A Pattern of Land Value in Bodetabek Area

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Key words: Land Value, Multiple Regression, Bodetabek

SUMMARY

The improvement of land value can not be separated from the development progress. Communities tend to cluster in areas that are considered to meet the needs of its survival. One phenomenon that looks real is the area spread around the DKI Jakarta city. Research conducted by the Research Center for Limnology LIPI Bogor (Wibowo et al , 2009) in the region Bodetabek indicate a correlation between the development of built up area to land values. Jakarta is growing into a center of activities make this city as a provider of jobs, but the land for settlement no longer affordable in terms of price for the workers, so that the developing of new settlements in rural areas such as Bekasi, Bogor, and Tangerang. This will certainly have an impact on land values in the Bodetabek area (Bogor, Depok, Tangerang, and Bekasi). This study uses the average of Tax Object Sale Value each villages in Bodetabek area as the reference of land value. A pattern of land values in the region can be traced further based on data obtained in this study. This study aims to produce a model of land value based indication of the relationship between population density per unit area of the villages in Bodetabek area, population density per built area of the villages in Bodetabek area, percentage of built area each villages in Bodetabek area, distance of each villages to the CBD (Central Business District) of DKI Jakarta on land values in Bodetabek area. The analytical method used in this study is multiple regression analysis with dependent variable Y = Land Value, as well as the independent variable X_1 = population density per unit area of the villages, X_2 = population density per built area of the villages, X_3 = percentage of built area each villages, and X_4 = distance of each villages to the CBD (Central Business District) of DKI Jakarta. Conclusion of this research is the X_1 (population density per unit area of the villages) is proportional to the value of land in Bodetabek, X_2 (population density per built area of the villages) did not affect value of land in the Bodetabek area, X_3 (population density per built area of the villages) is directly proportional to land value in areas Bodetabek, and X_4 (distance of each villages to the CBD of DKI Jakarta) is inversely proportional to land value in Bodetabek area.

SUMMARY

Perkembangan nilai tanah sendiri tidak bisa dilepaskan dari perkembangan pembangunan. Masyarakat cenderung mengelompok pada kawasan yang dianggap dapat memenuhi kebutuhan keberlangsungan hidupnya. Pengelompokan pada kawasan terbangun ini menyebabkan nilai tanah (akibat kesenjangan *supply* and *demand*) juga meningkat. Salah satu fenomena nyata yang terlihat adalah menyebarnya area terbangun di daerah sekitar DKI (Daerah Khusus Ibukota) Jakarta. Penelitian yang dilakukan oleh Pusat Penelitian Limnologi LIPI Bogor (Wibowo dkk, 2009) di wilayah Bodetabek mengindikasikan adanya korelasi antara perkembangan area terbangun terhadap nilai tanah. DKI Jakarta yang tumbuh menjadi pusat kegiatan menjadikan kota ini sebagai penyedia lapangan pekerjaan, akan tetapi lahan untuk permukiman tidak lagi terjangkau dari segi harga bagi para pekerja, sehingga

berkembanglah pemukiman baru di daerah pinggiran seperti di Kabupaten Bekasi, Bogor, dan Tangerang. Hal ini tentu akan berdampak pada nilai tanah di wilayah Bodetabek (Bogor, Depok, Tangerang, dan Bekasi). Penelitian ini menggunakan Nilai Jual Obyek Pajak (NJOP) rerata tiap desa/kelurahan sebagai acuan nilai tanah. Pola nilai tanah di wilayah Bodetabek dapat ditelusuri lebih lanjut berdasarkan data yang diperoleh pada penelitian ini. Penelitian ini bertujuan menghasilkan model nilai tanah berdasarkan indikasi adanya keterkaitan antara kepadatan penduduk per luas desa/kelurahan, kepadatan penduduk per area terbangun desa/kelurahan, persentase area terbangun tiap desa/kelurahan, dan jarak desa/kelurahan tersebut ke CBD (*Central Business District*) DKI Jakarta terhadap nilai tanah di wilayah Bodetabek. Metode analisis yang digunakan dalam penelitian ini adalah metode regresi berganda dengan variabel terikat Y =Nilai Tanah, serta variabel bebas X_1 = kepadatan penduduk per luas desa/kelurahan wilayah Bodetabek, X_2 = kepadatan penduduk per area terbangun desa/kelurahan, X_3 = persentase area terbangun tiap desa/kelurahan, dan X_4 = jarak desa/kelurahan tersebut ke CBD (*Central Business District*) DKI Jakarta. Kesimpulan yang diperoleh dari penelitian ini adalah X_1 (kepadatan penduduk per luas desa/kelurahan) berbanding lurus dengan nilai tanah di Bodetabek, X_2 (kepadatan penduduk per area terbangun desa/kelurahan) tidak berpengaruh terhadap nilai tanah di wilayah Bodetabek, X_3(persentase area terbangun tiap desa/kelurahan) berbanding lurus dengan nilai tanah hanya di wilayah Bodetabek, dan X_4 (jarak desa/kelurahan tersebut ke CBD DKI Jakarta) berbanding terbalik dengan nilai tanah di wilayah Bodetabek. Dengan mengetahui keterkaitan antara keempat variabel di atas dengan nilai tanah, dapat diketahui pola nilai tanah di wilayah Bodetabek.

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1. INTRODUCTION

1.1. Background

Land valuation is required in order to bring equity in the tax system and the legalization of land tenure, as well as the direction of optimum land use (highest and best use). Land value data transaction reports from official agencies such as PPAT also prove to be inaccurate (Rachman: 2006).

