 < 5$. It is assumed that inter independent variable does not occur multicollinearity problem.

Linearity test aims to determine whether two variables have a linear relationship significantly or not. It can be seen the linearity test of the location effectiveness that the significance value of 0.000. Because of significance less than 0.05 it can be analyzed that between the variable It is assumed that the high pattern of movement in the Oebobo Station of Kupang City is due to the effectiveness of the Station location. The close distance from passenger residence and the relatively fast trip time to the passenger destination requires a low cost for passengers in mobilizing to the destination of movement. So the existence of Oebobo Station location provides convenience for passengers in performing their daily activities using Station services.

The service operational linearity test is known that the significance value is 0.000. Because of significance less than 0.05 it can be concluded that between the variable pattern of movement and service operations there is a

linear relationship. It is assumed that service operations are able to provide satisfaction to Station service a user which leads to an increasing number of passengers at Oebobo Station. So that will make the pattern of movement is greater. Based on the linearity test of the movement of transport known that the value of significance of 0.218. Because of the significance of more than 0.05, it can be analyzed that between the variable pattern of movement and movement of freight there is no linear relationship.

The speed of movement of public transport in Oebobo Station tends to seem disorderly even not prioritizing passenger safety. Public transport drivers lack the awareness and self-control of passenger safety. Drivers of public transport run their vehicles at a relatively high speed just to get plenty of passengers. Sometimes driver behavior is scrambling for passengers with other drivers, so the habit of preceding public transport in front of it to get passengers has become the attitude of the drivers. Passengers feel the discomfort of this that causes the movement pattern to have a non-linear relationship with the movement of the vehicle.

Autocorrelation test is used to determine whether or not there is deviation of classical autocorrelation assumption that is a correlation between residual in one observation with other observation on the regression model. The prerequisite that must be fulfilled is the absence of autocorrelation in the regression model, obtained the value of Durbin Watson (DW) test resulting from the regression model is

1.803. While from table DW with significance 0.05 and amount of data (n) = 100 and k = 3 (k is number of independent variable) obtained dL value equal to 1.613 and dU equal to 1.735. Because of the $DW > dU$ ($2.072 > 1.7637$) value, it is analyzed that there is no autocorrelation problem in the regression model, so that location effectiveness variable, service operations, and transport movement are eligible for use in path analysis. The pattern of movement and location effectiveness there is a linear relationship. This means that the greater the value of location effectiveness, the higher the value of movement patterns.

B. Path Analysis

Path analysis is a developmental technique of multiple linear regressions. This analysis is used to analyze the causal relationships that occur in multiple regressions if the independent variables affect the dependent variable directly and indirectly. The main subjects of this analysis are the correlated variables.

Based on the results of correlation analysis can be seen that there are relationships between independent variables, namely the variable location effectiveness, service operational variables and transport movement variables. However, the magnitude of the relationship between variables varies, ie the location effectiveness variables have a moderate relationship to the operational variables of service but has a low relationship to the variable movement of transportation and operational variables services, as well as a low relationship with the variable movement of transportation.

Before giving further interpretation about the influence of the variables studied, and then first tested whether the Station performance variable (X) has an effect on the movement pattern (Y). Hypothesis testing is done through two stages, namely simultaneous influence test and partial influence test.

Based on simultaneous testing, from F-tables for significance levels of 0.05 and degrees of freedom $db1 = 3$ and $db2 = 96$ obtained $F_{0.05}(3,96) = 2.70$, the F-count is greater than F-table ($27.462 > 2.70$), or has a significance value of 0.000 which is smaller than the error rate of 5% ($\alpha = 0.05$). This suggests that there is a simultaneous influence between the dimensions of the Station performance variable on the pattern of movement.

The magnitude of influence simultaneously aspects dimensional variables X1 to X3 on the pattern of movement, shown by the value of coefficient of determination (R²) of 0.462. Which means that statistically, the pattern of movement in this case is influenced by the dimensions of these variables by 46.2%, and there are dimensions of other variables that have not been raised in this study that is equal to 53.8%.

Depend on the test partially indicates that the three dimensions of the X variables, have a significant influence on the pattern of movement. If the result is transformed to the model of the path diagram then graphically the model is as shown in Figure 5.

