The Factors of Land use Conversion from Settlement Area to Commercial Area at IR. Soekarno/ Merr Street, Rungkut Street, and Medokan Ayu Street, Surabaya

Agung Ndaru Purwanto[1], Jenny Ernawati[2], Agus Dwi Wijaksono[3]

[1]Master Programme of Urban and Regional Planning, Brawijaya University, Malang, Indonesia
[2,3]Urban and Regional Planning, Faculty of Technic, Brawijaya University, Malang, Indonesia

Abstract— *Land use that does not conform to its city plan is a common phenomenon that happens on fast growing cities. Land use conversion usually caused by discrepancy between the reasoning that underlie a city plan and market's judgement. At the area around Ir. Soekarno Street / MERR that designed as a part of Surabaya City Ring Road, the land use is gradually changing from settlement area into commercial area. In urban planning, it is important to understand the cause of land use change in order to be able to handle the implication well. Therefore, the research objective was to identify the factors that affecting land use conversion from settlement area into commercial area at Ir. Soekarno Street/MERR, Rungkut Madya Street, and Medokan Ayu Street. The research's methods are descriptive. The descriptive analysis was used to describe the land use change pattern at Ir. Soekarno Street/MERR, Rungkut Madya Street, and Medokan Ayu Street. Multiple regression analysis was used to analyses the factors that affecting land use conversion from settlement area into commercial area. The result showed that the factors that affecting land use conversion are land's value, average income of the land owner, and land use in the surrounding area.*

Keywords— *conversion factor, land use, settlement, commercial area, regression analysis.*

I. INTRODUCTION

Land use planning is the main guide for determining the direction and the management of activities and land use in the city. Land use planning usually took a form as city structural planning that was established by considering all the factors affecting it. Even so, since there are so many factors that could affect land use formation, oftentimes the land use formed not the way it was planned to be.

Land use that does not conform to its city plan is a common phenomenon that happens on fast growing cities. Land use conversion usually caused by discrepancy between the reasoning that underlie a city plan and market's judgement. In one hand, land use should be considering public needs and all the technical rules. In other hand, market's demand has the power that couldn't be controlled easily.

Land limitation and high land prices are common on places that had been set as commercial area in the middle of the city. It caused the invasion of commercial activities into settlement area. Accesibility toward settlement area makes it easier to convert settlement area into commercial area, as it happened at Ir. Soekarno Street/MERR. The street is part of Surabaya City road network system that formed a ring road of Surabaya (Surabaya City Spatial Plan 2013-2032)[1]. The street is passing settlement areas on the east side of the city and goes through to the north (Kenjeran). On the area surrounding the street, the land use is gradually changing from settlement area into commercial area.

The change was indicated by the increasing land prices on settlement areas surrounding Ir.\ Soekarno/MERR Street, Rungkut Madya Street, and Medokan Ayu Street. Based on Maulana (2013)[2], land prices at Kedung Asem on 2012 was about Rp5.000.000,00 – Rp6.000.000,00 / m2. And, land prices at Deles, Semolowaru, Medokan Semampir areas on 2012 are about Rp5.000.000, 00 – Rp7.000.000, 00 / m2. Before the developing of Ir. Soekarno/ MERR Street, the land prices on those areas are about Rp750.000, 00 – Rp5.000.000,00 / m2. The increasing land prices were indicating the uplift of land values caused by land use conversion from settlement area into commercial area. Whereas this change would bring up some implications such as decreasing green area ratio (GAR), increasing vehicle volumes and traffic jam, also parking problems that often happen at commercial area because of the use of roadside as parking site. Those phenomenons could affect the city's dynamics as a whole.

In urban planning, it is important to understand the cause of land use change in order to be able to handle the problems effectively. Therefore, in order to establish Surabaya City land use planning that is more accommodative to dynamical

changes, the research objective was to identify the factors that affecting land use conversion from settlement area into commercial area at Ir. Soekarno Street/MERR, Rungkut Madya Street, and Medokan Ayu Street. The research's methods are descriptive.

II.   METHODS

2.1   Research Variables

The research variables were obtained from theoretical review and policies review. The research variables and sub variables are mentioned at Table 1.