Republic of Indonesia National Land Agency (BPN) according to the mandate of Article 33 paragraph (3) of Law No. 5 Year 1960 as an institution mandated by regulation carry relationship between land and people of Indonesia in its efforts to be more involved in all aspects relating to the land, including the the land valuation is based on Regulation of the Republic of Indonesia Number 10 Year 2006 concerning the National Land Agency to develop and manage organizational units and Head of National Land Agency Regulation No. 3 Year regarding Organization and Working Procedure of the National Land Agency of the Republic of Indonesia where the task set formulation of technical policy and to implement the survey and mapping of potential land (including on valuation of land) is the core duties for the Directorate of Land Potential Surveys. BPN use market value as a land value. However, due to organizational units about valuating this land is still relatively new in the BPN, the provision of information on land value is still limited. For areas that are not yet available information on land value created by the BPN, NJOP data can be used.

The development land value alone can not be separated from the development progress. Society tends to cluster in areas that are considered able to meet the needs of its survival. Grouping in the built up area is causing land values (due to the gap of supply and demand) increased. One of the real phenomenon is visible is the spread of the built area in the area around DKI Jakarta. Research conducted by the Research Center for Limnology LIPI Bogor (Wibowo et al, 2009) in the Bodetabek area indicated a correlation between the development of the built area to land value. DKI Jakarta, which grew into the center of activities make this city as a provider of jobs, but the land for the settlements are no longer affordable for workers, so this reality triggers to develope a new settlement in the area around Jakarta such as Bekasi, Bogor, and Tangerang. In accordance with the principles of an economic price if the item required is still quite available, the price established by the market mechanism would not be as high if the required items are not sufficiently available. So also with land in the area of Bogor, Depok, Tangerang and Bekasi (Bodetabek) which is still fairly widely available, is the option most suitable place for living for workers. This will certainly have an impact on land values in the area Bodetabek (Bogor, Depok, Tangerang, and Bekasi). This study uses the Tax Object Sale Value (NJOP) average each villages as the reference land value. Pattern of land value in the Bodetabek area (Jakarta, Bogor, Depok, Tangerang, and Bekasi) can be traced back further, based on data obtained in this study.

1.2. Problem Formulation

Problem formulation in this study is how population density per unit area of the villages in Bodetabek area, population density per built area of the villages in Bodetabek area, percentage of built area each villages in Bodetabek area, distance of each villages to the CBD (Central Business District) of DKI Jakarta explain land values model in Bodetabek area.
The purpose of this study is to examine the characteristics of population density per unit area of the villages in Bodetabek area, population density per built area of the villages in Bodetabek area, percentage of built area each villages in Bodetabek area, distance of each villages to the CBD (Central Business District) of DKI Jakarta to land values in the Bodetabek area.
The hypothesis of this study is the population density per unit area of the villages in Bodetabek area, the population density per built area of the villages in Bodetabek area, the percentage of built area each villages in Bodetabek area, and distance of each villages to the CBD (Central Business District) of DKI Jakarta effect the value of land in the Bodetabek area.
The benefits of this research is by using the model of land value we can see a pattern of land value in Bodetabek area based on this model.

2. LITERATURE REVIEW

2.1. Previously Research

Various research on the development of methods of land valuation has been done by some researchers. Among the research conducted Imawan (2007), who conducted the land valuation method development use spatial analysis and artificial neural network. Location variables are used as the main variables in the model of land value considering that the variable location is a very significant variable in the model of land value.
Rachman (2006) use a deterministic regression equation for predicting the NIR (Y) based on PPAT deed report (X). Based on this research indicates that PPAT transaction price averaged only 56% of the NIR PBB.
Research conducted Wibowo et al (2009) showed that there are indications that the distribution of population and the increasing need for housing that increases the built area in the Bodetabek area related to land value, for it was based on secondary data from these studies established the independent variable is population density per unit area of the villages in Bodetabek area, population density per built area of the villages in Bodetabek area, percentage of built area each villages in Bodetabek area, distance of each villages to the CBD (Central Business District) of DKI Jakarta.

2.2. Land Valuation Method

Broadly speaking, land valuation methods commonly used method of market data approach, cost approach and income approach.

1) Market Data Approach.
   This approach is considering sales of similar property or replacement and related market

data, and generate the estimated value through the process (object valuation) compared with transactions of comparable properties, whether the property has occurred or is still in the bidding phase of a sales process.

2) Cost Approach.
   This approach considers the possibility that, as the substitution of purchasing a property, a person can make other property such as a replica of the original property or substitutes that provide comparable functionality.
3) Income Approach
   This approach considers the income and expenses associated with property valued and to estimate the value through the capitalization process. Capitalization linking income (usually a net income) with a definition of value through conversion of income into value estimation.

2.3. Regression Analysis

The analysis used in this study are multiple regression (Multiple Regression Analysis). Multiple regression analysis is a statistical tool that provides an explanation of the pattern of relationships (models) between the dependent variable with independent variables wich is more than one (Widarjono, 2005), in order to obtain the equation:
Y = C + + b3X3 b2X2 b1X1 + + b4X4 + Et
where :

Y	=	Dependent variable, in this case land value (Rupiah/m2)
C	=	Constant
X_1	=	variable population density per unit area of the villages (Person/Ha)
X_2	=	variable population density per built area of the villages (Person/Ha)
X_3	=	variable percentage of built area each villages (%)
X_4	=	variable distance of each villages to the CBD of DKI Jakarta (km)
b_n	=	Independent variable coefficients
E_t	=	*Error term*

Furthermore, the resulting multiple regression equation must be through statistical tests and classical assumption. Test statistics and classical assumption in this research was done by using statistical software *SPSS 17.00*.