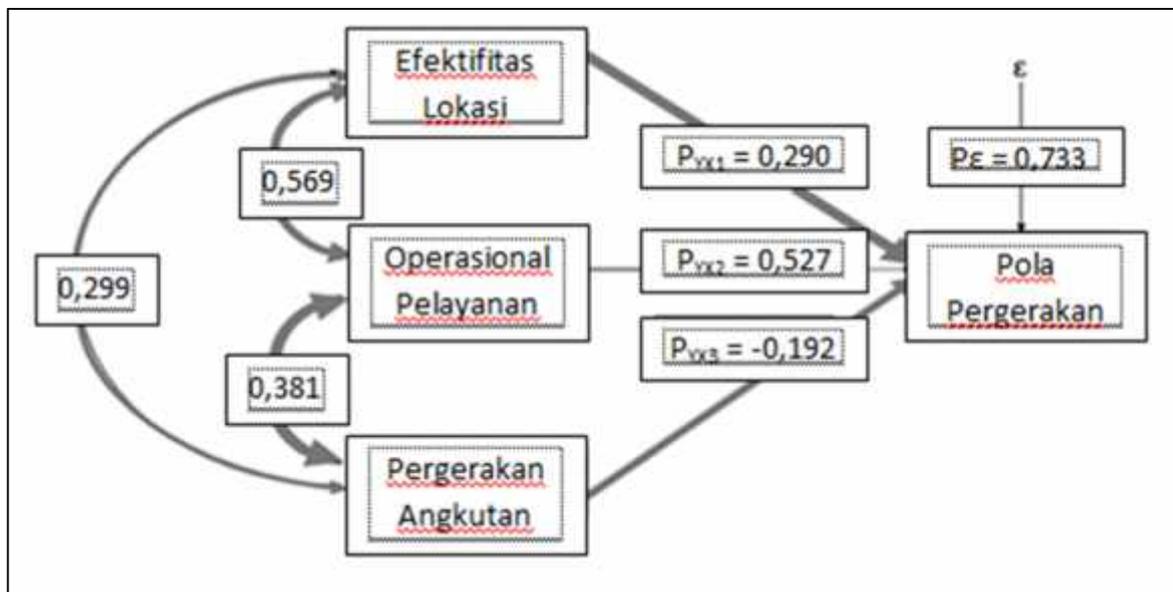


Fig. 5. Path diagram - model structural

To further assess the test results of each variable, the first is the location effectiveness variable, indicating that the magnitude of the effect of the dimension of location effectiveness

variables on the movement pattern with the operational service is 8.7%. While the dimension of transport movement variable will reduce the influence of 1.7%. So the dimension

of location effectiveness variables has partial influence on the movement pattern of 15.4%. This means that with the operational service and transport movement contribute to the effect of location effectiveness partially to the pattern of movement (Figure 6). Accordance with the idea

[8] that the determination of the Station location is influenced by transportation services and distance services that contribute positively to the pattern of transport movement that is the difference of route, destination, and type of transport vehicle.

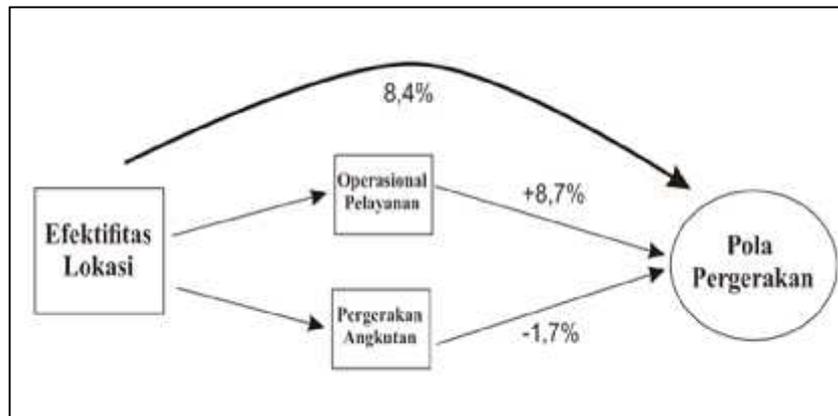


Fig. 6. Model of location effectiveness analysis

Second, depending on the operational variable of service, the amount of additional influence of Station service variable dimension to the movement pattern with the location effectiveness is 8.7%. While the dimension of the variable movement of transportation will reduce the influence of 3.9%. So the dimension of an operational variable of Station service has partially influenced the movement pattern of 27.8%. The operation of the Station services is very decisive for visitors and drivers to use the

Station services (Figure 7). Station management plays an important role in Station service operations. The capacity of the Station to meet the needs of passengers and drivers will provide convenience in conducting mobilization activities; this is an attraction for Station service users to take advantage of the Station because it feels comfortable and satisfied with Station service operations that will ultimately improve station performance for the better.

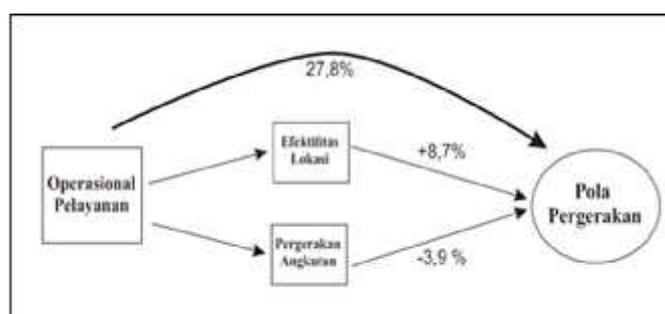


Fig. 7. Model of analysis service operasional

Waiting time is not long to give satisfaction to passengers will be the time spent in the station, as well as access in and out of the high station so as not to cause traffic jam inside the station. These process when confronted with thought [1], which states that the Station is a very complex facility is characterized by many activities that occur in the Station and often occur simultaneously causing traffic jam. However, it does not occur at the research location due to the lack of Station service users as well as facts in the field that show no traffic jam occurrence.