TABLE 1
RESEARCH VARIABLES

Indicator [3][4] [5][6][7][8][9][10][11]	Variable	Sub Variable	Operational Definition
The type of land use change	The type of land use change	-	Categories of the type of commercial activities at research area
Land use change rate	Land use change rate	-	The speed of land use change in the periods of 5 years (2012-2016)
Location distribution	Location distribution	-	The orientation of commercial area distribution based on the occurrence of land use change
physics	Land area per lot	-	Land area of the lots in research area.
Economic	Land value	-	The land value of the lots in research area.
Social	Land owner characteristic	Land owner earning	The average earnings of land owner of the lots in research area.
Policy	Land use guide plans	-	Policies that governing the land use in research area.
Accesibility	Transportation facilities	Public transportation	Public transportation which route goes through research area.
	Access to the city center	The distance to main road	The distance of research area to main road.
	Access to the central activities	The distance to central activities on the area	The distance of research area to central activities on the area, that is the university (educational facility).
	Road function	-	Road function classification in research area.
Spatial	Land use in surrounding area	Settlements	Settlement area around the research area.
		Comercials	Commercial area around the research area.
		offices	office area around the research area.
	Lot image	Type of activities	People's judgment about the commercial area on research area based on the type of activities.

2.2   Population and Samples

Population is the whole analysis unit that is the target of the research. The populations of the research are all the land owners of areas on the street corridor of Ir. Soekarno Street/MERR, Rungkut Madya Street, and Medokan Ayu Street, that changed their land use from settlement to commercial building.

Sample is part of population that taken by some methods and posses certain characteristics, clear, and thorough so that it can be assumed to represents the whole population (Nazir, 2003)[12]. To determine the sample used for this research, the method used were purposive sampling and simple random sampling. Purposive sampling has the benefit as the ability to obtain information-rich cases. Purposive sampling aims to take on subject not based on level, random, or spatial, but based on certain purpose. The use of this technique was for determining land use change actors at research area. The numbers of samples were calculated using equation (2.1).

$$n = \frac{N}{1+n(e)^2}$$ (2.1)

Explanation:

n   = the number of samples
N   = the number of population
e   = Margin error (10%)

Based on, the equations, the number of samples used to appraise the causative factors of land use conversion are 78 land owners.

2.3   Research Methods

The research's methods were descriptive. There were two analysis technic used in the research, i.e. observing land use pattern changes by descriptive analysis and identifying factors of land use change by regression analysis. The land use change was observed and produced a pattern. The analysis was used to identify a spatial pattern within a certain time which builds upon time factor (t). The land use change pattern was observed based on:

1. The speed rate of commercial land use development that was to observe the land use development from land's building area based on the formation periods of the building.

2. The commercial area location distribution that was to observe the land use development based on the location of commercial buildings.

3. The type of land use change that was to observe the land use change from previous land use to current land use.

    The observing of land use change on the research area was divided into 2 parts, namely:

-   The north zone

-   The south zone

The analysis was presented on the form of maps that describing the land use change at research area.

On determining the factors affecting land use conversion from settlement area into commercial area, regression analysis was used by utilizing SPSS software for windows. The analysis tool was used to determine causative relation in between variables. On table 1 are the variables used in the regression analysis.

TABLE 2
REGRESSION ANALYSIS'S VARIABLES

Dependent Variable (Y)	*Independent Variable* (X)
Land use change (Y) • Land use change rate (Y_1) • The type of land use change (Y_2)	Land area per lot (X_1)
	Land value (X_2)
	Land owner earnings (X_3)
	Land use guide plans (X_4)
	Transportation (X_5)
	Access to the city center (X_6)
	Access to the central activities (X_7)
	Road function (X_8)
	Land use in surrounding area (X_9)
	Lot image (X_{10})

III.   FINDING AND ARGUMENTS

3.1   Research Area Characteristic

3.1.1   Area Orientation

The research area is street corridor of Ir. Soekarno Street/MERR, Rungkut Madya Street, and Medokan Ayu Street. The targeted area is the lot that had undergoes land use change from settlement area into commercial area. The boundary of research area, namely:

-   North   : Surabaya River

-   South   : Rungkut Manggala and Puri, Mas Residential Areas

-   East   : Royal Town Regency, Residential Area

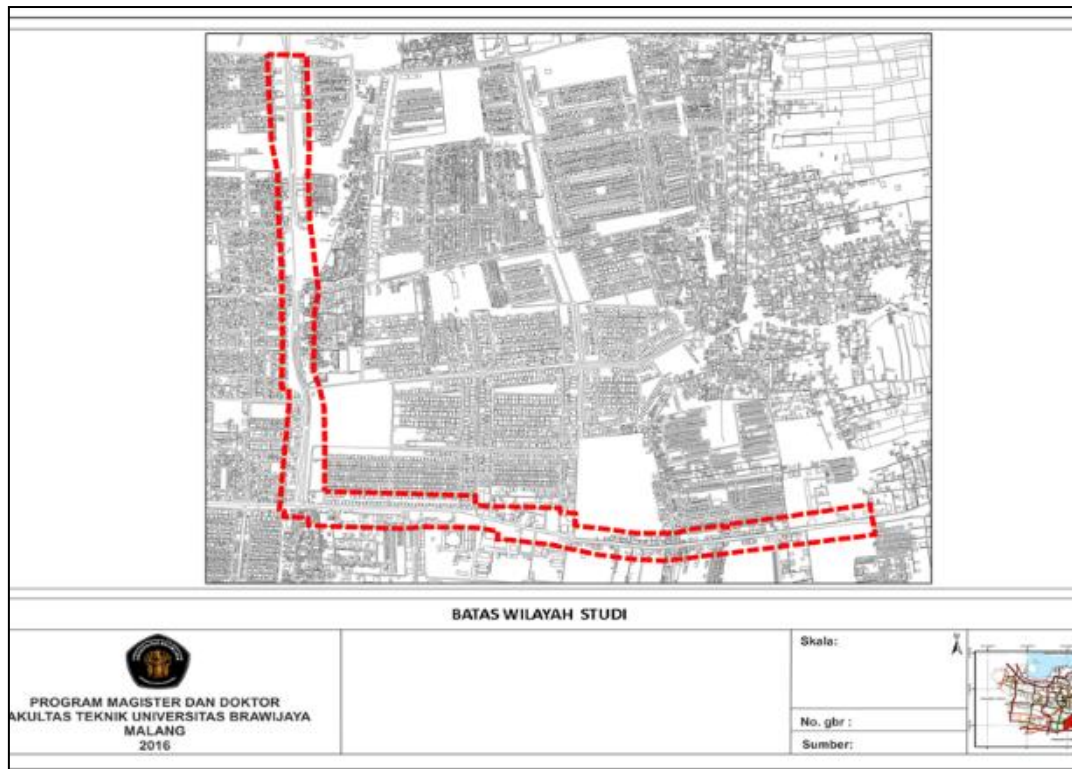-   West   : Rungkut Asri Barat, Residential Area

FIGURE 1. RESEARCH AREA ORIENTATION

3.1.2   Land Use Pattern

The observing of existing land use pattern of commercial area, the research area was divided into 2 zones, i.e:

a.   North Zone

The north zone spans from Guna Wangsa Apartment until Rungkut Madya Street intersection. The land use on north zone was dominated by commercial activities (stores, minimarkets, restaurants, etc), also services industries, such as banks, workshops, carwashes. The existence of commercial activities would encourage land use change on the back layer area to be secondary commercial area.

b.   South zone

The south zone spans from Rungkut Madya Street intersection to Medokan Ayu Street intersection. The land use on north zone was dominated by commercial activities (stores, minimarkets, restaurants, etc), services industries, such as banks, workshops, hair salons, and carwashes, also office complex. On this area, there was agglomeration of commercial building and transportation routes, resulting on high rate of accessibility.

3.2   Land Use Pattern Change Analysis

3.2.1   Land Use Change Process Analysis

Generally, the land use change at research area was started by "penetration", that is a breakthrough of new functions in a homogeneous function. The people changed their home (residential function) into commercial places (restaurant/café, laundy place, stores, etc). The success of the people, who originally opened the business together with the residential home, attracted more people to do the same thing. The phenomenon was stimulating the occurrence of "invasion". Invasion is greater than the penetration stage, but still not dominating. The accumulation of land use change was leading to the invasion of commercial activities on the main road, intersection and the surrounding area, until the proportion of commercial area increased gradually.

