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The Effect of Land Use and Traffic Performance on Urban Air Quality in the Maminasata Peri-Urban Area

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Abstract

The corridor of the Hertasning-Tun Abdul Razak road section is a peri-urban area that is experiencing high dynamics due to the need for housing and new facilities for activities. This manifests a spatial transformation. Spatial transformation has an impact on increasing anthropogenic activity which can reduce air quality. Increased journal anthropogenic activity with land use and performance across corridors. This research uses quantitative methods to measure the relationship between variables using land, traffic performance, and climatic conditions to air quality with data analysis using SEM PLS. The results of the hypothesis statistically on the effect of each independent variable on the dependent variable on land use have a significant effect on climatic conditions and air quality. However, land use variables have a dominant influence on air quality. Meanwhile, the analysis of the indirect effect shows that there is no indirect effect between land use and traffic performance on air quality. This shows that climatic conditions are not a mediating variable. The results of the analysis also show that there are only 2 valid land use indicators showing the effect, namely the use of grass land and water bodies. This explains that the increased built-up area on the Hertasning-Tun Abdul Razak road corridor does not affect air quality, but what affects air quality is the dominance of anthropogenic activities that can release emissions into the air. Anthropogenic activities that affect air quality are expected to come from open dumping, smoke pollution from fish combustion systems, and emissions from domestic waste that enter air bodies.

Keywords
anthropogenic activity; air quality; corridor; fairy-urban

I. Introduction

One of the road corridors in the Maminasata metropolitan area that shows signs of transformation is the Hertasning-Tun Abdul Razak road corridor. The Hertasning-Tun Abdul Razak Corridor is a suburb of Makassar City which is directly connected to the Maminasata Metropolitan area. In particular, this area is also connected to the Sungguminasa urban area in Gowa Regency. The appearance of the outskirts of the Hertasning-Tun Abdul Razak Corridor underwent rapid and revolutionary physical and spatial changes in the period 2004 - 2014. The shift in spatial function in this area is marked by the conversion of land use from productive land for agriculture to large-scale residential areas, education, offices, shopping centers, services, hotels, and other commercial economic activities. This shift in spatial function has an impact on changes in

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the spatial structure and is positively associated with changes in the structure of the community living on the outskirts of the Hertasning-Tun Abdul Razak Corridor. Changes in the social structure of the community in this corridor were initiated by changes in the orientation of local community activities (Surya, 2015).

Based on the concept of a corridor area proposed by McGee (1997) the area along the transportation route will undergo a spatial, economic, social and cultural transformation which in turn causes a very significant regional transformation from a rural nature to an urban one along the land transportation route (Yunus, 2006).). The role of transportation is a determining factor that causes changes in physical appearance (Yunus, 2008). Physical changes ultimately cause changes in environmental elements that exist in an area as a system. On the other hand, human activities will have an impact on the ecological environment. This concept has been emphasized through the Anthropocentrism Theory which views that humans are the main center of power in ecology and even the universe, thereby allowing environmental damage by and for the benefit of humans. While the holistic theory asserts that the destruction of nature will always be related to human actions and behavior (Inoguchi, et al, 1999).

One of the causes of the decline in the quality of the abiotic environment is the increase in anthropogenic activity which is marked by an increase in transportation flows. Improved accessibility is a driving factor for increasing transportation flows which ultimately reduces air quality in the area. In addition, the increasingly complex form of land use, namely the increasing number of built-up lands and less open land for vegetation growth, also has the potential to increase global warming which causes the creation of a city climate, namely a microclimate that is different from the suburbs. Conversion of natural land use to artificial has an impact on temperature changes, namely an increase in daily temperature. Climate change itself will reduce the air quality in the region. Development is a systematic and continuous effort made to realize something that is aspired. Development is a change towards improvement. Changes towards improvement require the mobilization of all human resources and reason to realize what is aspired. In addition, development is also very dependent on the availability of natural resource wealth. The availability of natural resources is one of the keys to economic growth in an area. (Shah, M. et al. 2020)

The corridor of the Hertasning-Tun Abdul Razak road section as an area experiencing a rapid increase in anthropogenic activity, will experience changes in urban air quality. For this reason, this study tries to analyze the relationship model of land use and traffic performance on urban air quality simultaneously. The results of this study can be used as the basis for regional development planning on the Hertasning-Tun Abdul Razak road corridor which is more sustainable.

II. Research Method

This research approach uses quantitative methods, in the form of a causal relationship associative problem formulation. This research is a causal research based on primary data analysis. Causal research with experiments to determine the relationship between land use, traffic performance, climate conditions and air quality.

