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Factors affecting the value of land passed by railroad tracks in the campus area Yogyakarta

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ABSTRACT

This research aimed to determine the factors that influence the land value of the railway train around the campus area in Timoho Yogyakarta. In this research, the sample of land value is taken from the land value population located around the railway train at Timoho area that is surrounded by campus, limited by four districts there are Kota Baru district and Demangan in the north and Baciro district and Muja-muju district in the south. The control area uses a land value survey in the Janti district in the north and Gedong Kuning district in the south. The technique of collecting data is from observation in location. The finding of this research shows that the distance of the land to the railway and campus influenced land value and the size of the land influenced land value. Public transportation is not influenced land value. The land access by railway trains influenced land value. The shape of land is not influenced land value.

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1. INTRODUCTION

Home is one of the basic human needs (Lesmana, 2021) which follows the law of the hierarchy of needs proposed by Abraham Maslow (Sumiarto, 1991). Today the property business is a promising business for investors (Fauziyah, 2022). Property development as a means of housing, commercial, and public services is closely related to the use of land and increasing land value by adding additional value to land value to achieve the highest value in the utilization of the land (Riza, 2005). The location of land affects the ease of accessibility to the place of production or the workplace, so the location factor will determine the high and low value of the land. Analysis of the location of land can be viewed from two aspects, which are convenience and environment (Eldred., 1987;Sari et al., 2020).

In relation to land valuation issues, understanding the state of the land and analyzing the market influence on property business activities is needed by consumers, sellers, or investors as well as government officials (Tambajong et al., 2019; Loly, 2020). In general, the factors that affect the high and low economic value of land are factors that are naturally owned by the land itself and socio-economic factors that influence the economic value of land (Presylia, 2002). Economic factors are the state of soil fertility, the wealth of natural resources of minerals contained in the soil, the distance near the location of the land to the center of the crowd, climatic conditions, and others. Socio-economic factors of the community are the increase in population density leading to increased demand for land; and development. road infrastructure, airfields, markets, waterways, provision of lighting facilities, drinking water, schools, and recreation areas (Herlambang, 2019).

Accessibility and a good housing environment will certainly add value to the housing (Widyonarso & Yuliastuti, 2014), but it can also be disadvantageous if the housing is in an

uncomfortable environment such as traffic congestion, noise, flood-prone, factory waste pollution, high-voltage electricity network towers, or the presence of railroad tracks. The uncomfortable environment will certainly affect the selling value of the house (Suryani, 2018).

The correlation between the location of land and the value of land is one of the interesting topics in land value research because land has its own uniqueness (Adi, 2015). The location of the land has different characteristics because each land has its uniqueness based on its location (AIREA, 2001; Andika et al., 2019). Favorable location and access will make the land more appealing and seen as having a high value. The location of the land is considered advantageous if the land is located in centers of economic activity or where demand for the land is likely to continue to increase. This is because the expectation of the benefits that the land can produce increases economically (Budiharjo, 1991; Kurniwati & Mudakir, 2004).

The location of the land in the area around the campus provides an advantage for the existence of the land. Indirectly, the campus is able to attract migrants from outside the area to live in the campus area for various favorable reasons. The campus will always be involved in the development of the surrounding area (Sungu-Eryilmaz & Greenstein, 2007). The existence of migrants from outside creates various other types of demand that can affect the increase in demand for land (Islami, 2019) (Tarigan, 2004). This is shown by Aulia's research (2005) which concluded that the distance of land to the campus has a positive effect on land value, which means that the closer the distance of land to the campus, the higher the land value.

Another study conducted by Nurhayani (2004) concluded that, land area variables, distance to public roads, campus environment dummy, and land condition dummy affect land value. Research that is also related to land value is Sukada (2002). These studies generally strengthen the theory that location variables are the dominant factor affecting land value (Jayadinata, 1999).

Timoho in the Yogyakarta area is one of the areas where there are many campuses. In this area, there are several campuses, such as Sunan Kalijaga State Islamic University (UINSUKA), Janabadra University, College for Village Community Empowerment, and Duta Wacana Christian University (UKDW). The existence of several campuses causes several areas in the Timoho area to be used to provide various campus life support facilities such as boarding houses and various businesses that provide student needs.