In the end, the new function (commercial) would be dominating the previous function (residential). On the last step, succession, the old function were already wiped out and be replaced by the new function. The change, would be responded by the government with the legalization of land use planning of the area in regards to the land use change occured.

3.2.2   Land Use Change Distribution Analysis

The distribution of commercial activities at the research area was not clustered on one location at the same time frame. The identification was observed on 5 years periods, i.e 2012-2016. The observation was divided into 2 zones, the north zone and the south zone.

The distribution of commercial areas on 2012, namely:

a. On the north zone, the distribution of commercial activities were gathered on one spot, which is the road intersection. It happened because the road intersection has higher accessibility level than the other places without a crossing. The intersections that close to city center has higher accessibility level than the further places. This condition was resulting to the road intersections that undergo the land use change.

b. On the south zone, the distribution of commercial activities were gathered on along the way of Rungkut Madya Street and Medokan Ayu Street in a linear form (ribbon shaped development). In this matter, it clearly showed the role of transportation system that affecting the development of commercial area so that the area spread was longer than it widen. The area along the main road is the area that got the most severe pressure of land use change. The high price of land along the road corridor encouraged the land owners to change the land use from residential into commercial.

The development of commercial area on the south zone had begun earlier because Rungkut Madya Street was established before Ir. Soekarno Street/ MERR was built.

The distribution of commercial activities on 2016 became more intense,with explanation:

a. On the north zone, the location distributions of commercial area were gathered along the way of Ir. Soekarno Street/ MERR corridor in a linear form (ribbon shaped development).

b. On the south zone, the distribution of commercial area that has been identified, was divided into 2 patterns:

-   At the corridor of Rungkut Madya Street and Medokan Ayu Street, the distribution of commercial activities were gathered along the way of Rungkut Madya Street and Medokan Ayu Street corridor in a linear form (ribbon shaped development).

On the enclave of the south zone, the pattern distribution of commercial activities was spread, generally they spread among the center of activities, near the educational center Pembangunan Nasional University (UPN). The pattern was formed as the result of domino effect from the land use change on Rungkut Madya Street and Medokan Ayu Street corridor
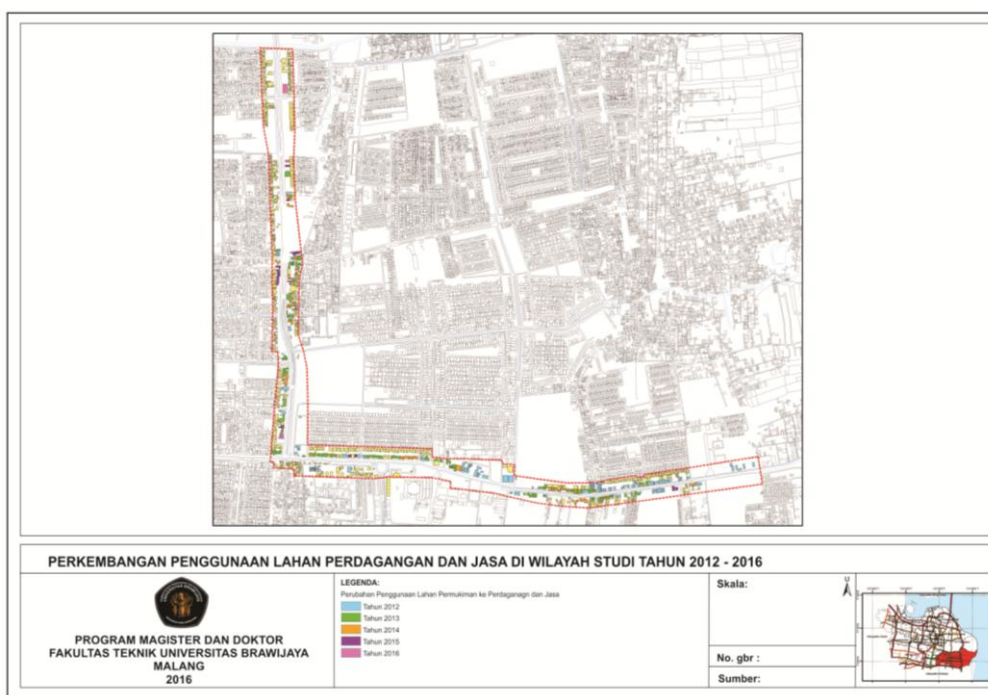