In this study there are 3 (three) variables, namely the independent variable (free), the moderator variable and the dependent variable (bound). The independent variables in this study are land use and traffic performance, the moderator variable in this research is climatic conditions and the dependent variable in this study is climatic conditions. The variables in this study are:

Table. 1. Research Variables

No	Variable Type	Variable	Indicator
1.	Independent/Free/Exogenous Variables	Land Use (X1)	a. Built Land (X1.1) b. Open Land (X1.2) c. RTH/Tree (X1.3) d. Grass (X1.4) e. Rice Fields (X1.5) f. Body of Water (X1.6)
		Traffic Performance (X2)	a. Average Speed (X2.1) b. Number of Side Barriers (X2.2) c. Vehicle Volume (X2.3) d. Average Density (X2.4)
2.	Dependent/Bound/Endogenous Variables	Air Quality (Z)	a. SO2 (Z1) concentration b. NO2 (Z2) concentration
3.	Intervening/Mediator Variables	Climatic Conditions (Y)	a. Temperature (Y1) b. Air Pressure (Y2) c. Relative Humidity (Y3) d. Wind Speed (Y4)

This research is a field research. Therefore, data collection was carried out through observation, survey, experimental, and field documentation. The data collection techniques are carried out directly for primary data and indirectly for secondary data. Determination of climatic conditions is carried out by collecting meteorological data in real time along with ambient air quality. Meteorological data is measured using a thermometer for measuring air temperature, barometer for air pressure, hygrometer for relative humidity, anemometer for wind speed. Determination of air quality is done by collecting pollutant data through analysis sampling at a certain time period. Pollutant data was measured using air quality monitoring equipment consisting of sampling equipment (impinger) and laboratory equipment (spectrophotometer) (Agustine, 2017).

III. Results and Discussion

3.1 Results

a. Land Use Analysis

One of the independent variables in this study is land use. Changes in land use are the impact of urbanization in urban areas. This phenomenon also occurs in the Hertasning and Tun Abdul Razak corridor roads. However, in this area it is more due to the existence of a very strategic road corridor. The results of the analysis of land use in the Hertasning and Tun Abdul Razak corridor roads are shown in the table below:

Table 2. Results of Land Use Interpretation

No	Monitoring Block	Land Use Area (Ha)						Total Area
		Built-up Land	Open field	Tree	Grass	Ricefield	Water Body	
1	Block 1	32.1	0.9	6.2	5.7	-	-	45.0

2	Block 2	38.3	-	6.5	0.1	-	-	44.9
3	Block 3	40.2	0.2	3.9	0.8	-	-	45.0
4	Block 4	32.9	1.2	3.5	6.5	-	0.7	44.9
5	Block 5	28.2	0.7	2.8	12.9	-	0.4	45.0
6	Block 6	12.8	-	4.2	19.2	4.2	4.5	44.9
7	Block 7	22.0	0.4	3.7	15.1	-	4.0	45.0
8	Block 8	8.4	10.5	4.4	6.3	14.1	1.3	45.0
9	Block 9	14.0	1.9	6.1	9.5	13.1	0.4	45.0
10	Block 10	12.5	1.5	6.0	13.8	9.7	1.6	45.0

Based on the data in table 2 above, the area of use of the built up land is decreasing from block 1 to block 10. The smallest built area is in block 8, this is because in block 8 generally the land use is in the form of rice fields. Meanwhile, the largest built-up area is in block 4, this is because in this block there is a meeting between office activities, services and trade. As for land uses such as open land, rice fields and bodies of water tend to be wider from block 1 to block 10, this is because the land from blocks 6 to 10 has not been fully developed, there are still land uses in the form of rice fields as before the corridor road Hertasning and Tun Abdul Razak.

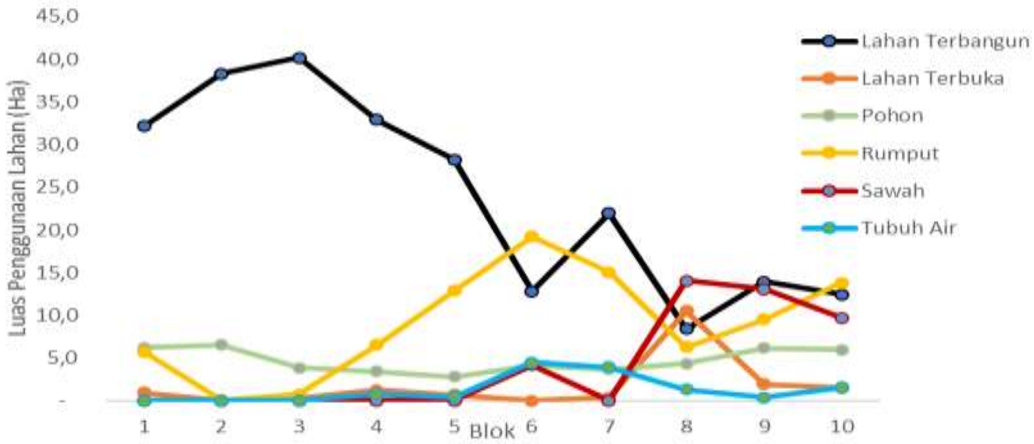

Figure 1. *Land Use Area for Each Block*

The results of this land use analysis further confirm that urban sprawl has occurred in the Hertasning and Tun Abdul Razak corridors. This is in line with the concept of a corridor area proposed by McGee (1997) where the area along the transportation route will undergo a spatial, economic, social and cultural transformation which in turn causes a very significant regional transformation from a rural nature to an urban one along the land transportation route. (Yunus, 2006).