3. RESEARCH METHODOLOGY

3.1. Framework and Hypotheses

Based on research from Wibowo (2009) indicate the effect of variable population density per unit area of the villages, the population density per built up area the villages, and the percentage of the built up area each villages to land value. Modelling the value of land in this study than mengggunakan variables from the research results also added to the variable distance from each villages to the Jabodetabek area of Jakarta's CBD with the assumption that the further distance of the villages in the Jabodetabek area of Jakarta's CBD, the land value will be increasingly reduced. Framework of research and formulation of hypotheses in this

research can be seen in Figure 1.

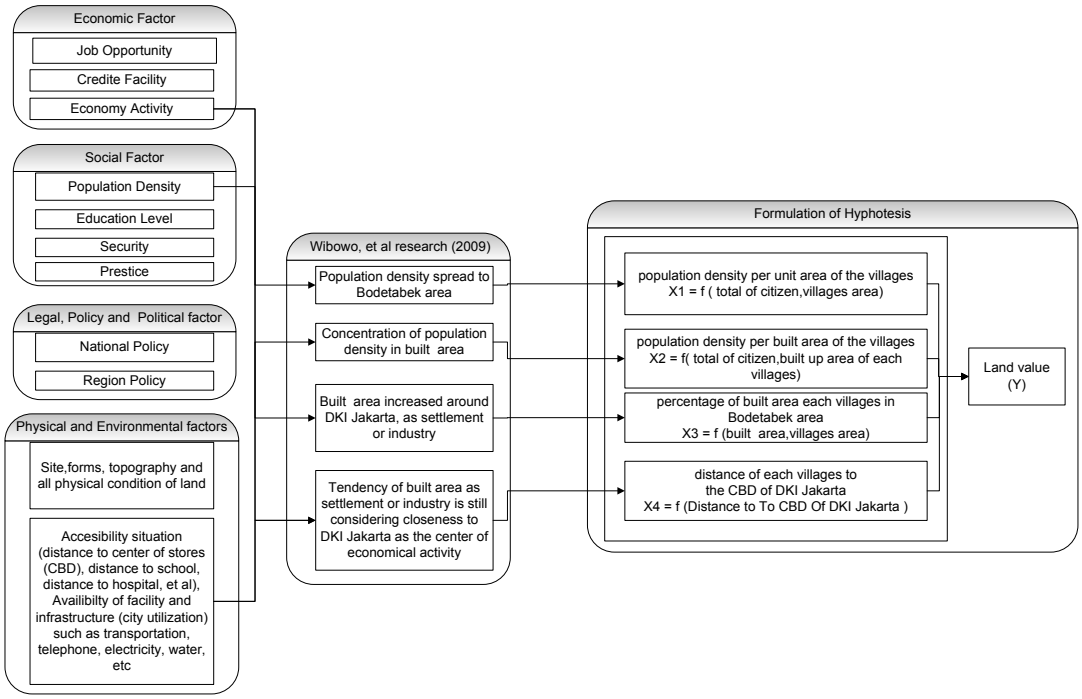


Figure 1. Framework and Hyphoteses

3.2. Stages of Data Analysis

Stages of data analysis includes the steps (Figure 2) as follows:

1) Initial data collection.
   Type and source of research data is secondary data obtained indirectly to support the writing of this research is to collect supporting data obtained from the Limnology Research Centre LIPI Bogor Cibinong and from other relevant agencies as well as with library research, internet, and interviews .
2) Data extraction.
   Secondary data have been obtained subsequently extracted to obtain data on variables that will be used in modeling.
3) Developing the mathematical models
   Land value model used in this study is the land value model with multiple regression analysis. Each group of land value data were then analyzed with multiple regression.
4) Mathematical Model Selection and Testing
   The mathematical model selected is the equation that satisfy the statistical test (the value of R, R2, and Sig Sig Simultaneous Partial) and economic test (multicollinearity).
5) Mathematical Model Validation
   The mathematical model applied to the next selected test data, and then searched the excess land value land value of the model with field test data and analyzed with a histogram.
6) Application of Mathematical Model
   The mathematical model is then applied to land value data.

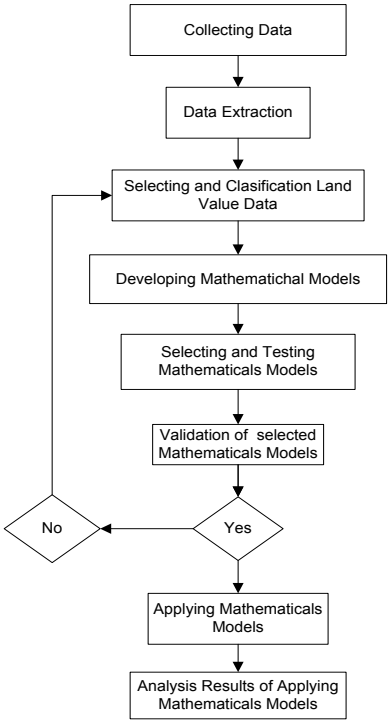


Figure 2: Stages of data analysis

4. RESULTS AND DISCUSSION

4.1. Overview Research Areas

Bodetabek is an acronym of Bogor District, Bogor City, Depok City, Tangerang District, Tangerang City, South Tangerang City, Bekasi City and Bekasi District. Jabodetabek area is located at coordinates 106 ° 20'-107 ° 27'29 "east longitude and 6 ° 00'-sixth ° 45 ' North South latitude.

