

Towards sustainable development: resource approach through interaction of peri-urban and surrounding areas

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Abstract. The dynamics of urban development are caused by an urbanization process. This is due to the imbalance between urban land use and people demand for space. It creates land use change in peri urban which is marked by emerging built up area in the urban core, which has become the trigger on rural-urban gap in Sidoarjo district. This paper will be assessing and analyzing the rural and urban interaction through the strengthening the potential of local resources through descriptive quantitative method. The finding of this paper shows the defining linkages happen among zones and subzones bound in each sector.

Keyword: Rural-urban interaction, Urbanization, urban development,

1. Introduction

The urbanization issues occur due to the composition of land resources and total population imbalance, specifically in urban area. As most activities are concentrated in urban areas, demand of resources will increase in providing people needs [1]. This phenomenon has impacted to people preference to move and live in peri-urban, creating the demographic symptoms so called urban transformation. This demographic development can be the evidence that the city is dynamically developed. The notion is aligned with Simon (2008) and Aquilar (2008) notion that the demographic developments will create urban expansion in surrounding area. The urban expansion also creates land use change ([4] [5]) and built up areas [6]. This transformation has impacted on the shrinkage of agriculture area. Achieving the sustainable development, the relationship between each urban, peri-urban, and rural area are needed. The relationship between them can be measured through interconnection between the economy, finance and social. Both of these areas have interconnected roles between locations [7] the urban as a market and the rural as production.

Sidoarjo one of the districts in East Java, become Surabaya's hinterland which containing some new growth centers. In last 10 years, the main economic activity in Sidoarjo district were concern in industrial development. The evidence shows that the industrial sector contributes to GDP of 45% [8] of East Java. Nowadays, the local government were strongly support the industrial sectors to expand the services in regionally and internationally [9]. However, this phenomenon has turned out be the triggers of regional disparity between rural and urban area. So, this article aims to discuss the urban



and rural resource through the strengthening aspects of interaction of peri-urban and surrounding areas.

2. Method

This research uses mixed method, both qualitative and quantitative, to analyzing the interaction of peri-urban and surrounding area. Quantitative method had been used in delineating study area into three zone: urban, peri-urban and rural area. This classification zone were based on population, density, spatial plan document (RTRW) and accessibility, qualitative method had been conducted in analyzing the interction of peri-urban and surrounding areas by flow analysis. This analysis were considered appropriate to explain and elaborate the linkage form, from origin to destination subzones.

3. Result and Discussions

3.1 Delineation of Study Area

The delineation process of the study area is based on several criteria: population, density, spatial plan and accessibility. In the study area using scoring analysis (Table 1)

Table 1. Process of Delineation Area

Parameter	Score	Classification	Sub district																	
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Population (Inhabitant)	1	Rural 59.587-117.896		1		1	1	1	1	1		1	1	1	1				1	
	2	Peri urban 117.897-176.204			2						2							2		2
	3	Urban 176.205-234.513	3													3	3			
Density	1	Low → 0.716 – 3.062		1		1	1			1		1	1	1	1				1	
	2	Midle → 3.062 - 5.398	2		2			2	2		2							2		2
	3	Urban → 5.398 - 7.734														3	3			
Policy of Spatial Plan (RTRW) Accessibility	1	Rural		1	1	1		1	1	1		1	1	1	1			1	1	1
	2	Peri urban																		
	3	Urban	3				3				3					3	3			
Accessibility	1	Local																		
	2	Collector					2	2		2				2	2					2
	3	Main road	3	3	3	3			3		3	3	3			3	3	3	3	
TOTAL			11	6	8	6	7	6	7	5	8	6	6	5	5	12	12	9	6	7

Information :

- | | | | |
|-------------|-----------------|-------------|--------------|
| 1. Sidoarjo | 6. Tulangan | 11. Wonoayu | 16. Gedangan |
| 2. Buduran | 7. Tanggulangin | 12. Tarik | 17. Sedati |
| 3. Candi | 8. Jabon | 13. Prambon | 18. Sukodono |
| 4. Porong | 9. Krian | 14. Waru | |
| 5. Krembung | 10. Balongbendo | 15. Taman | |

This research uses Usman's formula (2008) to find the interval class to analyses the delineation area

$R = \text{the highest data} - \text{the lowest data (Usman, 2008)}$

done

$$p = \frac{\text{Range}}{n} \rightarrow P = \frac{12-5}{2} \rightarrow P = 2.3$$