b. Traffic Performance Analysis

Another independent variable in this study is traffic performance. Traffic performance is an important variable in the research on the Hertasning and Tun Abdul Razak corridor roads, considering that the increase in trade and service activities on these roads results in a large-scale population mobilization pull which causes the service level on this road segment to be in category E, which shows the volume traffic is approaching the capacity of the road section (Rahman, et al, 2016). Based on MKJI (1997) the main function of a road is to provide transportation services so that road users can drive safely and comfortably. Traffic flow parameters which are important factors in traffic planning are volume, speed, and traffic density. According to Yani in Syardiansyah (2020) performance is a result of work achieved by a person in carrying out the tasks assigned to him based on skill, experience and sincerity as well as time. However according to Kasmir (2016) that performance is the result of work and work behavior of a person in a period, usually 1 year. Then the performance can be measured by the ability to complete the tasks and responsibilities given. This means that in work contains elements of the standard that achievement must be met, so, for those who reach the standards set means good performance.

For this reason, the indicators used in this variable include speed, volume, vehicle density, and the number of side barriers. The results of the analysis of the traffic performance of the Hertasning and Tun Abdul Razak corridors are shown in the table below:

Table 3. Results of Traffic Performance Analysis

No	Monitoring Block	Traffic Performance Indicator			
		Average Speed (Km/H)	Number of Side Obstacles	Number of Vehicles (Vehicles)	Average Density (Vehicle Hour/Km)
1	Block 1	30,665	17	6799	111.31
2	Block 2	27.6	28	4876	88.32
3	Block 3	24,925	68	5130	103.07
4	Block 4	28.7	40	6353	110.94
5	Block 5	27.85	39	5213	93.61
6	Block 6	35,975	20	4742	65,90
7	Block 7	30,175	18	3498	58.29
8	Block 8	31,775	15	2288	36.06
9	Block 9	37,775	9	1848	24.49
10	Block 10	38.1	8	1751	23.10

Based on the table above, the number of vehicles from block 1 to block 10 tends to decrease. The highest number of vehicles is in block 1 which is about 6,799 vehicles/hour and block 4 of 6,353 vehicles/hour. Meanwhile, the lowest number of vehicles per hour is in block 10, which is 1,751 vehicles/hour. This shows that the pull and generation on the Hertasning and Tun Abdul Razak corridor roads tend to decrease from Hertasning road to Tun Abdul Razak road. This can be understood because the center for office activities, trade and service funds is dominantly located on Hertasning Street, especially in blocks 1 to 4.

Meanwhile, the average speed from block 1 to block 10 tends to increase, although not significantly. Meanwhile, for the average speed, the results are inversely proportional to the density of vehicles and the number of side obstacles. Where the density of vehicles and the number of side barriers tend to decrease from block 1 to block 10. This shows that the service level of the Hertasning and Tun Abdul Razak corridor roads tends to improve from block 1 to block 10. This situation can be understood due to office activities, fund trading services tend to decrease in blocks 6 to 10.

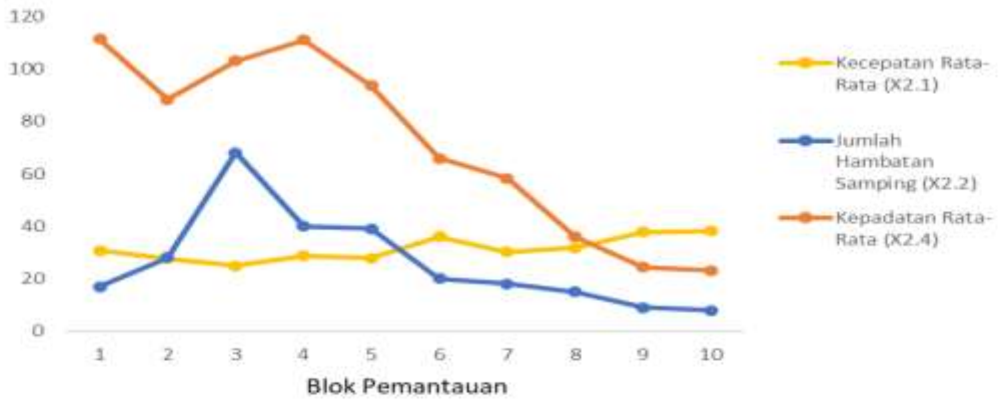

Figure 2. *Average Speed, Vehicle Density and Number of Side Barriers for Each Monitoring Block*

c. Analysis of Climatic Conditions

The mediator variable in this study is climatic conditions. This is based on the consideration that the urban microclimate is strongly influenced by physical conditions and activities that occur in urban areas. For this reason, in this study, measurements of climatic conditions were carried out based on indicators of temperature, pressure, relative humidity, and wind speed. The results of the measurement of climate conditions in each monitoring location block are shown in the table below.

