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Peri-urban typology of Bandung Metropolitan Area

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Abstract

Peri-urbanization is a spatial phenomenon that continues to develop in a rapidly growing metropolitan region. The phenomenon of peri-urbanization in Indonesia, one of which occurred in Bandung, is indicated in terms of population growth, socio-economic activities, and the physical expansion of urban areas across administrative boundaries. Area of peri-urban is unique, which consist of both urban and rural characteristics. This paper identifies the typology of peri-urban areas of Metropolitan Bandung. Using cluster analysis, the typology of the peri-urban area is analysed based on physical, social and economic characteristics. In Peri-urban Bandung, there are three typologies of the peri-urban areas: Predominantly Urban, Semi-Urban and Potential Urban areas. Predominantly Urban Area is located in a border of Bandung has a significant physical, social and economic urban characteristics, while Semi-urban Area and Potential Urban Area has both urban and rural characteristics. Understanding to these characteristics could inform a more strategic approach for management of each typology of peri-urban areas.

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1. Introduction

Peri-urban development has been a complex phenomenon, which is characterised by the transformation of landscapes formed previously by rural life into urban. The transformation changes in the way people uses their environment, consequently to the spatial structure of the landscape (Antrop, 2000), rapid population growth and migration (Hudalah et al., 2007).

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Area of peri-urban is unique, which consist of both urban and rural characteristics. From an ecological perspective, the peri-urban area can be characterised by mixed land uses between the suburb and the countryside, which is ecologically and socio-economically integrated into urban function (Simon et al., 2004, Drescher and Iaquina, 2002). In socio-economic term, the composition of a peri-urban system is heterogeneous and subject to rapid change (Drescher and Iaquina, 2002). Following Webster (2002) the development can be defined as ‘a process in which rural areas located on the outskirts of established cities become more urban in character, in physical, economic, and social terms’.

Peri-urbanisation phenomenon occurred in many large cities of Indonesia, one of which occurred in Bandung. In peri-urban, the development of built-up area is distributed across cities, through the administrative boundary, generates a configuration of large peri-urban areas (Webster, 2002). Process of the peri-urbanisation in Bandung Metropolitan Area is indicated by the population growth, increases from 5 million in 1991 to more than 8 million in 2013. The population growth implies to the need of land. Peri-urban area develops into new urban activity centres, some of them without any proper development plans due to lack of understanding of urban and rural characteristic and its linkages. Understanding to these characteristics could inform a more strategic approach to peri-urban management.

This study aims to identify the typology of peri-urban areas of Bandung Metropolitan Area. The objectives of this study are as follows:

1. To identify peri-urban characteristics of Bandung Metropolitan Area based on physical, economic and social conditions;
2. To classify regional typology of peri-urban.

Characteristics and Definitions of Peri-urban

Many scholars define understandings of peri-urban (see Table 1). Following those definitions, we can draw the variables in understanding peri-urban characteristics.

Table 1. Peri-urban Definisions

No	Sources	Peri-urban Definitions
1	Andreas (1942)	The peri-urban region is the mixing zone of characteristically agricultural and characteristically urban land use structure.
2	Garnier and Chabot (1967)	Peri-urban is an area where the continuous built up town ends.
3	Singh (1967)	The peri-urban region is a rural land with urban phenomena.
4	Wehrein (1942)	Peri-urban represents an area that is forced by the urban development.
5	Dickinson (1967)	The peri-urban region is an area where housing, industries, and offices have become urban orientation.
6	Pryor (1971)	The peri-urban area is an area of rural-urban fringe. It is characterised based on the settlement's density, the existence of commercial functions, industrial, the level of land conversion, and the existence of commuting.
7	Yunus (2001, 2008)	The peri-urban area is an area in between urban zone and rural zone. According to Yunus, there are 4 zones of peri-urban, namely: (1) town frame; (2) urban-rural frame; (3) rural-urban frame; (4) rural frame.
8	Direktorat Jenderal Penataan Ruang – PU (2006)	Peri-urban area is located outside the core of metropolitan/urban. It forms as a supporting line of facilities and urban mass transport, and an urban extension from its core in random growth (sprawl) for 40-50 kms outside. Direktorat Jenderal Penataan Ruang-PU (2006) classifies the peri-urban region into three category based on its land use and economic activities, i.e: (1) Predominantly Urban; (2) Semi Urban; and (3) Potential Urban

Source: Andreas (1942), Garnier and Chabot (1967), Singh (1967), Wehrein (1942), Dickinson (1967), Pryor (1971), Yunus (2008)

2. Methods

This study used exploratory approach to develop an understanding of peri-urban characteristics systematically. The information and data required for the study are generated and collected from various secondary sources.

