Parameters Affecting the Land Value in The Perspective of Experts and Institutions Related to Land Valuation

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ABSTRACT

Abstrak - There are varieties of criteria and parameter that affect the land value. Therefore, the research focusing on determination of parameters that affect the land value is needed, in which it will give positive contribution for academic and practical. This study begins by identifying the parameters that is based on previous researches. Furthermore parameters are analyzed to result the nominal of the mean and standard deviation based on the questionnaire result from the perspective of experts and institutions related to land valuation. This research results the parameters affecting the land value that are categorized into 4 quadrants in Cartesius diagram. Parameters that most influence the land value in quadrant I, consist of: scarcity, geography, distance from CBD, time to CBD, class road, form of land, land condition, topography, comparison with the surrounding property, shopping complex, network, environmental cleanliness, land use, legal status, regulation, rate of return, lease price. The parameters that most influence can be determined by using the method of interviews with experts to establish the parameters that most influence in each quadrant or Pearson correlation and Cronbach's alpha reliability analysis or confirmatory factor analysis that use maximum likelihood estimation method.

Key word: Land value, parameter, mean, standard deviation

INTRODUCTION

The land use change in a zone will affect the market value of land in an area [1]. The tendency of the physical changes associated land use essentially can be divided into two changes, namely changes in land use and use of building [2]. Changes in land use in the city indicated a change from agricultural land, vacant land and green belt into area of residential, trading, services and residential. This condition will also affect the change in the value of land [3].

Based on the reality of the above conditions, the value of land is expected to accommodate the attributes of the development of physical and urban infrastructures more comprehensively, thus the value of land can represent a reasonable condition and can be estimated according to the development that is influenced by multiple attributes (discrete and continuous), both spatial and non-spatial.

One element that affects the value of the land is a geographical element. Density and the development of the residential areas and business areas affect the value of the surrounding land. This is particularly relevant to the research that has been done before [4], in the study stated that the land value is strongly influenced by the accessibility, distance to the city center, land use, zoning, density and spatial gradient effect. Similarly, described by [5] that the value of land is affected with the geographical location. Conditions of Surabaya city is relatively diverse, both from the effect of geographical, social and cultural. The analysis model that considers the geographical effects is important to be applied in the land valuation. Analysis model that considers the geographical effects, need to more attention to the variables that will be used [6].

Based on some empirical review above, can be identified various criteria and parameters that can affect the land value. Therefore, research that focuses on the determination of parameters that affect the land value is very necessary, so that can make a positive contribution to the academic and practical.

MATERIALS AND METHODS

Parameters that influence land value are arranged in the form of tabulations with the criteria of supply, demand and highest best use. The criteria of highest and best use consisting of physical, environmental, legal, social, financial feasibility, economic, productivity and public and private boundaries. Overall there are 83 parameters that affect land value.

The influence of parameters can be categorized with 4 perceptions, namely: (4) very influential, (3) influential, (2) not influential and (1) very not influential. The questionnaire is structured, then distributed to 31 respondents who consist of experts in the assessment of the land, specifically: Academic, Tax Office, Directorate General of Taxation, Agency of Income and Financial Management, Association of Real Estate and Brokeradge, Land Office, Center of Accountant Development and Appraiser Services - Ministry of Finance, Office of Public Appraiser Services.

Results of questionnaire are calculated with mean and standard deviation. Afterwards, this result is graphed with the mean on the x-axis and standard deviation on the y-axis into Cartesius diagram. Thereafter, distribution of mean and standard deviation for each parameter is cut with an average of mean and average of standard deviation [7].

Based on these intersections, the distribution of the mean and standard deviation can be clustered into 4 quadrants and can be known parameters included in quadrant I, II, III and IV. Quadrant I represents the mean and standard deviation is greatest, so that the quadrant I can represent parameters that are very influential in the assessment of the land.