Table 4. Results of Measurement of Climate Conditions

No	**Monitoring Block**	**Climate Condition**			
		Temperature (oC)	Pressure (mmHg)	Relative Humidity (%)	Wind Speed (m3/sec)
1	Block 1	30	746	50	0.7
2	Block 2	29	746	58	0.7
3	Block 3	30	746	44	0.81
4	Block 4	30	746	44	0.9
5	Block 5	31	746	44	0.1
6	Block 6	31	746	45	0.8
7	Block 7	31	746	46	1
8	Block 8	31	746	44	1
9	Block 9	31	746	47	0.9
10	Block 10	31	746	45	0.9

Based on the table above, the air temperature in blocks 5 to 10 is 1 or 2 degrees higher than blocks 1 to 4. This is inversely proportional to the relative humidity where humidity tends to decrease from block 1 to block 10. This can be understood because in block 5 to 10 tend to be more open environment so that the intensity of sunlight is greater. This is also due to the fact that the tree cover factor in blocks 5 to 10 tends to be less than in blocks 1 to 4. The air pressure conditions tend to be the same for all blocks of monitoring locations, namely at 746 mmHg. While the wind speed for each block varies from one block to another. Where the lowest wind speed is in blocks 1 and 2, namely 0, 7 mmHg and the highest wind speed is in blocks 4, 9 and 10. This can be understood because in blocks 1 and 2 generally there are many buildings and trees, the wind movement is blocked a lot so that in the end the wind speed becomes low, while in blocks 9 and 10 the surrounding environment is more open, so the wind movement is freer so the wind speed is high. The description of the relationship between these climate indicators and the monitoring location blocks is shown in the table below.

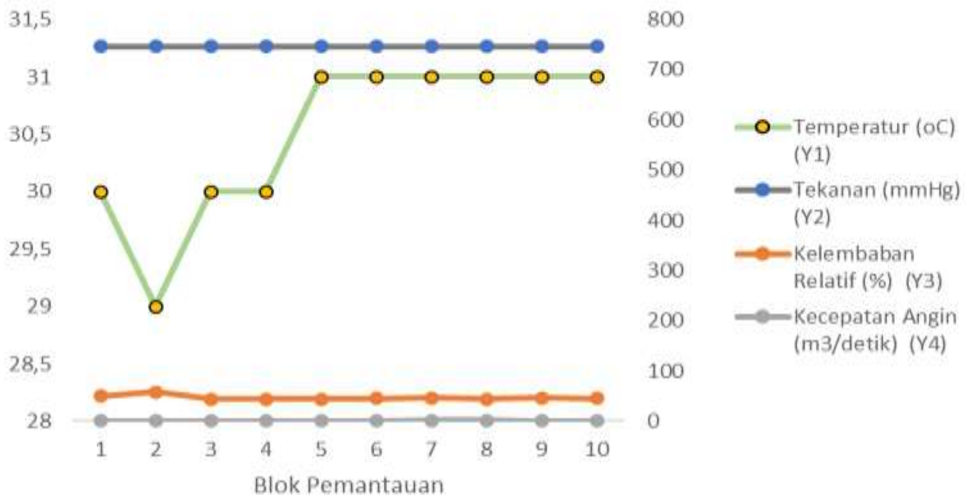

Figure 3. *Measurement of Climate Conditions for Each Monitoring Block*

d. Air Quality Analysis

The dependent variable in the study is air quality. Urban air quality is generally influenced by the increase in population activity in an area, which is characterized by increased attraction and generation in that area. One of the sources of pollution that can reduce urban air quality is emissions from transportation facilities such as motorized vehicles. For this reason, in this study, air quality was determined from the results of field measurements for SO2 and NO2 parameters. The results of the air quality analysis on the Hertasning and Tun Abdul Razak corridor roads are shown in the table below:

Table 5. Results of Air Quality Analysis

No	**Monitoring Block**	**Parameter Measurement Results**	
		SO2 (ug/Nm3)	NO2 (ug/Nm3)
1	Block 1	10.00	3.66
2	Block 2	28.00	0.45
3	Block 3	56.00	0.16
4	Block 4	533.00	1.13
5	Block 5	514.00	3.70
6	Block 6	537.00	0.90
7	Block 7	491.00	1.08
8	Block 8	305.00	1.71
9	Block 9	316.00	0.73
10	Block 10	351.00	0.16

Source: Field Measurement Results, 2020

Based on the results of the air quality analysis in the table above, it appears that the concentration of SO2 tends to increase from blocks 1 to 10. Specifically, the concentration of SO2experienced a significant increase starting from block 4 which reached 533 ug/Nm3. Meanwhile, the NO2 concentration fluctuated from block 1 to block 10. The highest NO2 concentration was found in blocks 5 and 1, which were 3.70 ug/Nm3 and 3.66 ug/Nm3 respectively. The lowest NO2 concentration was found in block 3 and block 10 with a NO2 concentration of only 0.16 ug/Nm3. The graph of the relationship between SO2 and NO2 concentrations for each monitoring block is shown in Figure 4.13 below.