FIGURE 2. ANALYSIS OF THE DEVELOPMENT OF COMMERCIAL ACTIVITIES AT RESEARCH AREA 2012-2016

3.3　　Analysis to Determine Factors Affecting Land Use Change from Settlement Area to Commercial Area

The analysis to determine factors affecting land use change from settlement area to commercial area was using multi linear regression analysis. There were 2 dependent variables studied, land use change rate (Y_1) and The type of land use change (Y_2).

3.3.1　　The Land Use Change Rate

Based on the result of multi linear regression analysis showed on table 3, formed the regression model of the factors affecting the land use change rate.

<p align="center">TABLE 3</p>
<p align="center">COEFFICIENT VARIABLES OF LAND USE CHANGE RATE</p>

<p align="center">Coefficients(a)</p>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	4.177	1.372		3.045	.003		
	luas lahan per kapling	-.255	.202	-.177	-1.264	.210	.571	1.752
	nilai lahan	.384	.163	-.295	-2.362	.021	.719	1.390
	penghasilan	.293	.121	.283	2.416	.018	.817	1.224
	arahan guna lahan	.280	.203	.167	1.375	.174	.760	1.316
	sarana transportasi	-.094	.163	-.098	-.578	.565	.390	2.563
	akses menuju pusat kota	.269	.167	.233	1.614	.111	.542	1.844
	fungsi jalan	-.222	.153	-.189	-1.450	.152	.665	1.503
	akses menuju pusat kegiatan	-.154	.171	-.108	-.901	.371	.781	1.281
	guna lahan sekitar	.259	.207	.178	1.253	.215	.559	1.790
	image kapling	.118	.176	.077	.671	.504	.853	1.173

a. Dependent Variable: perubahan pemanfaatan lahan

The coefficients table was used to identify the influence of independent variables to dependent variables. If the significance value was smaller than 0, 05, and then the variable was affecting the dependent variable, which is the years, spent on land use change. Based on table 3, the variable with value less than 0, 05 were land value and earnings. The regression model is:

$$Y_1 = 4{,}177 + 0{,}384\ X_2 + 0{,}293\ X_3 \tag{3.1}$$

Explanation:

Y_1　= land use change rate

X_2　= Land Value

X_3　= Earnings

Based on equation (3.1), it was known that all of variables as predictor have positive influence towards the years spent on land use change. It means, the higher land value and land owner's earnings, the faster land use change rate happened.

3.3.2　　The Type of Land Use Change

Based on the result of multi linear regression analysis showed on table 4, formed the regression model of the factors affecting the type of land use change.

TABLE 4
COEFFICIENT VARIABLES OF THE TYPE OF LAND USE CHANGE

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.722	1.001		2.719	.008		
	luas lahan per kapling	.031	.147	.030	.213	.832	.571	1.752
	nilai lahan	.070	.119	.074	.594	.554	.719	1.390
	penghasilan	.229	.089	.304	2.584	.012	.817	1.224
	arahan guna lahan	.099	.149	.081	.664	.509	.760	1.316
	sarana transportasi	.069	.119	.099	.584	.561	.390	2.563
	akses menuju pusat kota	-.106	.122	-.125	-.870	.388	.542	1.844
	fungsi jalan	-.054	.111	-.063	-.482	.631	.665	1.503
	akses menuju pusat kegiatan	-.080	.125	-.077	-.643	.523	.781	1.281
	guna lahan sekitar	.311	.151	.293	2.064	.043	.559	1.790
	image kawasan	-.103	.128	-.092	-.804	.424	.853	1.173

a. Dependent Variable: jenis perubahan pemanfaatan lahan

The coefficients table was used to identify the influence of independent variables to dependent variables. If the significance value was smaller than 0,05, then the variable was affecting the dependent variable, which is the type of land use change. Based on table 4, the variable with value less than 0, 05 were earnings and land use in surrounding area. The regression model is:

$$2,722 + 0,229 X_3 + 0,311 X_9 \qquad (3.2)$$

Explanation:

Y_2 = type of land use change

X_3 = earnings

X_9 = land use in surrounding area

Based on equation (3.2), it was known that all of variables as predictor have positive influence towards the type of land use change. It means, the more relevant land use in surrounding area (with commercial activities) and the higher land owner's earnings, the more diverse the type of land use change.