An interesting problem to study regarding land value in the Timoho area is the presence of a railroad line in the middle of the area. Although the Timoho area is surrounded by many campuses, the presence of the railroad tracks can make the environment less comfortable. The uncomfortable environment will certainly affect the selling value of residential houses. Research related to the influence of the railroad tracks has been conducted by Winoto (2003) who examined the factors that influence the selling value of residential houses that are passed by the railroad tracks in East Bekasi.

2. RESEARCH METHOD

The type of data used in this research is cross-section data. Land value samples were taken from the population of land values located around the Timoho area railroad tracks surrounded by the campus environment. The research was conducted in the following way. A literature study was conducted by studying various literature books and articles related to the research problem. Documentary studies were conducted to obtain the necessary secondary data by visiting agencies/offices/institutions related to the research problem. In this research, the information needed is from the Head of the Land and Building Tax Service Office, sub-district offices, and village offices located in the study area. Field study by making observations of the location that is the object of research to find out the outline of the condition of the area and to obtain other important information that has not been obtained from literature and documentary studies.

The analytical tool used in this study is multiple linear regression analysis with the OLS method or the least squares method. Multiple linear regression analyzes the dependence of one variable (dependent variable) on one or more other variables (independent variables) so that it is in accordance with the research objectives to be achieved. The basic model of multiple linear regression is as follows (Gujarati, 2006)

$$Y = \alpha_1 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots + \beta_k X_k + ui\ k \quad (1)$$

K: number of explanatory variables.

The application of the model to this study is:

$$Y = \alpha_1 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 D_1 + \beta_5 D_2 + \beta_6 D_3 + \beta_7 D_4 + ui \quad (2)$$

Y : Land value (rupiah per square meter)
X_1 : Land distance from railway (meters)
X_2 : Land distance to nearest campus (meters)
X_3 : Land area (square meter)
D_1 : Dummy road passed by public transportation
1 for land traversed by public transportation
0 for land that is not passed by public transportation
D_2 : Dummy passing through the railroad gate
1 for land that does not pass through the railroad gate
0 for land passing through a railroad gate
D_3 : Land shape dummy
1 for regular square shape land
0 for irregular shape
D_4 : Campus dummy
1 for land near campus
0 for those distant from the campus

3. RESULTS AND DISCUSSIONS

Some suitable function forms for empirical function model selection in this study are lin-lin, log-log, lin-log, and log-lin models. The function form of the selected model is done by selecting the best model. To determine the regression results of the best model, one of them is the MacKinnon, White, and Davidson test (MWD test) (Gujarati, 2006).

The selection of the right model function is based on testing various forms of model functions, which are the linear-linear, logarithmic-linear, linear-logarithmic, and logarithmic-logarithmic regression forms against the conditions of linearity, normality, and the level of significance of the variables.

Table 1. Goodness of Fit Summary Analysis

Variable	Model			
	A. Lin-Lin	B. Log-Log	C. Lin - Log	D. Log – Lin
Lin/Log	t-stat.	t-stat.	t-stat.	t-stat.
C	15,69770*	39.37040*	-0,707039	222,4987*
JR/LJR	7,796798*	7,554793*	8,124299*	5,982453*
JK/LJK	-7,793950*	-5,632244*	-5,643390*	-8,694830*
LT/LLT	4,668158*	3,955818*	5,054174*	3,499582*
D1	0,109635	0,142885	0,075923	0,426634
D2	-2,094958*	-2,069986*	-1,989665*	-2,105775*
D3	1,145148	1,411593	1,721646	0,882105
R2	0,761661	0,700081	0,7371781	0,728734
F-stat.	75,09904	54,85445	64,11505	63,13080

The test results show that the correct model is the linear-linear form. The equation form becomes:

$$NT = a + \beta_1 LJR + \beta_2 LJK + \beta_3 LLT + \beta_4 D_1 + \beta_5 D_2 + \beta_6 D_3 + \beta_7 D_4\, e \quad (3)$$