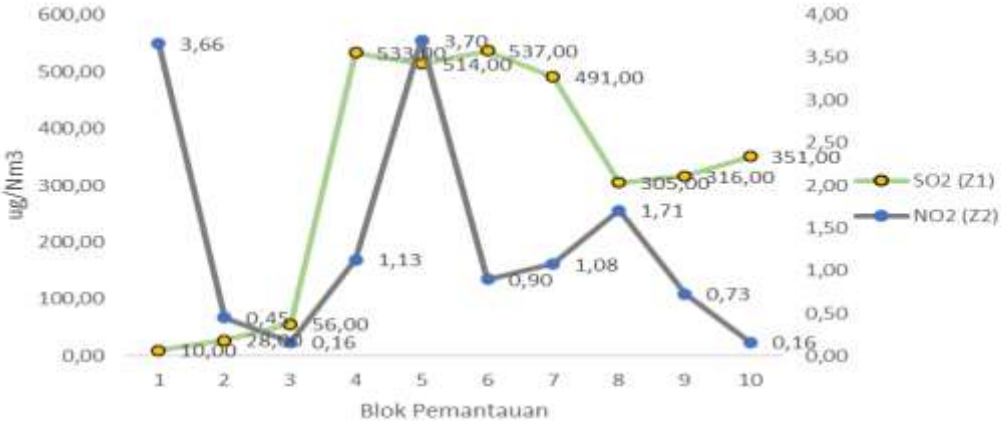

Figure 4. *Graph of SO2 and NO2 Concentrations for Each Monitoring Block*

e. Structural Model Evaluation Results

Evaluation of the structural model in this study is known as the outer model test. The outer model is a model that specifies the relationship between the latent variable and its indicators or it can be said that the outer model defines how each indicator relates to the latent variable. The outer model is interpreted by looking at the convergent value (convergent validity). The PLS Algorithm model is presented in the image below.

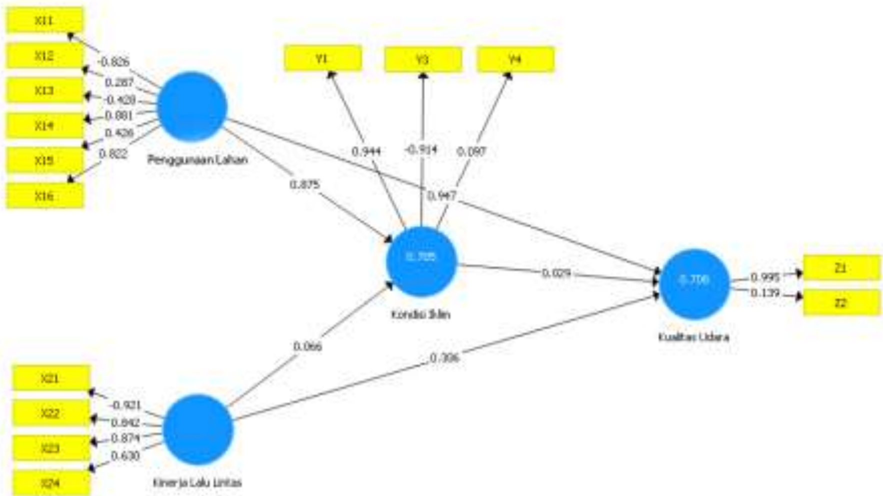

Figure 5. *PLS Algorithm Model 1*

Convergent validity is measuring the magnitude of the Loading Factor for each latent variable (indicator). A loading factor above 0.70 is highly recommended, however, a loading factor above 0.50 can still be tolerated as long as the model is still in the development stage. The results of the loading factor values for each indicator are shown in the table below.

Table 6. Loading Factor Value Algorithm Indicator 1

	Traffic Performance	Climate Condition	Air Quality	Land Use
X11				-0.826
X12				0.287
X13				-0.428
X14				0.881
X15				0.426
X16				0.822
X21	-0.921			
X22	0.842			
X23	0.874			
X24	0.630			
Y1		0.944		
Y3		-0.914		
Y4		0.097		
Z1			0.995	
Z2			0.139	