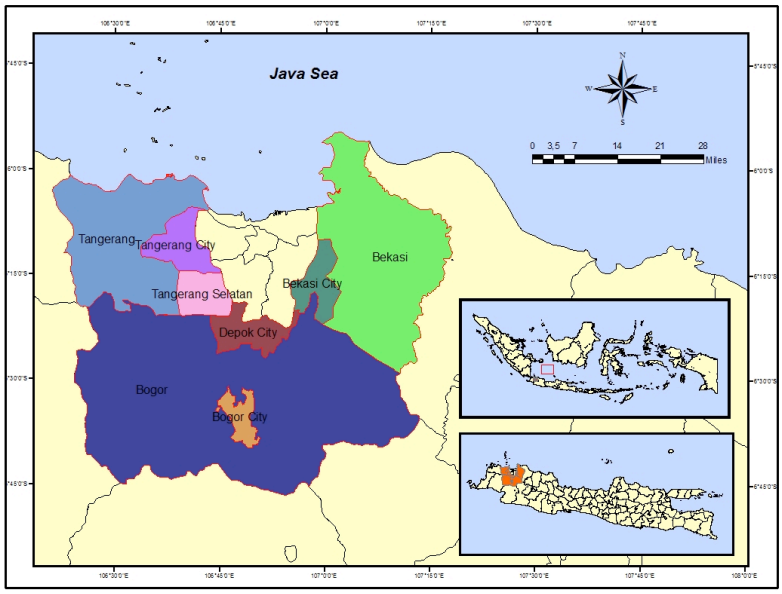


Figure 3: Administration area of Bodetabek

4.2. Data Input and Extraction

Land value in Bodetabek area is shown in this Figure 4.

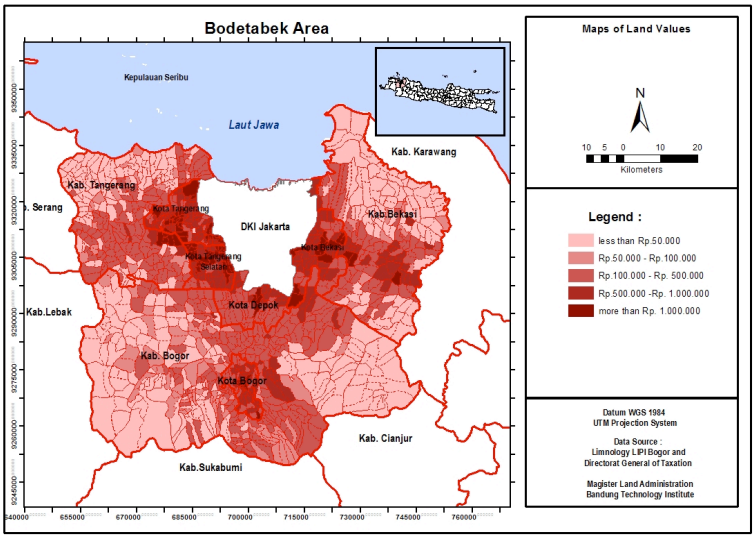
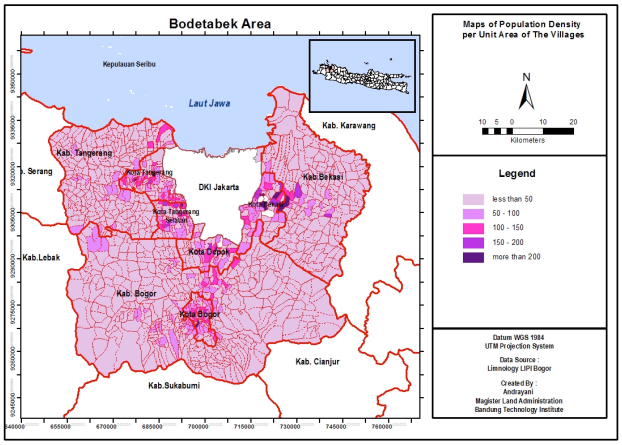
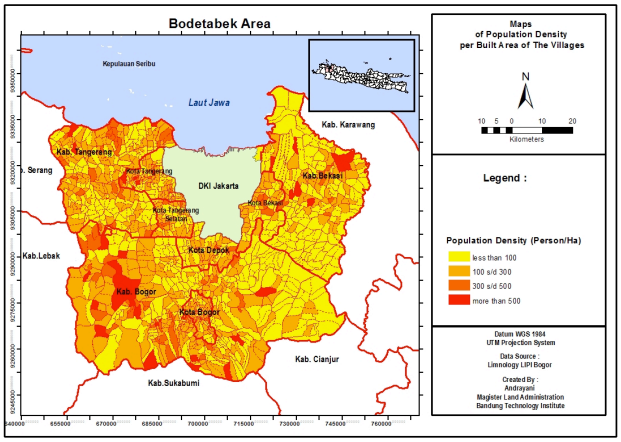


Figure 4. Land Values in Bodetabek Area

Data extraction is shown in Figure 5.