Description:
NT : land value
LJR : distance of land from the railroad
LJK : land distance from the nearest campus

LLT : land area
D1 : land passed by public transportation
D2 : land through railroad track
D3 : regular land shape
D4 : campus dummy

Table 2. Linear-linear Regression Analysis Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	91301.46	470536.0	0.194037	0.8464
LJR	219656.7	30365.22	7.233826	0.0000
LJK	-237862.6	38744.88	-6.139200	0.0000
LLT	297880.0	60613.14	4.914445	0.0000
D1	-9016.636	45484.03	-0.198237	0.8431
D2	-103069.9	49260.27	-2.092354	0.0382
D3	66761.81	45565.43	1.465186	0.1451
D4	149425.9	53503.55	2.792823	0.0060
R-squared	0.750903	F-statistic		60.28988
Adjusted R-squared	0.738448	Prob(F-statistic)		0,000000
Durbin-Watson stat	2.142961			

The method of detecting heteroscedasticity in this study was carried out with the White test (White Heteroskedasticity Test) using regression assistance (attachment). The guidelines for using White's test are:

1. if the value ($n*R^2$) < the value in the chi-square table then rejects the hypothesis stating that there is a heteroscedasticity problem in the model being estimated.
2. if the value ($n*R^2$) > the value in the chi-square table then rejects the hypothesis stating that there is no heteroscedasticity problem in the model being estimated.

The test results in the attachment show that the $n*R^2$ value is 15.86227 with a probability of 0.0698, which means that the research model does not have a heteroscedasticity problem.
The t-test is used to determine the significance level of each regression coefficient.
T table (0.05, df = 120) = 1.98
When t count < - t table or t count > + t table means that the independent variable statistically affects the dependent variable at the level. From the table, it can be concluded that the significance conditions of each independent variable at 0.05 are as follows.

Table 3. Result of t test

Variable	t-Statistic	|t-table|
C	0.194037	1,98
LJR	7.233826	1,98
LJK	-6.139200	1,98
LLT	4.914445	1,98
D1	-0.198237	1,98
D2	-2.092354	1,98
D3	1.465186	1,98
D4	2.792823	1,98

R^2 states how large a proportion of the variation in the dependent variable can be explained by the independent variable. From the results of Table 2 it can be seen that the amount of R^2 is 0.7509, which means that 75.09 percent of the variation in the land value variable can be explained by area, distance to the highway, distance to the campus, the road passed by public transportation, the road passed by the railroad tracks, land shape, and the remaining campus dummy of 24.81 percent is explained by other variables outside the model.

Interpretation of results
The resulting equation in Table 2 can be summarized as follows:

$$NT = 91{,}301.46 + \beta_1\ 219{,}656.7X_1 - \beta_2 237{,}862.6\ X_2 + \beta_3 297{,}880.0\ X_3 - \beta_4 9{,}016.6\ X_4 - \beta_5 103{,}069.9\ X_5 + \beta_6 66{,}761.81\ X_6 + \beta_7 149{,}425.9\ X_7 + e \quad (4)$$

The analysis results show that the constant value in the regression model is significant. This means that a positive constant indicates that land remains valuable under any condition (when all variables are ignored). This implies that land is something very valuable because it is very important for human life.

The effect of land distance from the railroad on land value in Table 2 shows that land distance from the railroad has a significant effect on land value. The coefficient of land distance from the railroad of 297,880.0 means that the distance from the railroad has a positive effect on land value, the further away from the railroad, the higher the land value. Every additional distance of land from the railroad by 1 m will increase the land value per meter by Rp 219,656.7 assuming other variables remain constant. This result shows that the community has considered and made the distance of land from the railroad a determining factor for land value.

Effect of land distance to the nearest campus on land value. Table 2 shows that the distance of land to the highway has a significant effect on land value at 0.05. The coefficient of land distance to the nearest campus is -237,862.6, which means that the distance of land to the nearest campus has a negative effect on land value, the farther from the highway the lower the land value will be. Every additional distance of land to the highway by 1 percent will reduce the land value per meter by Rp 237,862.6 assuming other variables remain constant.