Table 5 above shows that the land use construct, the loading value on the X11 indicator is -0.826; X12 0.287, X13 -0.428, X14 0.881, X15 0.426 and X16 0.822. Traffic Performance construct, the value on the X21 indicator is -0.921, X22 0.842, X23 0.874 and X24 is 0.630. Construct of climatic conditions, the loading value on the Y1 indicator is 0.944, Y3 -0.914 and Y4 is 0.097. Air Quality construct, the loading value on the Z1 indicator is 0.995 and Z2 is 0.139. From the results of convergent validity above, there are still loading values < 0.6, namely X11, X12, X13, X15, X21, Y3, Y4 and Z2, so that these indicators are declared invalid and are then removed from the model. While the indicator with a loading value > 0.6 is said to be valid, then the indicator is valid as a measure of the construct. Based on the valid loading value for each indicator, a second algorithm test is carried out to see the validity of the indicator as a measure of its construct. The results of the second algorithm test are shown in the image below:

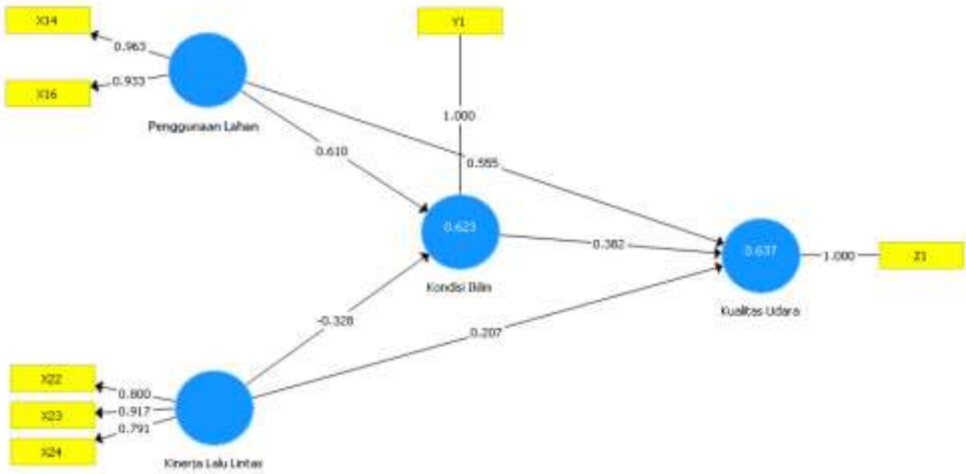

Figure 6. *Model PLS Algorithm 2*

Based on Figure 5 above, it shows that in the path diagram of the PLS Algorithm 2 model there is no negative variant, so that the existing indicators are declared valid with the number of indicators 7. The loading factor values for each of the above indicators are shown in the table below:

Table 7. Value of Loading Factor Indicator Algorithm 2

	Traffic Performance	Climate Condition	Air Quality	Land Use
X14				0.963
X16				0.933
X22	0.800			
X23	0.917			
X24	0.791			
Y1		1,000		
Z1			1,000	

The table above shows that all indicators have a loading value above 0.6, where a loading value > 0.6 is said to be valid (Igbaria et al. in Wijanto, 2008:65 and Ghozali, 2008a:135). Therefore, all of these indicators are declared valid as a measure of the construct. Based on the results of the analysis, it is shown that the manifest variables (indicators) that determine in this model are only 7. For the land use variable, it is determined by indicators of land use of grass and water bodies. The traffic performance variable is determined by indicators of the number of side barriers, vehicle volume, and average density. Meanwhile, climatic conditions and air quality are determined by indicators of air temperature and SO_2 concentration respectively.

f. Structural Model Evaluation Results

To test the structural model, it is done by looking at the value of R^2 which is a Squared Multiple Correlation test. The squared multiple correlation coefficient (squared multiple correlation coefficient = R^2) is used to determine how big the variance of the latent variable explains the indicator variable. Based on the results of the analysis, the climatic condition construct obtained an R^2 value of 0.623 which can be interpreted that the variance in climatic conditions can be explained by the land use construct and traffic performance of 62.3% while the remaining 37.7% (100% - 62.3%) explained by other variables outside the study. The results of the complete R-square value are presented in the table below.

Table 8. R-Square Value for Goodness of The Fit . Test

	R Square
Climate Condition	0.623
Air Quality	0.637

Based on the R-Square value above the level of trust, the relationship or the influence of the independent variable (indicator variable) namely land use and traffic performance on the dependent variable (latent variable) climatic conditions and air quality are only 62.3% and 63.7%, respectively. . This shows that there are other independent variables (indicator variables) that were not examined in this study but have a relationship and influence on the dependent variable (latent variable). However, the level of trust in the relationship between the independent variables used in this study is greater than the independent variables that are not used, so that the independent variables used can be used as measures of the dependent variable.

Furthermore, the hypothesis test is intended to see the significance of the influence between independent constructs on the dependent and answer what has been hypothesized. Tests with a significance level of 5% if the t-statistic value> 1.96 then the null hypothesis (H0) is rejected. The t-statistical value of the influence coefficient of the latent construct was obtained from PLS Bootstrapping. The results of the PLS Bootstrapping Model are presented in the image below.