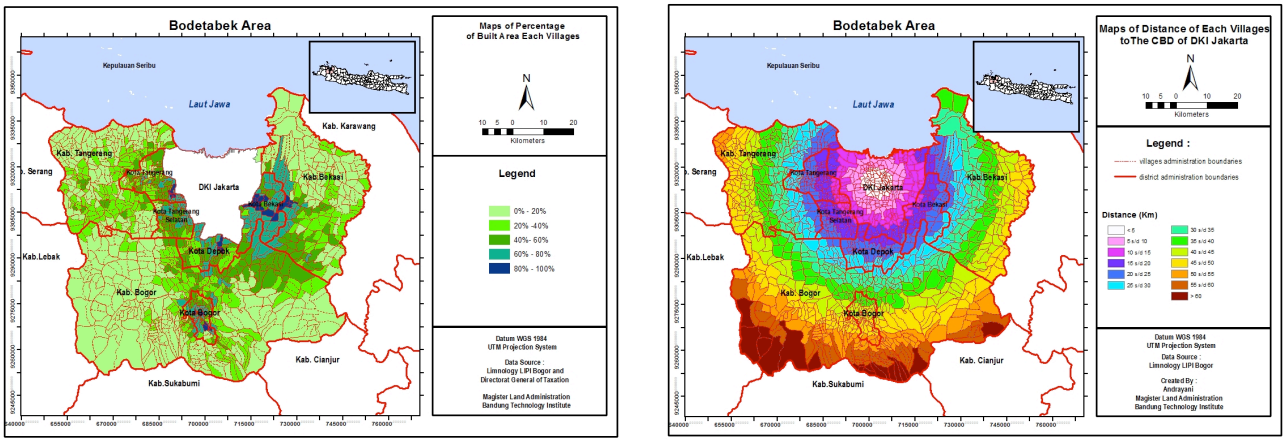


Figure 5. Data Extraction

4.3. Data Analysis

Data land value in the area Bodetabek consists of 1177 data. Histogram land value can be seen in Figure 6. Figure 6 shows that the frequency of the highest land value lies in the set of data values of this land is the land value of less than 500.000, -/m2.

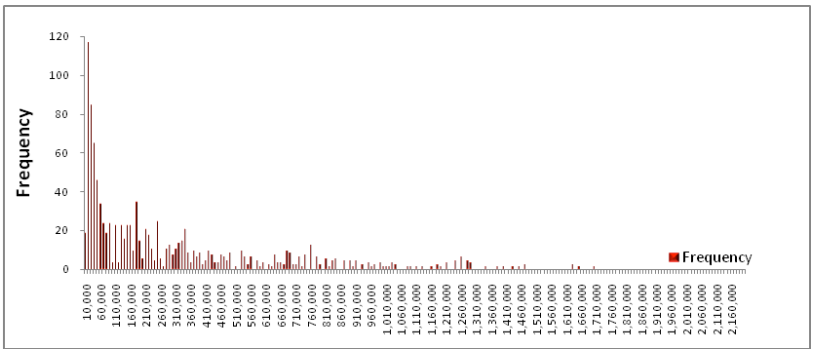
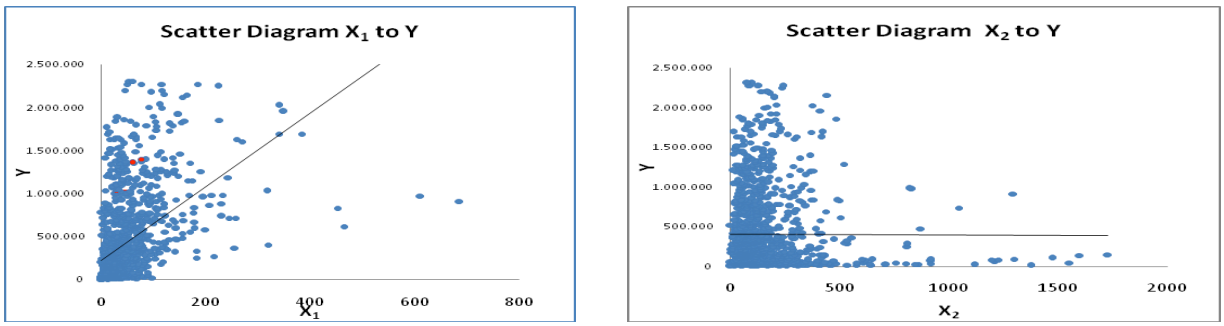


Figure 6. Data Histogram

The relationship of each variable to the value of land can be seen in the scatter diagram of the relationship of each variable to the value of land can be seen in Figure 7.



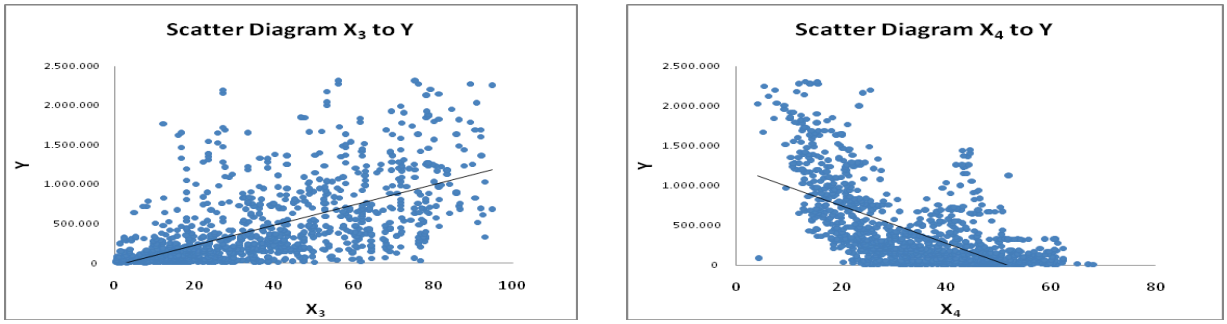


Figure.7
Scatter Diagram of Relation between Land Value Data Relations
with Each Data Variable