Analysis data used multivariate analysis based on quantitative variables to differentiate the socio-economic characteristics of peri-urban. Analysis of peri-urban typology was carried out by Cluster Analysis.

Peri-urban of Bandung Metropolitan area as a case study follows to the West Java Regulation No.12/2014, which defines that Bandung Metropolitan Area consists of 61 the districts and spread over in Bandung, Cimahi, some districts in Bandung Regency, some districts in Bandung Barat Regency, and two districts in Sumedang Regency. Bandung and Cimahi represent the metropolitan's core, and the others represent the peri-urban, which is consists of 28 districts and 255 villages. The cluster analysis used 18 variables that classify and explain the characteristic of peri-urban (Table 2).

Table 2. Research Variables and Indicators

Aspect	Variables	Indicators	Source
Physical	Topographic	Slope	(Hinderink and Sterkenburg, 1975, Smailes, 1981, Yunus, 2005, Pryor, 1968)
		Elevation	
	Land-use	Area of agricultural land	
		Area of non-agricultural land	
	Density	Housing Density	
	Public facilities	Service index of SMP (Junior High School)	
Service index of SMA (Senior High School)			
Accessibility	Service index of Local clinic		
	Ratio of Asphalt roads to the total area		
	Ratio of pavement roads to the total area		
	Ratio of non-pavement roads to the total area		
Social	People Productivity	Dependency Ratio	Pyor, 1968, Nelson, 1955, Yunus, 2006
		Activities Intensity	
	Social prosperity	Ratio of poor families	
	Economy	Economic structures / Labor Force	
Secondary sectors			
		Tertiary sectors	

Source: Hinderink and Sterkenburg (1975), Smailes (1981), Nelson (1955), Yunus (2005), Yunus (2006), Pryor (1968)

3. Result and Discussions

Based on 17 iterations of cluster analysis of 255 villages and 18 variables, peri-urban region of Bandung Metropolitan Area divided into three typologies (Table 3). Based on the similarity of a physical, social and economic characteristic in each cluster, we can define the first cluster as Predominantly Urban, the second group as Semi Urban and the third one is Potential Urban. The Predominantly Urban has a significant urban characteristic in physical, social and economic conditions. In contrast, the Potential Urban has significant rural characteristics.

Furthermore, base on the cluster analysis, the Predominantly Urban consist of 57 villages, the Semi Urban composed of 123 villages and the Potential Urban consists of 75 villages. Fig.1 shows that the villages in Predominantly Urban are located adjacent to the core of metropolitan (Bandung and Cimahi), while the villages in Semi Urban spread to the south. The villages belong to Potential Urban cluster spread to the north of Bandung, shows the significant differences to the first and second clusters in term of their location.

Table 3. The Characteristics of Each Cluster

Aspects	Variables	Indicators	Characteristic of Cluster I	Characteristic of Cluster II	Characteristic of Cluster III
Physical	Topographic	Slope	13.68%	14.64%	17.79%
		Elevation	703.3 masl	712.3 masl	952.masl
	Land-use	Area of agricultural land	29.03%	65.25 %	67.6 %
		Area of non-agricultural land	70.97 %	34.75 %	32.38 %
	Density	Housing Density	25.4 houses / ha	8.96 houses / ha	6.80 houses / ha
	Public facilities	Service index of SMP (Junior High School)	0.48	0.70	0.57
Service index of SMA (Senior High School)		0.32	0.43	0.21	

	Accessibility	Service index of Local clinic	2.16	3.99	2.14
		Ratio of Asphalt roadsto the total area	3.08	1.87	1.97
		Ratio of pavementroads to the total area	1.49	0.54	0.83
		Ration of non-pavement roads to the total area	0.00	0.02	0.08
		Distance to the nearest core Bandung/Cimahi	18.43 km	23.7 km	23.86 km
Social	People Productivity Activities	Dependency Ratio	52.27	53.20	60.0-60.0
		Population Density	96.31 people / ha	36.50 people / ha	26.39 people / ha
Economic	Social prosperity Economic structures / Labor Force	Ratio of poor families	0.34	0.49	0.60
		Primary sectors	6.83 %	18.84 %	62.34 %
		Secondary sectors	41.2 %	39.89 %	10.83 %
		Tertiary sectors	51.95 %	41.26 %	26.81 %