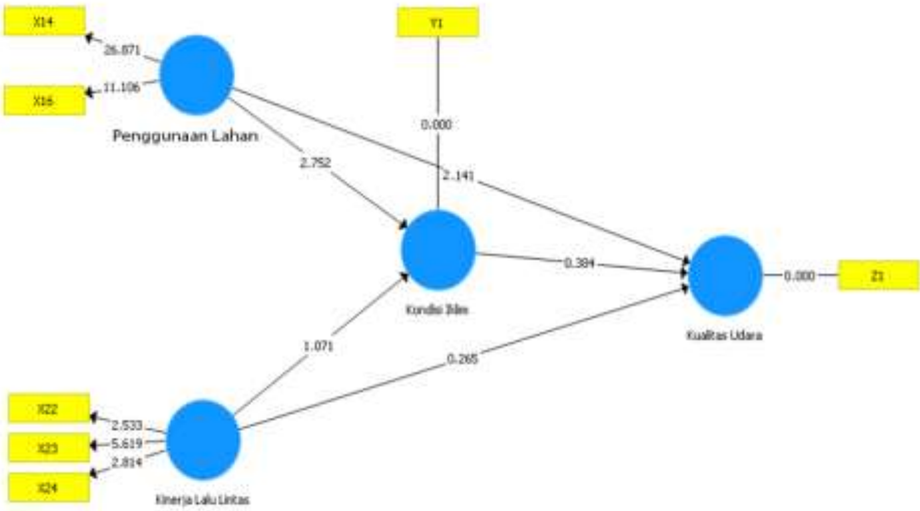

Figure 7. *PLS Bootstrapping Model*

The value of the parameter coefficients can be seen in the value (original sample) and the significance value of the t-statistical results of PLS Bootstrapping processing can be seen in the table below.

Table 9. Coefficient Value (Original Sample), Standard Error and T-Statistics

	Original Sample (O)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Traffic Performance -> Climatic Condition	-0.328	0.306	1.071	**0.285**
Traffic Performance -> Air Quality	0.207	0.780	0.265	**0.791**
Climate Conditions -> Air Quality	0.382	0.994	0.384	**0.701**
Land Use -> Climatic Conditions	0.610	0.222	2,752	**0.006**
Land Use -> Air Quality	0.555	0.487	2,141	**0.040**

Table 8 above is used as the main reference for testing the hypothesis. The test criteria is to reject H0 if the T-Statistics value is > 1.96 or the P value is < 0.05. In testing the hypothesis of the effect of land use on climatic conditions, the results of the T-Statistic value of 2.752 > 1.96 or P value of 0.006 <0.05 (see table 8) then H0 is rejected, which means land use has an effect on climatic conditions. While testing the hypothesis of the effect of traffic performance on climatic conditions, the results of the T-Statistic value of 1.071 < 1.96 or P value of 0.285 > 0.05 (see table 8) then H0 is accepted, which means that traffic performance has no effect on climate conditions.

3.2 Discussion

The results of this study indicate that land use has a significant effect on climatic conditions. Land use is related to human activities in certain land areas, such as settlements, urban areas and rice fields. Land use is also the use of land and the natural environment to meet human needs in the implementation of life. Rapid urban population growth, as well as development activities in various fields will lead to increased demand for land. This will encourage the conversion of agricultural land to non-agricultural areas in urban areas. This phenomenon also occurs in the Hertasning-Tun Abdul Razak road corridor, where this corridor was previously dominated by land use in the form of rice fields and grass, but currently leads to land use in the form of settlements and trade and service activities. In the end it will increase the built area (Sakti, 2016). The results of this study show slightly different results from the previous explanation. Where the tendency is that the temperature in the area with high building density, namely in the Hertasning area, is lower than the temperature in the Tun-Abdul Razak area, where the building density is lower. This is because the tree cover on the Hertasning road section is denser than in the Tun-Abdul Razak area, although in the Hertasning road section the buildings are denser but have been arranged better. Better urban planning with the placement of shade trees affects heat release and storage in urban areas (Coutts et al., 2007).

The results of this study indicate that traffic performance has no significant effect on climatic conditions. This result is slightly different from various literatures which explain that vehicle density as part of traffic performance indicators can affect climate. The use of gasoline and diesel fuel in vehicles has a global impact on air quality, human health, and climate change (Huang et al., 2020). The transportation sector is the main contributor to the increase in greenhouse gas emissions that can cause climate change on a macro scale. The difference between the results of this study and the results of previous studies is due to differences in the measurement scale. This research was conducted on a micro-scale urban environment, so the measured climate is the micro-climate. At the micro-scale the transportation sector does not directly contribute to the improvement of the micro-climate, but affects the macro-climate through the phenomenon of greenhouse gases. Reducing transport emissions plays an important role in achieving the 1.5°C goal of the Paris Agreement (Masson-delmotte, nd, 2018).