Note :
 R = Range
 p = interval class
 n = Total class

The calculation shows the interval class of classification as folloow: Rural Interval 5 – 7.3 , Peri-urban interval 7.4 – 9.6 , and urban interval 9.7 – 12.1 . Analyzing the score, this area consist of three zone i.e. urban, peri-urban and rural. Therefore, the delineation area of these zone are explained in table 2 and figure 2

Tabel 2. The result of Deliniation area

Zone	Sub Zone (sub district)
Urban	Sidoarjo, Waru, Taman, Gedangan
Peri Urban	Krian, Candi, Krembung, Tanggulangin, Sukodono
Rural	Porong, Buduran, Tulangan, Jabon, Balongbendo, Wonoayu, Tarik, Prambon, Sedati.

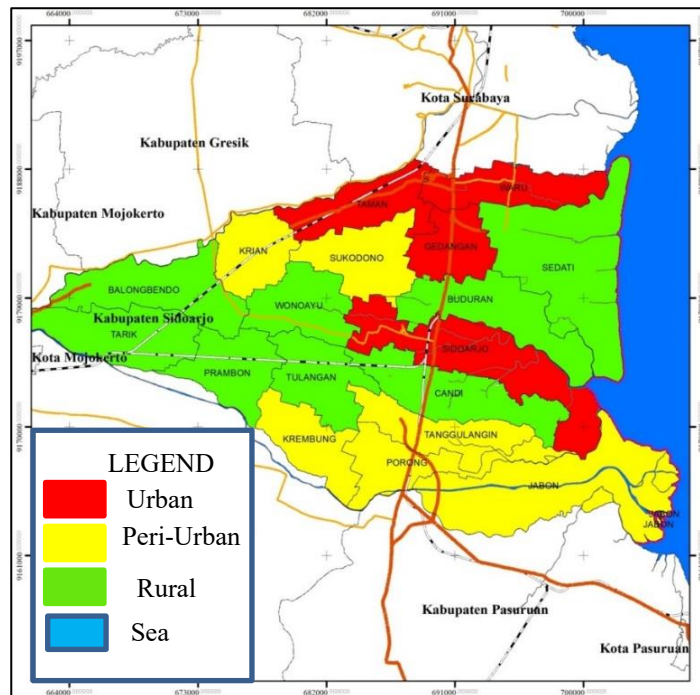


Figure 1. Delineation Map

3.2 Flow Analysis to Identify The Interaction between Peri Urban and Surrounding Area

Identifying the interaction of periphery in Sidoarjo district were based on the function of each area and interrelationship between potentials. Referring to the potential resources. Sidoarjo has been divided into three zones based on their potential sectors namely industry, agriculture and fishery (Government of Sidoarjo district report, 2009). Using flow anlysis to identify the interaction between urban and rural areas, the finding shows the form linkage of each subzones to other subsuzone. This analysis uses three variables such as: labor, raw material and market to explore the potential resources in eachsub-district, as shown on table 3 below:

Table 3. The Sub Zone Area in Sidoarjo District

Zone	Sub Zone	Sub district
Urban	Sub Zone A	Sidoarjo, Waru, Taman, Gedangan
Peri Urban	Sub Zone B1	Tanggulangin, Porong, Sukodono, Krian
	Sub Zone B2	Krembung, Porong, Jabon
	Sub Zone B3	Jabon
Rural	Sub Zone C1	Sedati, Tulangan
	Sub Zone C2	Sedati, Tulangan, Wonoayu, Balongbendo, Tarik, Candi, Buduran, Prambon
	Sub Zone C3	Sedati

3.2.1 The characteristic of Zone

A. Urban Zone

It is only one sub – zone in Urban Area which can be categorized into tree scale of industrial namely Large, Medium and Small Industry. The scale of industry based on the level of service. Furthermore, the interaction between each zone, can be seen on three potential aspects of (1) Labor, (2) raw materials and (3) marketing, as shown in table 4.

Table 4. Urban Zone Potential

Sub Zona	Potential	Interaction Urban Rural		
		Raw Material	Labor	Marketing
Sub Zona A	Large Industrial Sector (PT Maspion) in Waru Sub - district. Medium Industry sector (PT Evata Eastern Enterprise) in waru sub - distric Small Industry sector (Batic Craft) Sidoarjo district	Inport (China)	Labor distribution on Sub Zona A Sub zona B1 in Sukodono and Krian sub – District	All Sidoarjo district area and out side of Sidoarjo district areas (Surabaya, Gresik, Mojokerto).