RESULTS AND DISCUSSION

The results of questionnaire recapitulation of the mean value and standard deviation (SD) for each parameter can be seen in Table 1.

TABLE 1
RECAPITULATION OF THE MEAN AND STANDARD DEVIATION FOR EACH PARAMETER

No	Parameter	Mean	SD	No	Parameter	Mean	SD
1	Utility	3,6452	0,6607	43	Transportation	3,4194	0,6204
2	Scarcity	3,7419	0,4448	44	Volume of vehicle	3,0323	0,6046
3	Desirability	3,4839	0,6768	45	Gutter	2,8710	0,5623
4	Effective Purchasing Power	3,3548	0,6607	46	Building coverage	3,1290	0,7184
5	Geography	3,7097	0,5287	47	Floor area ratio	3,1935	0,7033
6	Distance from CBD	3,6129	0,5584	48	Water contamination	3,2581	0,6816
7	Distance to Public Fasility	3,2581	0,6816	49	Air contamination	3,1613	0,6878
8	Climate	2,4516	0,6239	50	Voice contamination	3,0323	0,7063
9	Accessibility	3,7742	0,6170	51	Environmental comfort	3,3871	0,6152
10	Time to CBD	3,3871	0,5584	52	Environmental cleanliness	3,1613	0,5829
11	Class roads	3,5161	0,5080	53	View	3,0000	0,5164
12	Land area	3,3226	0,6525	54	Building density	3,1613	0,7347
13	Building floor area	2,8710	0,7634	55	Population density	3,0968	0,5975
14	Building position	2,7742	0,7169	56	Population character	2,9677	0,6575
15	Life of the build	2,6129	0,7154	57	Flooding	3,5806	0,6720
16	Advertisement	2,3871	0,6672	58	Quake	3,0968	0,7463
17	Elevation	3,1290	0,4995	59	Hurricane	2,9355	0,7273
18	Form of land	3,3226	0,5408	60	Zoning	3,5806	0,7199
19	Land condition	3,2581	0,4448	61	Heritage	3,4194	0,7199
20	Fertility	2,6452	0,6082	62	Land use	3,8065	0,4016
21	Adaptability	2,5806	0,6720	63	Tax	2,9355	0,6290
22	Topography	3,1935	0,5428	64	Legal status	3,7419	0,4448
23	Geology	2,6452	0,6082	65	Amount of tax	3,0000	0,6325
24	Drainage	3,0645	0,5736	66	Regulation	3,4516	0,5059
25	Land capacity	3,0968	0,4729	67	Population growth	3,0968	0,6509
26	Type and land orientation	3,0000	0,5164	68	Age	2,6452	0,6082
27	Leveling	3,0645	0,4424	69	Behavior to the law	2,9032	0,5975
28	Filling	3,1290	0,4995	70	Discipline	3,0645	0,6800
29	Compaction	2,9677	0,4819	71	Dignity	2,8710	0,5623
30	Paving	2,7742	0,6170	72	Level of crime	3,2258	0,7169
31	Pedestrian	2,8065	0,5428	73	Level of education	2,8065	0,7492
32	Streetlight	2,5484	0,5680	74	Rate of return	3,5806	0,5642
33	Park area	2,8710	0,6187	75	Net operating income	3,4839	0,6256
34	Comparison with the surrounding property	3,3871	0,5584	76	Lease price	3,7097	0,4614
35	Education fasility	3,0323	0,6575	77	Level of income	3,5161	0,6256
36	Shopping complex	3,3226	0,4752	78	Region growth	3,6129	0,6152
37	Garden	2,8710	0,4995	79	Construction trend	3,2258	0,6688
38	Worship	2,7742	0,6170	80	Level of productivity	3,1613	0,7347
39	Hospital	2,7419	0,6816	81	Public zone	3,2258	0,6170
40	Entertainment	2,7419	0,6308	82	Property tax	3,0645	0,6800
41	Government fasility	2,7097	0,5884	83	Private zone	3,1935	0,6542
42	Network fasility	3,2581	0,5755				

The average of mean is 3.1403 and an average of standard deviation is 0.6092 for all parameters. The result of clustering that is devided in 4 quadrants can be seen in figure 1. All figures and tables below are the results of the command output window Matlab 7.8.0 and microsoft excel 2010.