The results of this study indicate that land use has a significant effect on air quality. These results are in line with research conducted in Wuhan, Central China. Research conducted between 2007 and 2014 at 9 locations by looking at the quantitative relationship of land use variables (built soil, water bodies, and vegetation) with air quality variables (SO2, NO2, PM10) showed that land use significantly affects air quality. . However, in this study there are differences in the effect of land use on air quality compared to research conducted in Wuhan (Xu et al., 2016). The results of air quality measurements in the Hertasning-Tun Abdul Razak road corridor showed a significant increase in the concentration of SO2 in block 4 to block 10 monitoring locations from 56 ug/Nm3 to 533 ug/Nm3. When related to land use, there is an increase in the area of land use in the form of bodies of water and grass compared to blocks 4, 5 and 6. Land use in the form of water bodies is dominated by the appearance of canals where domestic wastewater is produced. The decomposition of domestic waste that enters the canals releases H2S gas which is characterized by a foul odor. Furthermore, H2S in the air will be oxidized to SO2. This causes an increase in the concentration of SO2 in the monitoring block where the land use contains a body of water. In addition, at the monitoring location, especially on Jalan Tun-Abdul Razak (blocks 6 to 10) it was found that a lot of land use in the form of grass is used as a waste disposal site, causing a strong stench that comes from the decomposition of organic waste. Waste that undergoes decomposition will release H2S gas which is then oxidized to SO2.

The results of this study indicate that traffic performance has no significant effect on air quality. This result is different from previous studies which showed a significant relationship between traffic performance and air quality. Traffic emissions make a significant contribution to urban air pollution in many Chinese cities. The transportation sector from 1990 to 1995 contributed about 1 and 2% to total SO2 emissions, 9 and 12% to total NOx emissions and 14 and 22% to total CO emissions (He et al., 2016). Previous research conducted in Merauke City also showed that vehicle volume had a very significant effect on increasing CO, NOx and SO2 concentrations in ambient air (Parenden & Cipto, 2019). Different conditions from the research results along the Hertasning-Tun Abdul Razak road corridor indicate that other variables greatly affect the air quality in the area, which is marked by a significant increase in SO2 concentration from monitoring blocks 1 to 3 to blocks 4 to 10. Anthropogenic activities that do not come from the use of transportation strongly affect the SO2 concentration in the area. These anthropogenic activities can be in the form of open dumping of waste, smoke pollution from burning fish, and emissions from domestic waste that enter the river.

The results of this study also show that there is no indirect effect between land use and traffic performance on air quality. This is because the indirect effect through the mediator variable (climatic conditions) cannot be analyzed because the mediator variable (climatic conditions) does not have a significant influence on the dependent variable, namely air quality. These results further confirm that air quality in the Hertasning-Tun Abdul Razak road corridor is only directly affected by land use and not through climatic conditions, so it can be concluded that climatic conditions are not a mediator variable in measuring air quality in the Hertasning-Tun road corridor. Abdul Razak.

IV. Conclusion

Based on the results of structural model analysis and goodness of fit testing, this study produces an acceptable structural equation so that it can explain the effect of each independent variable on the dependent variable. The resulting structural equation, namely:

Air Quality = 0.555*Land Use + 0.382*Climate Condition
Air Quality = 0.207*Traffic Performance + 0.382*Climate Condition
Climatic Condition = 0.610*Land Use – 0.328*Traffic Performance

Based on the results of the structural model evaluation analysis with SEM PLS, it shows that there are only 2 valid land use indicators showing the effect of land use on air quality, namely the use of grass land and water bodies. This explains that the increase in the built-up area in the Hertasning-Tun Abdul Razak road corridor does not affect air quality, but what affects air quality is the dominance of anthropogenic activities that can release emissions into the air. Anthropogenic activities that affect air quality are estimated to come from open dumping of waste, smoke pollution from burning fish, and emissions from domestic waste that enter water bodies. This is indicated by the increase in SO2 concentration in the monitoring location block whose activities are dominated by the above activities. The increase in built-up land in the Hertasning-Tun Abdul Razak road corridor is partly a consequence of urban sprawl, not by itself reducing air quality. Areas filled with built-up areas on the Hertasning-Tun Abdul Razak road corridor, especially in blocks 1 to 3, actually have better air quality because the environment has been arranged so that anthropogenic activities that can release SO2 emissions can be minimized. In addition, the behavior of people who use vacant land for making garbage also greatly affects the air quality in the Hertasning-Tun Abdul Razak corridor. The same thing does not happen in areas that have not been fully developed in the Hertasning-Tun Abdul Razak road corridor, especially in blocks 4 to 10, has poor air quality because the environment has not been neatly arranged so that anthropogenic activities that can release SO2 emissions are difficult to avoid. The results of this study can be taken into consideration in structuring the corridor area where the urban sprawl phenomenon occurs, that the development of the area must be followed by better environmental management and management such as structuring green areas, limiting burning activities, and open dumping of waste on vacant lands. who hasn't woken up.

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