Source : Analysis, 2015

There were statistical differences in physical, social and economic characteristics among three clusters of peri-urban Bandung Metropolitan Area, are as follows:

1. Villages in Predominantly Urban Cluster have extensive non-agricultural land, higher housing density, better accessibility, as well as higher human resources productivities compare to the villages in Semi Urban and Potential Urban Clusters.
2. Villages in Semi Urban Cluster identified as an area with mixing urban and rural characteristics.
3. Villages in Potential Urban Cluster have a steeper slope, locate at a higher elevation, and have a wider agricultural land, a lower density of housing and population compare to those in Predominantly Urban and Semi Urban Cluster. The economic structure in this area is still in primary sector.

However, there are no significant differences in public facilities services (education and health facilities) all around peri-urban Bandung, indicates that people have the same access to the public facilities in all region of peri-urban.

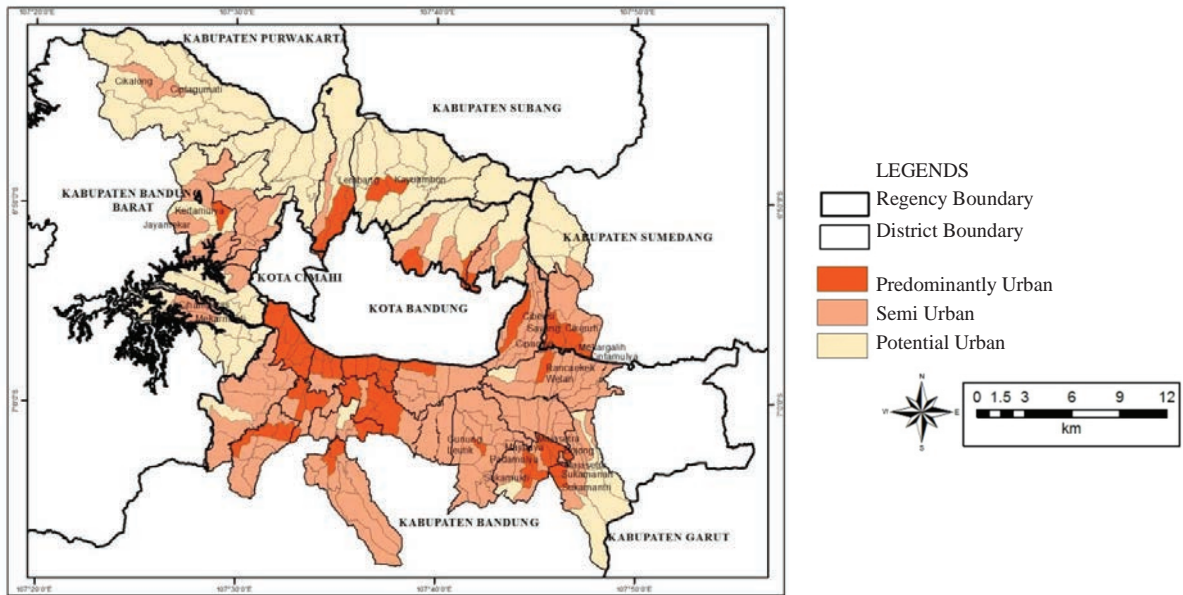


Fig.1. Peri-urban Typology of Bandung Metropolitan Area

4. Conclusions

The similarity characteristics of villages in Predominantly Urban to the core of Bandung show as a part of sprawl phenomena. In general, the results indicate that slope/topography, accessibility and location correlate to the direction of urban development. The closer such regions to the core, the more likely they will have urban characteristics. Certain causes -where the villages with dominant urban characteristics are located far from the core, it can be explained as the leap frog process of sprawl in this region. This condition can be explained as some villages may have support factors to develop intensively due to the regulations (for example Lembang as a Districts Centre and area of tourism development, Majalaya as an area of industrial development, and Jatininggor as a strategic area of education).

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