Third, the variable movement of public transport describes the magnitude of the reduction of the value of the effect of the variable dimension of the movement of transportation on the pattern of movement with the effectiveness of the location is 1.7%. While with the operational dimension of Station service will reduce the influence of 3.9%

(Figure 8). So the dimensions of vehicle movement variables do not have a partial effect on the movement pattern of -1.8%. The speed of moving the vehicle gives the impression of comfort for the passengers. For some passengers, the faster the vehicle will move the faster they will arrive at their destination. However, most drivers at the study sites do not have an awareness of the importance of vehicle speed, especially for the safety of passengers and themselves. Most drivers drive their vehicles at high speed without thinking about the safety and comfort of passengers. Impressed that the driver is moving at high speed to compete with other drivers to get passengers. This gives a sense of discomfort for the passengers. The ability of the driver to control the speed of the vehicle to stay at a safe level is desirable. Awareness of the importance of passenger safety and comfort must be owned by each driver.

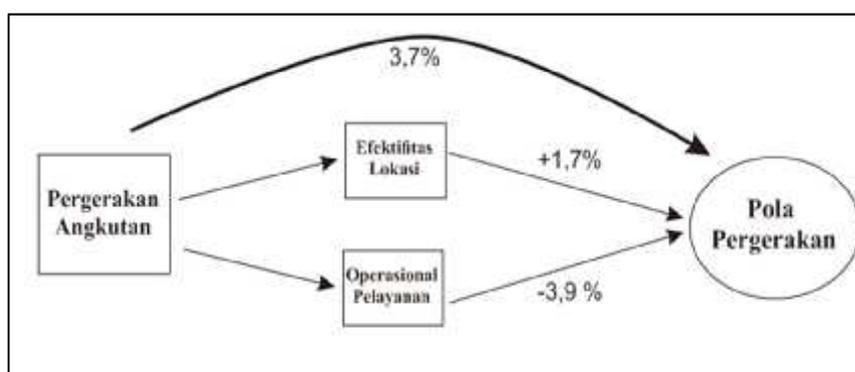


Fig. 8. Model of Analysis movement public transport.

According to an analysis of the performance of the Station, it can be concluded that the performance of the Station in favor of Kupang adequate movement, shown by the effectiveness of the location, movement of

transport service operations and simultaneously have the significant effect on the pattern of movement in the city of Kupang. Similarly, the results of the study [5] that Station performance strongly supports the pattern of urban

movement described by the route of transportation from the Station have been able to reach the centers of urban activity. This means optimal Station performance when the pattern of movement reaches across the city.

However, the result of partial path analysis shows that the movement of transportation which includes the destination, the route of transport movement and the safety of passengers and the lack of public transportation operating in Oebobo Station, has an impact on the reduction of Station performance value. This is obtained from the partial test results of the movement of transportation to the operational services provide a minus value (-) to the pattern of movement.

3. CONCLUSION

The Station performance to supporting the Kupang City movement is sufficient and significant based on the location's effectiveness, service operation, and public transport movement. However, partially, the movement of public transport such as the pattern, speed, purpose, and route of movement and the lack of transportation operating at Oebobo Station have an impact on the reduction of Station performance value.

REFERENCES

- [1] Morlok, E.K. (1991). Pengantar Teknik dan Perencanaan Transportasi, Edisi ke-3, Erlangga, Jakarta
- [2] Tamin, O. Z. (2000). Perencanaan dan Permodelan Transportasi, Edisi ke-2. ITB. Bandung
- [3] Setiawan, B. (2004). Pengaruh Struktur Kota Terhadap Pola Pergerakan Di Kota Semarang dan Kota Surakarta, Thesis, unpublsh, Universitas Diponegoro, Semarang.
- [4] Sibagariang, H. (2014). Kinerja dan teknis pelayanan Station angkutan umum Kota Sibolga, thesis, unpublsh, Department of Civil Engineering, North Sumatera University, Medan.
- [5] Angestiwi and Rakhmatulloh. (2013). Analisis Kinerja Station Leuwipanjang terhadap Pergerakan Kota Bandung, Jurnal Pembangunan Wilayah dan Kota, Universitas Diponegoro, Vol. 9, No. 2, p. 205-214.
- [6] Sihono. (2006). Pengaruh Lokasi terhadap Aktivitas Station, thesis, unpublsh Magister Teknik Pembangunan Wilayah dan Kota, Universitas Diponegoro, Semarang.
- [7] Latif, A. and Suhirkam, D. (2013). Analisis kebutuhan pelayanan kendaraan umum dalam Station Alang-Alang Lebar Palembang, PILAR Jurnal Teknik Sipil, Volume 9, No. 2, Politeknik Negeri Sriwijaya.
- [8] Iles. (2005). Public Transport in Developing Country, Elseiver.