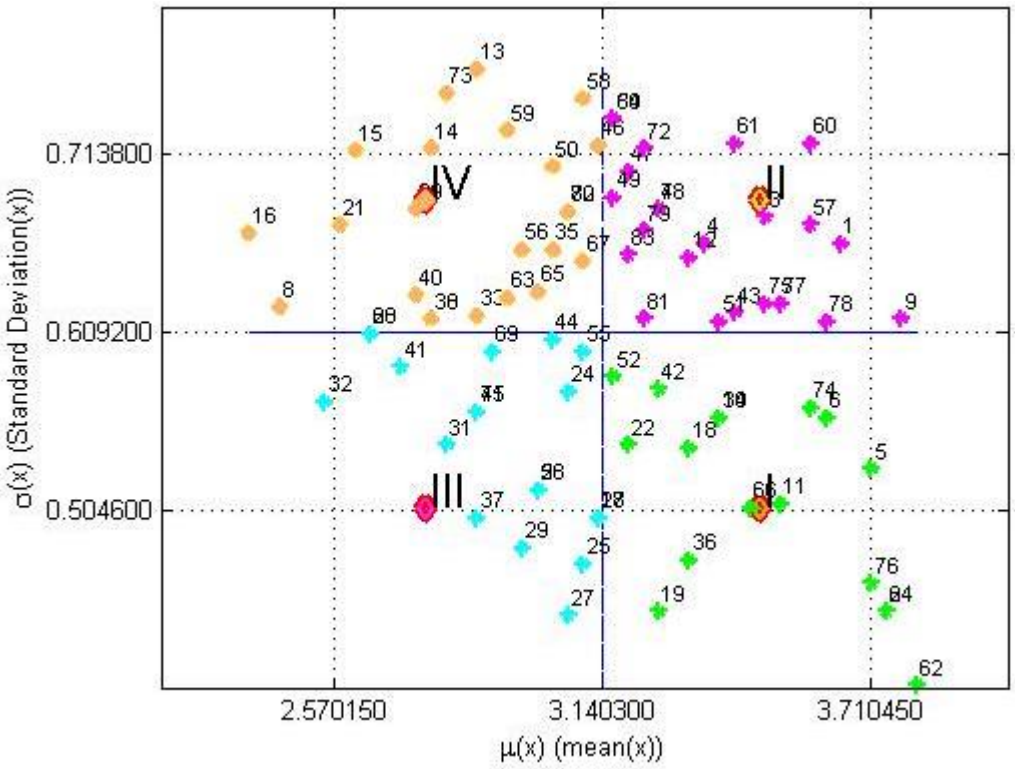


Fig.1. 4 quadrants of the parameters distribution in Cartesius diagram

Each of the parameters that is entered in quadrant I, II, III and IV, as can be seen in table 2 and table 3 below. The parameters are included in quadrant I are parameters that greatly affect the land value.