B. Peri-urban Zone

Linkages and functions between zones in Sidoarjo were focused on three potential sectors namely industry, agriculture and fishery. In order to identify the interaction among sectors, we divide it into three sub zones based on the main potential resources in each zone (table. 5).

Table 5. Peri- urban Zone Potential

Sub Zona	Potential	Urban rural interaction		
		Raw material	Labor	Marketing
Sub Zona B1	Large Industry sector (PT Manohara Asri) in Krian district Medium Industry sector Small industry sector (leather Industry) in	Outside of Sidoarjo regency (Tuban Regency)	Labor distribution on Taman sub distric (A) Tanggulangin	All Regional of Sidoarjo regency and outside of Sidoarjp Regency (Surabaya, Gresik, Mojokerto)

Sub Zona	Potential	Urban rural interaction		
		Raw material	Labor	Marketing
	Tanggulangin sub district		n and krian sub district (B1) Balongbendo sub district (C2),	
Sub Zona B2	Cane farming. The largest produce of sugar cane in Krembung, Jabon and Porong sub - district.	The raw materials produced by sub zone B2 are from sub Zone B2 (Krembung, Porong and Jabon sub – distric)	Labor in the cane agriculture sectors comes from its local region of B2	All Regional of Sidoarjo regency and outside of Sidoarjp Regency (Surabaya, Gresik, Mojokerto)
Sub Zona B3	Fishery in Jabon sub – district has fish crackers as featured, Aquaculture (seaweed and tilapia) and fishery ponds (shrimp vannamei, tiger shrimp, milkfish and mangrove crab)	The raw materials from the local sub zone B3 (Jabon sub distric)	Labor from the local sub zone B3 (Jabon sub district)	Mostly in urban areas as Waru, Gedangan, and Taman sub district (A) and outside of Sidoarjp Regency (Surabaya, Gresik, Mojokerto)

C. Rural Zone

Rural zone were characterised on three sectors : Industry, agriculture and fishery (table 6).

Table 6. Rural Zone Potential

Sub Zona	Potential	Rural Urban Interaction		
		Raw material	Labor	Marketing
Sub Zona C1	Medium Industry (Candi Sugar factory) in Candi Sub District. Small Industry (Batik Tulis) in Tulangan sub district.	The Raw Material not only come from local area but also from sub zone B1 (Porong sub district)	Labor factory in sub zone C1 come from local area C1.	All Regional of Sidoarjo regency and outside of Sidoarjp Regency (Surabaya, Gresik, Mojokerto)
Sub Zona C2	Cane Farming. The largest produce of sugar cane in Tulangan sub district Rice Farming. The largest rice produce in	Jabon sub- district (B2) and Tulangan sub – district (C2). Wonoayu, Tarik, Balongbendo and Tulangan sub – district (C2) .	Jabon sub district (B2) and Tulangan sub – district (C2) Labor from local sub zone B3 (Wonoayu, Tarik, Balongbendo and Tulangan Sub – district).	Marketing area on surrounding B1 and B2 (Tanggulangin, Porong and Jabon sub district). All Regional of Sidoarjo regency and outside of Sidoarjp Regency (Surabaya, Gresik, Mojokerto)

Sub Zona	Potential	Rural Urban Interaction		
		Raw material	Labor	Marketing
Sub Zona C3	Wonoayu, Tarik, Balongbendo and Tulangan Sub – district. Fisheries producers in Sedati sub – district. Potential resources on fishery products such as fish crackers.	Sedati Sub district	Sedati Sub district	Most of urban areas such as Waru, Gedangan, and Taman sub district (A) and outside of Sidoarjo Regency (Surabaya, Gresik, Mojokerto).

3.2.2 Flow analysis through the interaction between peri urban and surrounding area

Flow patterns Analysis (flow analysis) is used to determine the relationship pattern between one zone another. The analysis focused on three sectors: industry, agriculture and fisheries, and the type of urban village relationship pattern were based on their main resources labor, raw materials and marketing.