Figure 7 can be explained as follows:

- Scatter diagram variable X1 with Y variables showed a positive relationship between population density per unit area of the villages to land value.
- Scatter diagram variable X2 with Y variables showed a positive relationship between population density per built area of the villages to land values.
- X3 scatter diagram with Y variables showed a positive relationship between percentage of built area each villages to land value.
- Scatter diagram X4 variable to variable Y is a negative relationship between distance of each villages to the CBD of DKI Jakarta to land values.

Land value data in this group in 1177 as further data are separated as much data as a 1077 model data with measures multiple regression analysis is shown in Table 1.

Steps	Variables	R	R^2	Adjusted R^2	Sig Simultan	Sig Partial					VIF				C	β			
						C	X_1	X_2	X_3	X_4	X_1	X_2	X_3	X_4		X_1	X_2	X_3	X_4
Step 1	X_1, X_2, X_3	.664a	0.44	0.439	.000[a]	0.634	0	0.177	0	-	1.64	1.201	1.615	-	-7,651.33	1,092.94	31.263	8,383.85	-
Step 2	X_1, X_2, X_3, X_4	.702a	0.493	0.491	.000a	0	0	0.342	0	0	1.648	1.203	2.169	1.48	385,347.43	1,199.67	20.975	5,693.22	-8,597.77
Step 3	X_1, X_3, X_4	.702a	0.493	0.491	.000a	0	0	-	0	0	1.414	-	1.934	1.477	393,387.14	1,252.89	-	5,535.14	-8,632.08

Table 1. Multiple Regression of Land Value Data

According to Table 1 obtained equation was chosen for the data with land value land value in Bodetabek areas namely:

$$\mathbf{Y = 393.387{,}143 + 1.252{,}894\ X_1 + 5.535{,}138\ X_3 - 8.632{,}081\ X_4}$$

X_1 and X_4 have significant correlation with the value of land with a strong enough that the R value of 0.702. Adjusted R^2 value of 0,491 means that the independent variables in this case X_1 (population density per unit area of the villages), X_3 (percentage of built area each villages to land value), and X_4 (distance of each villages to the CBD of DKI Jakarta) jointly explain the variable land value only amounted for 49,1%, while the remaining 50, 9% is explained by other variables not examined in this study. This may imply that in fact the land value is variable X_1, X_3 and X_4 that affect land values.

The test results on the test data of 100 test data illustrated by Figure 8. Figure 8 shows the difference between land value data and land value model results in the largest field test data are generally located on low land values (less than 500.000, -/m2) and high land values in this test data.