TABLE 2
QUADRANT I and II

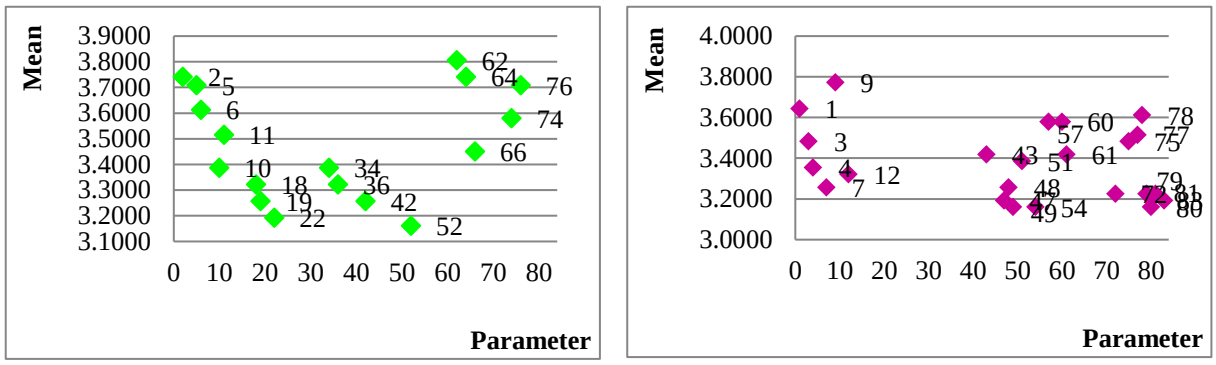
	Parameter Name
Parameter 2	Scarcity - supply
Parameter 5	geography
Parameter 6	distance CBD
Parameter 10	time to CBD
Parameter 11	class roads
Parameter 18	forms of land
Parameter 19	land condition
Parameter 22	topography
Parameter 34	comparison prop
Parameter 36	shopping comp
Parameter 42	network
Parameter 52	env cleanliness
Parameter 62	land use
Parameter 64	legal status
Parameter 66	regulation
Parameter 74	rate of return
Parameter 76	lease price

17 parameters in quadrant I

	Parameter Name
Parameter 1	Utility
Parameter 3	Desirability
Parameter 4	Effective Purch P
Parameter 7	distance p fas
Parameter 9	accessibility
Parameter 12	land area
Parameter 43	transportation
Parameter 47	floor area ratio
Parameter 48	water cont
Parameter 49	air cont
Parameter 51	env comfort
Parameter 54	building density
Parameter 57	flooding
Parameter 60	zoning
Parameter 61	heritage
Parameter 72	level of crime
Parameter 75	net op income
Parameter 77	level of income
Parameter 78	region growth
Parameter 79	construction tr
Parameter 80	level of prod
Parameter 81	public zone
Parameter 83	private zone

23 parameters in quadrant II

The result of the analysis is based on the mean of each parameter in the quadrant I and II can be seen in figure.2.