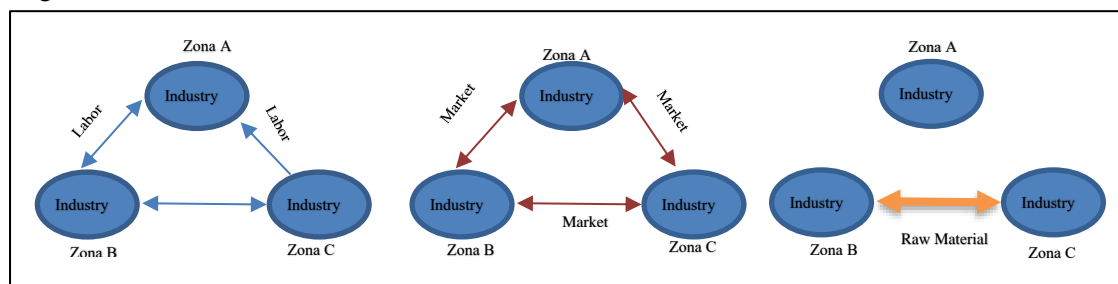


Figure 2. Interaction Between Peri-Urban and Surrounding area in Industrial Potential

Figure 2. The illustration of the relationships between Zone A, Zone B and Zone C in the industrial area, which is only have potential resources of labor and marketing. Raw materials in zone A come from outside (zone B and C).

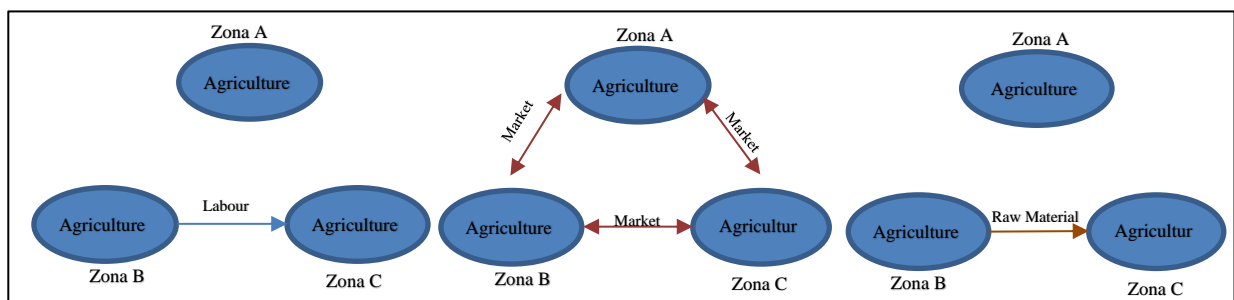


Figure 3 Interection Between Peri Urban and Surrounding area in Agrariculture Pontential

Figure 3 The illustration of the relationship between zone A, zone B, and zone C in Agriculture is only on marketing, whereas for labor and raw material distribution on two interacting zones refer to zone B and Zone C.

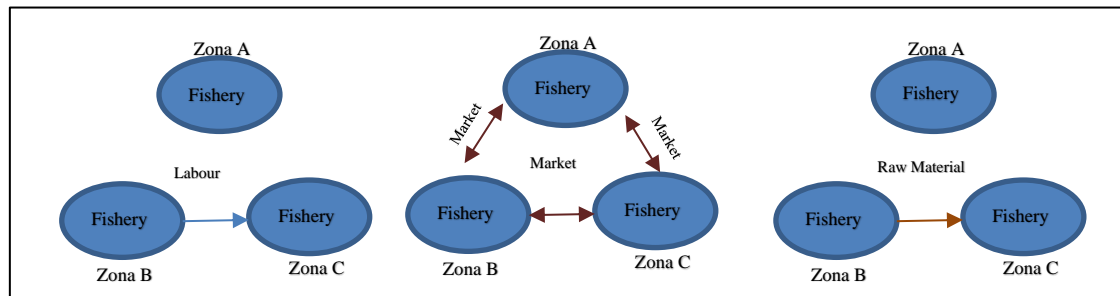


Figure 4 Interection Between Peri Urban and Surrounding area in Fishery Pontensial

Figure 4 The illustration of the relationship between Zone A, Zone B and Zone C in Fisheries is only on marketing. Whereas for labor and raw distribution on two interacting zones refer to Zone B and Zone C. (This is similar with the interaction in agriculture).

4. Conclusions

The sustainable development in Sidoarjo can be done through the balancing between regions such as urban, peri-urban and rural area. This article addressing on the deleniation area and the interaction between peri-urban and surrounding area . The finding shows that (1) Sidoarjo district consist of three zones of sub district such as, urban area: Waru, Gedangan, Taman and Sidoarjo; Peri-urban area: Krembung, jabon, Tanggulangin, Sukodono, and Krian; and rural area: Sedati, Tulangan, Wonoayu, Balengbendo, Tarik, Candi, Prambon, (2) On the one aspect, marketing has the highest impact on the interconnection between each zone, on the other the raw material has the lowest influence.

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