As in each regression analysis, the value of R square (R^2) of the model resulted were 22,2%. It means that on determining the factors that affecting land use conversion from settlement area to commercial area at Ir. Soekarno Street/MERR, Rungkut Madya Street, and Medokan Ayu Street could be explained by the predictor variables (land value, earnings, land use on surrounding area), but the value was relatively small. The rest of it, 77,8% of the factors were influenced by other factors that did not included in this research.

IV.   CONCLUSION

4.1   Summary

The reseach's conclusion were described as below:

a.   Land use change pattern from settlement area to commercial area at Ir. Soekarno Street/MERR, Rungkut Madya Street, and Medokan Ayu Street was divided into 2 types, i.e. linear pattern (ribbon development) along the way on street corridor and spread pattern and clustered around center of activities on enclave part.

b.   The factors that affecting the land use conversion from settlement area into commercial area are land value, earnings, and land use in surrounding area.

4.2   Recommendation

Based on the research results, recommendation are given, i.e:

a. The existing commercial activities are to be maintained and encouraged to provide a parking area on the lot.

b. On the enclave, the one which still dominated by residential area, it need to be controlled, so that commercial activities, especially the big ones, won't caused a negative impact.

c. Participation of the stakeholders, which are bureaucrats, governments, scholars,and the people, are needed in order to implement regulation and land use planning.

d. The advanced research related to the impact of land use change is needed.

REFERENCES

[1] RTRW Kota Surabaya Tahun 2012-2032

[2] Maulana, Rizki. 2013. Pola Spasial Harga Lahan Sepanjang Koridor MERR pada Ruas Rungkut sampai Arif Rahman Hakim di Kota Surabaya. Jurnal Teknik POMITS Vol.1, No.2.

[3] Bintarto. 1977. Pola Kota dan Permasalahannya. Yogyakarta: Fakultas Geografi Universitas Gajah Mada.

[4] Nirmalakawuri, Ratri. 2015. Studi Perubahan Pemanfaatan Lahan dari Perumahan ke Komersial Ditinjau dari Aspek Fisik dan Lingkungan (Studi Kasus: Koridor Jalan Raya Darmo, Kota Surabaya).

[5] Resiwiyasa. 2014. Analisis Perubahan Penggunaan Lahan Permukiman di Kecamatan Seberang Ulu I Kota Palembang 2004-2012. Jurnal Penelitian Geografi Vol.2 No.1 Tahun 2014.

[6] Saputro, Rangga Kusuma. 2009. Prediksi Perkembangan Perubahan Penggunaan Lahan di Kecamatan Sedati. Tugas Akhir. Surabaya: Program Studi Perencanaan Wilayah dan Kota ITS.

[7] Sujarto, Djoko. 1986. Perencanaan Kota Baru. Bandung, Penerbit ITB.

[8] Syahrir. 2010. Kajian Perubahan Pemanfaatan Lahan Perumahan menjadi Perdagangan dan Jasa Komersial di Perumahan Tumbuh I dan Perumahan Tumbuh II Kota Kendari. Tesis. Semarang: Universitas Diponegoro.

[9] Wijayanti, Awita. 1998. Faktor-faktor Penentu Efektivitas RDTRK sebagai Pengendali Penggunaan Lahan di Kawasan Peleburan Kotamadya Semarang. Jurusan Perencanaan Wilayah dan Kota, Semarang: FT UNDIP.

[10] Wulandari, Ayu. 2007. Studi Pola Perubahan Pemanfaatan Lahan Perumahan menjadi Komersial di Koridor Kertajaya Surabaya. Tugas Akhir. Surabaya: Program Studi Perencanaan Wilayah dan Kota ITS.

[11] Yunus, Hadi Sabari. 2002. Struktur Tata Ruang Kota. Jakarta : Pustaka Pelajar.

[12] Nazir, Moh. 2003. Metode Penelitian. Jakarta : Ghalia Indonesia.