Quadrant I Quadrant II

Fig.2. Mean of each parameter in the quadrant I and II

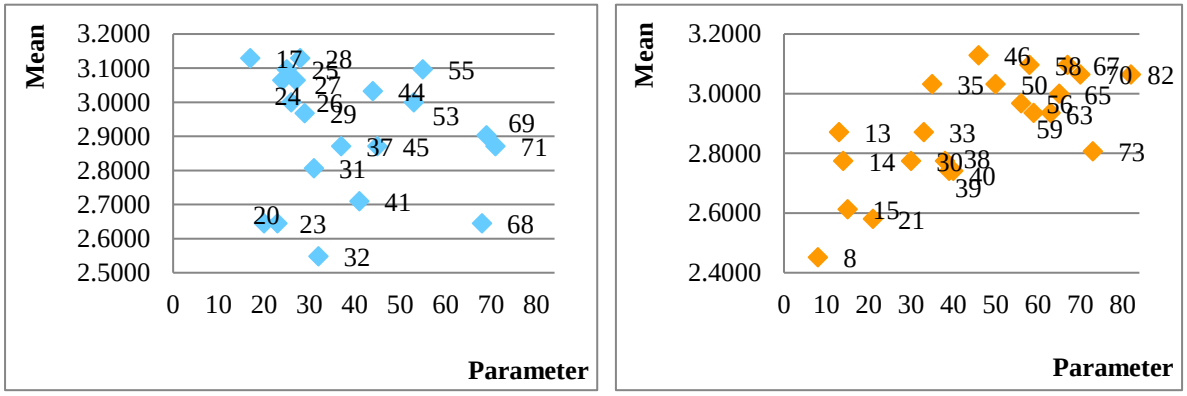
TABLE 3
QUADRANT III and IV

	Parameter Name
Parameter 17	elevation
Parameter 20	fertility
Parameter 23	geology
Parameter 24	drainage
Parameter 25	land capacity
Parameter 26	land orientation
Parameter 27	leveling
Parameter 28	filling
Parameter 29	compaction
Parameter 31	pedestrian
Parameter 32	streetlight
Parameter 37	garden
Parameter 41	government fas
Parameter 44	volume of vehicle
Parameter 45	gutter
Parameter 53	view
Parameter 55	pop density
Parameter 68	age
Parameter 69	behavior to the law
Parameter 71	dignity

	Parameter Name
Parameter 8	climate
Parameter 13	building fl area
Parameter 14	building postn
Parameter 15	life of the build
Parameter 16	advertisement
Parameter 21	adaptability
Parameter 30	paving
Parameter 33	park area
Parameter 35	education fas
Parameter 38	worship
Parameter 39	hospital
Parameter 40	entertainment
Parameter 46	building coverage
Parameter 50	voice cont
Parameter 56	pop character
Parameter 58	quake
Parameter 59	hurricane
Parameter 63	tax
Parameter 65	amount of tax
Parameter 67	pop growth
Parameter 70	discipline
Parameter 73	level of education
Parameter 82	property tax

20 parameters in quadrant III 23 parameters in quadrant IV

The result of the analysis is based on the mean of each parameter in the quadrant III and IV can be seen in figure 3.



Quadrant III Quadrant IV

Fig.3. Mean of each parameter in the quadrant III and IV

Johnson and Wade [4] show the geographical location, distance from the central business district (CBD), the density of buildings and population density affect land value. Previous research assessment of land use that affected land had been carried out by [8], [9], [10]. Lean and Goodall [11] show the value of land is affected by the utility, scarcity, desirability and effective purchasing power. Shenkel [12] shows the level of productivity affects the value of the land. American Institute of Real Estate Appraisers [13] shows the geographic location, accessibility, size or land area, elevation, soil conditions, environmental, zoning, land use, and legal status affect the land value.

Bolen et al [14] describe the distance from the CBD, parks, building coverage, floor area ratio, comfort and scenic environment affect land value. Betts and Ely [15] show the parameters that affect the value of the land, namely: geographical location, accessibility, size or area of land, land forms, soil conditions, adaptability, topography, geology, drainage, soil type and orientation, leveling, filling, compaction, paving, pedestrian, street lights, parking facilities, comparisons with other properties, network facilities, transportation, environmental comfort, flood, earthquake, zoning, rules of cultural heritage, legal status, rate of return, net operating income, the level of productivity, public restrictions, property taxes and private boundaries. Suyudi [16] shows parameters distance from the CBD, network facilities, zoning, land use and legal status affect the value of the land. Hubacek and Vazquez [17] describe the utility, scarcity, desirability and effective purchasing power affect the value of the land. Putra [18] shows that the parameters geographic location, accessibility, size or land area, elevation, soil conditions, environmental comfort, zoning, land use and legal status affect the value of the land.

Carr et al [19] show the utility, scarcity, desirability and effective purchasing power affect the value of the land. Oshiro [20] shows desirability, distance from the CBD, transport, regulation and income levels affect land value. Sutawijaya [21] describes the parameters that affect the value of the land are the distance from the CBD, accessibility, class roads, transportation, population density and flooding.

Wolcott [22], the parameters that affect land values are utility, scarcity, geographic location, climate, accessibility, fertility, topography, educational facilities, parks, facilities network, transport, sewerage, water pollution, air pollution, sound pollution, zoning, land use, type of tax, the amount of tax, regulatory, population growth, age, attitudes towards law, order, dignity, crime rate, education level, income level, growth and development of the construction area. Parameters affecting land value are geographic location, accessibility, soil conditions, topography, educational facilities, shopping malls, parks, places of worship, a place of health, entertainment places, government offices, network facilities, population density, regulation, order and income levels [23].