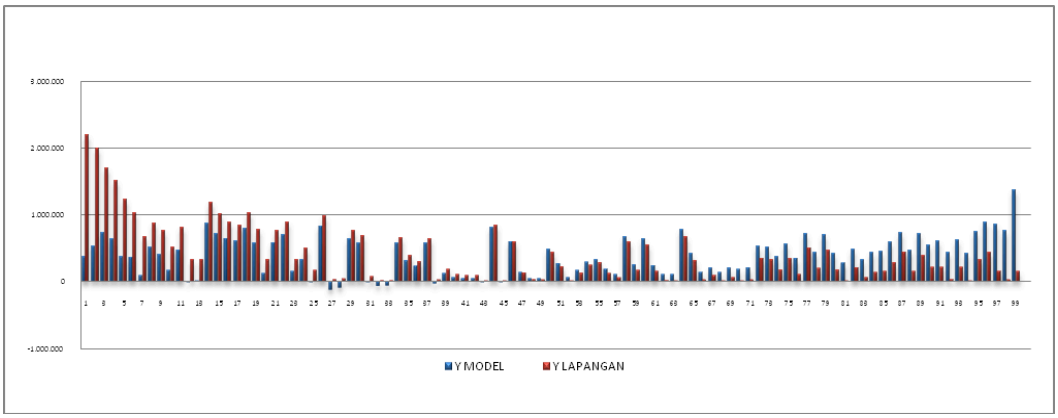


Figure 8.
Comparison of Model Land Value and Real Land Value Data

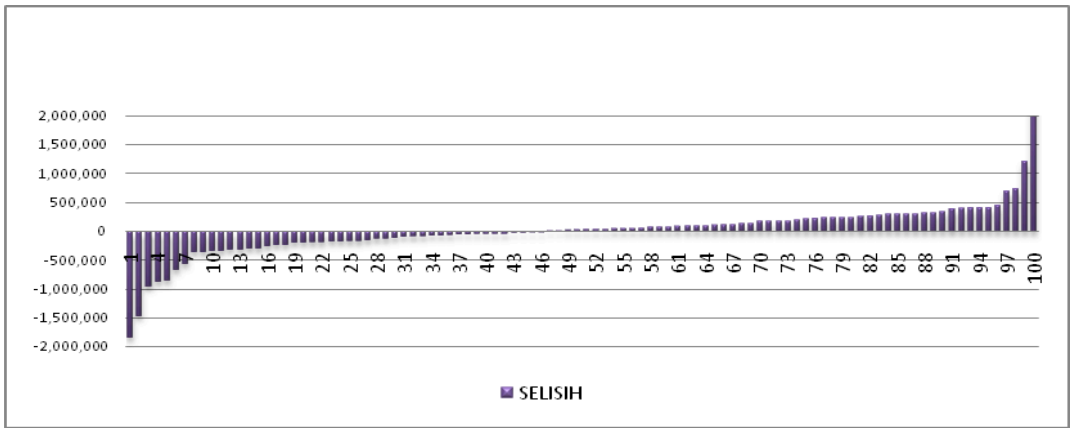


Figure 9.
Difference in Land Value Model and Real Land Value Data

Figure 9. shows that the difference over estimate on the test data is the biggest difference was greater than Rp.1.500.000, -/m2.

Based on the analysis on the test data with the absolute difference in the number of errors on the test data of Rp. 2.,838.292,09, an average difference of error Rp. 278.382,92 with a maximum difference value of Rp. 1.833.355,18 and the minimum difference. Rp.1.914,60. The model results are then applied to the equation all the data as shown in Figure 10 and 11.

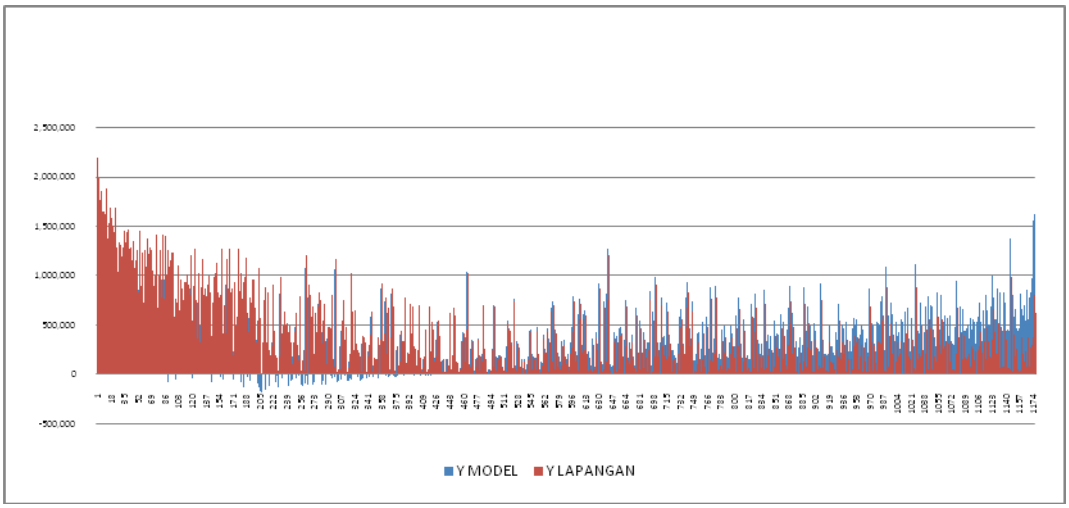


Figure 10.
Comparison of Model Land Value and Real Land Value Data (Applied to All Data)

Figure 10 showed shows that the the biggest difference between the model results and the land value data is on the land value data more than Rp. 2.000.000/m2 and land value data less than 500.000/m2.

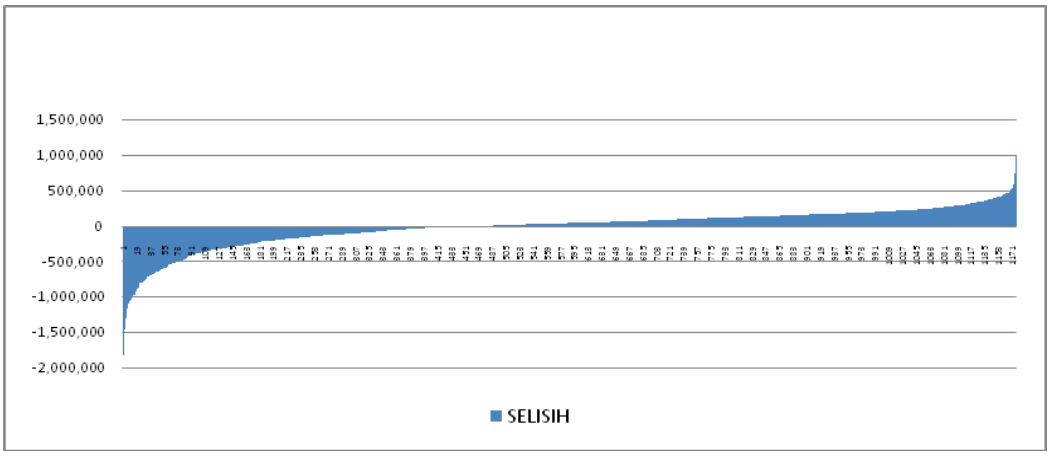


Figure 11.
Difference in Land Value Model and Real Land Value Data (Applied to All Data)

Figure 11 showed that the biggest difference is the difference in under estimate land value (model results are lower than real land value data) more than Rp.1.500.000, -/m2.