Effect of land area on land value. Table 2 shows that land area has a significant effect on land value. The coefficient of land area of 297,880.0 means that land area has a positive effect on land value, the larger the land area, the higher the land value. Every additional $1m^2$ of land area will increase the land value per meter by Rp 297,880.0 assuming other variables remain constant.

The t-test results in Table 2 show that the road traversed by public transportation has no significant effect on land value. The coefficient of the dummy road passed by public transport of 9,016.6 means that the dummy road passed by public transport has a positive effect on land value, the more the road is crowded with public transport, the land value will increase. Each additional public transportation by 1 percent will increase the land value per meter by Rp 9,016.6 assuming other variables remain constant.

The results in Table 2 shows that the land passing through the railroad gate has a significant effect on land value. The coefficient of the dummy passing through the railroad door is 103,069.9, which means that the dummy road passing through the railroad door has a negative effect on land value, the more land passed by the railroad door, the cheaper the land value will be. Each additional railroad door by 1 percent will increase the land value per meter by Rp 103,069.9 assuming other variables remain constant.

The results in Table 2 shows that the shape of the land has no significant effect on land value. The coefficient of dummy land shape is 66,761.81, which means that the shape has a positive effect on land value, the more organized the square shape, the higher the land value. Each additional regularity of land shape by 1 percent will increase the land value per meter by Rp 66,761.81 assuming other variables remain constant.

The shape of the land has a significant effect on land value. The campus dummy coefficient of 149,425.9 means that the shape has a positive effect on land value, with the presence of a campus, the land value will be higher. Every additional campus presence of 1 percent will increase the land value per meter by Rp 149,425.9 assuming other variables remain constant.

Comparison of land value in the control area

To see the impact of the railroad on land value, it is necessary to compare land values that are both located on the railroad track. The results of the analysis with the t-test show the following results.

Table 4 Result of the t-test

Area	Average land value	t-Statistic	P-value
Research	Rp 1.573.649	9,555	0,000
Control	Rp 881.000		

The results of the analysis show that the average land value in the research area is Rp1,573,649 which is higher than the land value in the control area at Rp881,000. This means that there is a significant difference between the land value in the study area and that in the control area as shown

by the t-test which is significant at the 5 percent significance level. Thus, it can be stated that the presence of a railroad line will have a negative impact on land values so land values will be lower. However, the value of land around the railroad line will still be high if the location of the land is close to the campus.

According to Pareek & Kumar (2024) other factors contribute to the land value among environmental factors, such as closeness to garden areas, slum areas, landfills, and industrial zones. Among socio-economic factors, such as proximity to specific communities, statistical analysis of the surveyed data reveals that proximity to specific communities, proximity to low-income area, and proximity to restricted zone hold a significant impact on land value. Among plot attributes, such as availability of sewage and water supply, statistical analysis of the surveyed data reveals that available road width and plot in planned development hold a significant impact on land value.

Research conducted by Sutawijaya (2009) on factors affecting land value in Semarang City shows that there are several variables that can affect land value. Population density has a positive value because more people can cause limited space or land locations for human settlements and other interests. Road width has a positive value because locations that have wide roads can make the location very strategic and have high accessibility compared to land located on small roads and alleys. The availability of transportation facilities has a positive value because it is related to the ease of doing activities or mobility. The flood-free environment variable has a positive value, this means that land with a flood-free environment is certainly more valued than land locations that are often affected by flooding. In this research, there are several different results due to differences in the environment where this research took place near the campus area and also passed by the railroad.

4. CONCLUSION

This research focused on identifying independent variables that can influence the land value of Timoho area in Yogyakarta where the area is passed by railroad tracks. There are many factors that influence the land value such as distance, land size, and convenience. However, other factors do not contribute as significantly such as land traversed by public transportation and land shape. The results of this study show that the selling value of residential houses whose accessibility is blocked by the railroad track is significantly and negatively affected by the presence of the railroad track. For future research related to land value, it is recommended to include security variables that may affect land value and there is a possibility of expanding the research by testing whether the variables that have a statistically significant effect in this study remain consistent at different times.

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