Hamid and Nadila [24] show geographic location parameters, the distance from the CBD, or the size of the land area, floor area of the building, the position of the building, land use and legal status affect the value of the land. The analysis of the land value parameters that is influenced by distance from public facilities on land values have been done by [25]. Kahonde and Whittal [26] describe the land value is affected by the parameters of the sights. Subagiyo [27] shows the range of public facilities and building density affect land value .

The effect of distance from the CBD, road grade and size of land will affect the value of land [28]. Rahayu [29] describes the parameters of the distance from public facilities, accessibility and size of area of land or affect the value of the land. Distance parameters of public facilities, the size of land, building floor area, building age, place of education and parks affect the value of land [30].

Dunn [31] describes the parameters of utility, scarcity, desirability and effective purchasing power also affects the value of the land. In an article written by Leksono et al [32] described the parameters of travel time to the CBD, class roads, transportation and traffic volume affect land value. Kok et al [33] show the value of the land is affected by the parameters of its geographical location, distance from the CBD, accessibility, elevation, topography and population characteristics. Harjanto [34] show the geographic location, the size of land, the width of the front side, elevation, land form and land use affect land value.

Olawande [35] describes the parameters affecting the value of land are utility, scarcity, desirability, geographical location and accessibility. Gwartney [36] describes that land value is affected by the utility, scarcity, geographic location, climate, accessibility, fertility, topography, educational facilities, parks, network facilities, transportation, sewers, water pollution, air pollution, pollution sound, zoning, land use, type of tax, the amount of tax, regulatory, population growth, age, attitudes towards law, order, dignity, crime rate, education level, income level, growth and development of the construction area. Baranzini and Schaerer [37] show that the parameters of the climate, view and land use affect land value.

In this study has not been able to set the parameters that most influence in each quadrant. The parameters most influential in each quadrant can be determined only by the mean or the standard deviation alone. The parameters

that most influence cannot be determined by using the mean and standard deviation simultaneously. This is caused the relationship between the mean and the standard deviation is not linear.

CONCLUSION

This study can analyze parameters that influence the value of land by using the analysis of the mean and standard deviation that is based on the questionnaire results from the perspective of experts and institutions related to land valuation. Analysis of this study can describe and generate parameters that are included in quadrant 1, 2, 3 and 4. The parameters that most influence the land value in quadrant 1, consist of: scarcity, geography, distance from CBD, time to CBD, class road, form of land, land condition, topography, comparison with the surrounding property, shopping complex, network, environmental cleanliness, land use, legal status, regulation, rate of return, lease price.