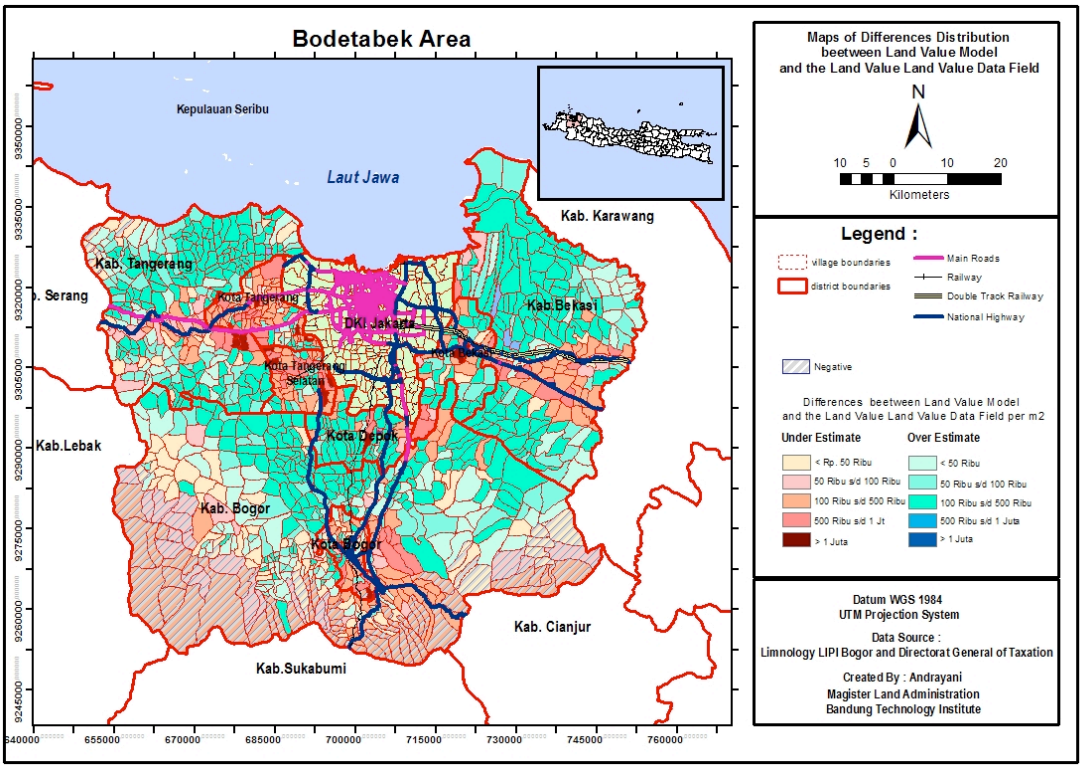


Figure 12
Maps of Distribution of Difference between Land Value Model and Real Data Land Value

Distribution maps of the difference in value of land application of the results of this model in Figure 12 shows that:

1. Under estimate (model results are lower than real land value data) spread along the road network (arterial roads, highways and railways) and areal around center of Bogor City.
2. Most of the difference error is over estimate (land value model bigger than real data) less than Rp.500,000, -.
3. The highest over estimate (model results are higher than real land value data) more than 500,000,- is in the area of Bekasi.
4. There are still negative results for the area with a distance more than 50 km from the center of CBD of DKI Jakarta.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusion:

Based on the results of research on the conclusion drawn is:

- Model of land value in the Bodetabek is:

$$Y = 393.387{,}143 + 1.252{,}894\ X_1 + 5.535{,}138\ X_3 - 8.632{,}081\ X_4$$

- From the analysis above conclusions have been associated with the effect of each variable to the value of the land, among others:
  1. X_1 variables (population density per unit area of the villages) influence land value in the Bodetabek area. This variable is directly proportional to the value of land in the area Bodetabek

2. X_2 variables (population density per built area of the villages) did not affect land values Bodetabek area.
3. X_3 variables (percentage of built area each villages) in Bodetabek area variables affect the data value of land in Bodetabek area. This variable is directly proportional to the value of land in Bodetabek area.
4. X_4 (distance of each villages to the CBD of DKI Jakarta) effect land value in the Bodetabek area. This variable is inversely proportional to the value of land in the Bodetabek area, This can be interpreted as the accessibility to the center of Jakarta CBD is very influential on the value of land in the Bodetabek area.

- The highest under estimate (model results are lower than real land value data) in the Bodetabek area is around the facility of a road to Jakarta and surrounding areas close to areas of Jakarta.
- Over estimate (model results are higher than real land value data) in the Bodetabek area is in areas far from the center of Jakarta's CBD, but the over estimate on Bodetabek area are generally not too large (less than 500,000, -/m2) . Differences over estimate the highest in the Jakarta area (more than Rp1.000.000, -/m2) contained in the areas adjacent to the center of Jakarta's CBD, but with high population density.
- Based on these results, the distance to the CBD of DKI Jakarta is the distance that most influence on land values in Bodetabek area, but there are highest differences under estimate (model results are lower than real land value data) when approaching Central Business District in other areas, especially to the CBD of Bogor, Karawaci (Tangerang) and Cikarang (Bekasi).

5.2. Recomendations:

- For further research is needed to consider in addition to the Jakarta CBD is also the influence of accessibility to the CBD of Bogor, Karawaci (Tangerang) and Cikarang (Bekasi).
- The model generated in this study can be applied to the valuation of land in the BPN using the market value.
- Linear regression method was used in this study need to be developed on a different approach methods, especially nonlinear model approach.

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BIOGRAPHICAL NOTES

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