REFERENCES

[1] Olayiwola, L M., OA Adeleye dan AO Oduwaye. "Correlates of Land Value Determinants in Lagos Metropolis Nigeria". Kamla-Raj. J. Hum.Ecol, 17 (3): 183-189 (2005). Department of Urban and Regional Planning Obafemi Awolowo University. Ile-Ife. Nigeria. 2005.
[2] Pemerintah Kota Surabaya. "Rencana Tata Ruang Wilayah Kota Surabaya". 2007.
[3] Putra, I Nyoman Dita P., Nadjadji Anwar, Christiono Utomo, Bangun Muljo S dan Nanang Setiawan. "Evaluasi Penggunaan Lahan dan Prediksi Perkembangan Sektor Primer, Sekunder dan Tersier pada Wilayah Kota Surabaya berdasarkan PDRB". Jurnal Teknik Sipil Kern Vol.1 No.2 Nopember 2011. Surabaya. 2011.
[4] Johnson, Michael S dan Wade R. Ragas. "CBD Land Values and Multiple Externalities". Land Economics, Nov 1987; 63, 4; Proquest Agriculture Journals. pg.337. 1987.
[5] Soetarto, Endriatmo. "Metodologi Penilaian Tanah untuk Berbagai Kebutuhan". Institut Pertanian Bogor. Bogor. 2009.
[6] Junedi, Sugeng. "Perbandingan antara Regresi Global dengan Geographically Weighted Regression untuk Memodelkan Data Pendapatan di Indonesia". Tesis. Jurusan Statistika. FMIPA. ITS. Surabaya. 2009.
[7] Rakhmawati, Ana and Christiono Utomo. "Analisis Faktor-Faktor yang Mempengaruhi Turnover Pekerja Proyek Konstruksi di Surabaya". Master Thesis of Magister Management Technology. ITS. 2011.
[8] Thünen, von J.H. "Der Isolierte Staat in Beziehung auf Landschaft und Nationalökonomie". Trans. By C.M. Wartenberg. 1966. Von Thünen's Isolated State. Oxford: Pergamon Press. 1826.
[9] Wegener, Michael. "Current and Future Land Use Models. The Land Use Model Conference". Texas Transportation Institute. Dallas. 1995.
[10] Cho, Seong-Hoon., Neelam Poudyal dan Dayton M.Lambert. "Estimating Spatially Varying Effects of Urban Growth Boundaries on Land Development and Land Value". Land Use Policy 25. 2008. 320-329. Available online at www.sciencedirect.com.
[11] Lean, William dan Brian Goodall. "Aspect of Land Economics". The Estates Gazette Limited 28 Denmark Street. London. WC2. 414pp. 1966.
[12] Shenkel, William M. "Modern Real Estate Appraisal". McGraw-Hill. 1978.
[13] American Institute of Real Estate Appraisers. "The Appraisal of Real Estate". Ninth Edition. MAI dan RM. 1987.
[14] Bolen, Fulin., Funda Yirmibesoglu, Handan Turkoglu dan Perver Korca. " Determinants of Land Prices in Istanbul a Case Study". Istanbul Technical University, Faculty of Architecture, Department of Urban and Regional Planning. Taksim Istanbul Turkey. 1996.
[15] Betts, Richard M dan Ely, Silas J. "Basic Real Estate Appraisal". Fifth Edition. Prentice Hall. New Jersey. 2001.
[16] Suyudi, Bambang. "Model Pendugaan Nilai Tanah dengan Teknologi Sistem Informasi Geografis". Thesis. Magister Teknologi Informasi Spasial. Program Studi Teknik Geodesi. ITB. Bandung. 2002.
[17] Hubacek, K dan Jose Vazquez. "The Economic of Land Use Change". International Institute for Applied System Analysis. Schlossplatz 1A-238. Laxenburg. Austria. 2002.

[18] Putra, I Nyoman Dita P. "Analisa Nilai Pasar Tanah dengan Metode Pengembangan Lahan (studi kasus Perumahan Puri Karang Asem Malang)". Thesis. Manajemen Konstruksi. ITS. Surabaya. 2002.
[19] Carr, Dennis H., Jeff A. Lawson dan J. Carl Schultz, Jr. "Mastering Real Estate Appraisal". Dearborn Financial Publishing, Inc. Dearborn Real Estate Education. Chicago. USA. 2003.
[20] Oshiro, Kenji. "Land Price Changes in Sendai and Sapporo, Japan". The Industrial Geographer, Volume 1, Issue 1, pp.35-50. © 2003 *Oshiro*. 2003.
[21] Sutawijaya, Adrian. "Analisis Faktor-Faktor yang Mempengaruhi Nilai Tanah sebagai Dasar Penilaian Nilai Jual Obyek Pajak (NJOP) PBB di Kota Semarang". Jurnal Ekonomi Pembangunan Vol. 9 No. 1, Juni 2004 Hal: 65 – 78. Jakarta. 2004.
[22] Wolcott, Richard C. "The Appraisal of Real Estate American Institute of Real Estate Appraiser". North Michigan. Chicago Illinois. 1987.
[23] Putra, I Nyoman Dita P., Anna Rumintang dan Dedye Purnomo. "Penilaian Properti Pergudangan dengan Pendekatan Data Pasar dan Biaya". Proceeding. The Integration of Civil Engineering Sciences Supporting The Improvement of National Economy. Seminar Nasional – Rekayasa Perencanaan II 2004. Surabaya. 2004.
[24] Hamid, Abdul dan Nadila binti Hamidi. "Implikasi Pencemaran Alam Sekitar terhadap Nilai Harta Tanah Kediaman". First Real Estate Educators and Researchers Malaysia (REER) Seminar. UTM City Campus. Malaysia. 2005.
[25] Imawan, Diddy Wahyudi. "Pengembangan Metoda Penilaian Tanah dengan Menggunakan Analisis Spasial dan Jaringan Syaraf Tiruan". Thesis. Teknik Geodesi dan Geomatika-Administrasi Pertanahan. ITB. Bandung. 2007.
[26] Kahonde, Justine dan Jennifer Whittal. "Surveying Technical towards the Modelling of View for CAMA Property Valuations". School of Architecture, Planning and Geomatics. University of Cape Town. 2007.
[27] Subagiyo. "Kajian Kenaikan Nilai Tanah Akibat Pengadaan Tanah untuk Pembangunan Kawasan Perkantoran dan Infrastruktur di Cimahi Utara". Thesis. Teknik Geodesi dan Geomatika-Administrasi Pertanahan. ITB. Bandung. 2007.
[28] Suartana Tk, I Kadek Arya. "Penilaian Tanah Massal dengan Pendekatan berbasis Nilai Aset Nominal". Jurnal Survey dan Penilaian Properti, Vol. 53 tahun 2008. ISSN No. 1410-1742. Direktorat Jenderal Pajak. Jakarta. 2008.
[29] Rahayu, Heffi Christya. "Analisa Nilai Tanah terhadap Lingkungan Kampus Politeknik Pasir Pangaraian". Jurnal Aptek Vol. 1 No. 1 Juli 2009. Rokan Hulu. Riau. 2009.
[30] Lin, Tzu-Chin dan Min-Hua Jhen. "Inequity of Land Valuation in the Highly Developed City of Taipei, Taiwan". Land Use Policy 26 (2009) 662-668. Contents Lists Available At Sciencedirect. Land Use Policy. 2009.
[31] Dunn, Chuck dan Real Estate Division. "The Appraisal of Real Estate". 3rd Canadian Edition Busi 330. Sauder School of Business. Vancouver. Canada. 2010.
[32] Leksono, Bambang Edhi., Yuliana Susilowati, Hendriatiningsih and Denisanto. "The Influence of Urban Accessibility in Determining Average Indicated Land Values for the Region". FIG Congress. Facing the Challenges-Building the Capacity. Sydney. Australia. 2010.
[33] Kok, Nils., Paavo Monkkonen dan John M.Quigley. "Economic Geography, Jobs, and Regulations: The Value of Land and Housing". ASSA Meetings. 2011.
[34] Harjanto, Budi. "Teori dan Berbagai Model Aplikasi Penilaian Massal". Edisi Pertama. BPFE. UGM. Yogyakarta. 2011.
[35] Olawande, Oni Ayotunde. "Land Value Determinants and Variability in Commercial Property Values in Emerging Economy: Case study of Ikeja Nigeria". Department of Estate Management. Covenant University. Ota Nigeria. 2011.
[36] Gwartney, Ted. "Estimating Land Values". Greenwich. Connecticut. 2011.
[37] Baranzini, Andrea dan Caroline Schaerer. "A Sight for Sore Eyes: Assessing the Value of View and Land Use in the Housing Market". Journal of Housing Economics 20 (2011) 191-199. Contents lists available at ScienceDirect. 2011.