Peri-urban Transformation in West Bandung Regency: A Physical, Social, and Economic Analysis

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Abstract

Peri-urban zone shared a similar yet unique characteristic of its city-like environment. Situated right in a transition zone between rural and urban marked by urban pattern of population density, diverse activities, and intense spatial relations in a regional complementary dimension, West Bandung Regency is one of peri-urban zone surrounding Bandung City within Bandung Metropolitan Area. West Bandung Regency plays a significant role in driving socio-economic dynamics of the city. Likewise, Bandung City shaped transformations of its peri-urban areas, such as the transition of rural agrarian nature into settlement-dominated urban area. Therefore, this research is done to examine the transformation of West Bandung Regency peri-urban area, under the four peri-urban types; (1) Urban Fringe Zone, (2) Rural Urban Fringe Zone, (3) Urban Rural Fringe Zone, and (4) Rural Fringe Zone. This research implement spatial analysis technique using GIS tool of weighted overlay. Result of this study shows typological transformation of each sub-districts that has the peri-urban characteristic within 10 years (2009 and 2019). Out of seven sub-districts in West Bandung Regency; Batujajar, Padalarang, Ngamprah, Cisarua, Parongpong, Lembang, and Cihampelas, there has been transformation of previously seven urban rural fringe in 2010 to four urban fringe zone and three urban rural urban fringe zone in 2020. Analysis on peri-urban typology is carried under analysis on physical, social, and economic aspect of each sub-districts.

Keywords: External Development, Peri-urban, Rural, Transformation, Urban, West Bandung Regency.

Introduction/Background

Peri-urban zone portrayed complex phenomenon of rural-urban environment, which identified by its urban characteristic and social consideration to it as well as huge influence of the city to its economic activity. A remarkable shift spotted from peri-urban growth is a transition from rural to urban life. Antrop (2000) stated that the transformation changes seen from the way people use their environment, consequently to the spatial structure of the landscape. This categorization brings vivid definition peri-urban zone, while its spatial landscape has been transformed from rural agrarian nature into urban settlement, rural characteristics and village nature is still clear. Other categorization of peri-urban zone is stated by Hudalah et al., (2007) on which that rapid population growth and migration also count as the portrayal of peri-urban zone. Peri urban zone is also known for its heterogeneous demographic, due to intense movement of people reaching city-life and activities. Kurnianingsih (2013) specified the

process of peri-urban growth as the consequences of land-scarcity of urban core development which led to external development that require land conversion. Furthermore, the consequences of urban development will not only change its physical landscape, it also affect socioeconomic significantly as industrial activities started and developers seek opportunities of newly changed land.

Peri urbanization process also occurred in Bandung Metropolitan Area, which was indicated by population growth from 5 million in 1991 to more than 8 million in 2013. With population increase, the need for land and urban activities center had been grown since then (Budiyantini & Pratiwi, 2016). Land conversion resulted from needed land for developments also left the city or the urban core and its surrounding peri-urban a challenging task, which is to ensure the environmental quality and even food availability. West Bandung Regency is one of important source of vegetables and fruits traded in Bandung Metropolitan Area, therefore agricultural landscape availability will help the region fulfill its food security. However, rural and urban zones are characterized by striking proportion of urban dan rural land difference. Thus to implement regional development policies projected to tackle consequences of peri-urbanization, classification of peri-urban zone is necessary (Jupri & Mulyadi, 2017)

Identification of characteristics bound to West Bandung Regency could be done through categorization based on physical, economic, and social aspects. This categorization helps to make decision of zones influenced by urban sprawl. According to Hapsari & Aulia (2019), the categorization consist of;

a. Physical aspect; land-use, education facilities, and health facilities.
b. Social aspect; population density, and population growth.
c. Economic aspect; percentage of people working in agricultural sector.

Those categorization is intertwined into peri-urban zones classification. According to Yunus (2008), the classification consist of;

a. Urban Fringe Zone (*Zona Bingkai Kota/ZOBIKOT*)
b. Urban Rural Fringe Zone (*Zona Bingkai Kota Desa/ZOBIKOTDES*)
c. Rural Urban Fringe Zone (*Zona Bingkai Desa Kota//ZOBIDESKOT)*
d. Rural Fringe Zone (*Zona Bingkai Desa/ZOBIDES*)

Methods

This research is done under Mixed Method Research (MMR) approach, which involves collecting, analyzing, and integrating quantitative and qualitative data. The outcome of MMR is to bring comprehensive understanding of the phenomenon under investigation Leavy (2017). Required data in this research are; (1) the percentage of agriculture land, (2) school facility fulfillment, (3) adequate health facilities, (4) population density per kilometer square, (5) percentage of population growth, and (6) percentage of people working in agricultural sector. Data were all analyzed from secondary sources with classification system of Indonesian Central Bureau of Statistics (*Badan Pusat Statistik/BPS*). Data analysis is completed through scoring of all the variables to decide the types of peri-urban zone for each sub-districts in

West Bandung Regency. The following table is the data processing through variable scoring:

Table 1.

Characterization and variable scoring

Variable	Characteristics				Sources
	Urban Fringe Zone (Zobikot)	**Urban Rural Fringe Zone (Zobikotdes)**	**Rural Urban Fringe Zone (Zobideskot)**	**Rural Fringe Zone (Zobides)**	
	Physical Aspects				
Land-use	0 - 25% rural land 4	25% - 50% rural land 3	50% - 75% rural land 2	75% - 100% rural land 1	(Jupri & Mulyadi, 2017)
Education Facility	sufficient 4			insufficient 1	(Hapsari & Aulia, 2019)
Health Facilities	adequate 4			inadequate 1	(Hapsari & Aulia, 2019)
	Social Aspects				
Population Density	≥7500 4	4000 - 7499 3	1250 - 3999 2	≤1249 1	(Hapsari & Aulia, 2019)
Population Growth	≥4% 4	3.99% - 2% 3	2% - 1.99% 2	≤1% 1	(Hapsari & Aulia, 2019)
	Economic Aspects				
Livelihood Activities	0 - 25% agriculture sector 4	25% - 50% agriculture sector 3	50% - 75% agriculture sector 2	75% - 100% agriculture sector 1	(Yuliana & Budiasih, 2009)

Further characterization of each sub-districts to decide the peri-urban zone is done by determining the range of scores generated from each variable scoring shown in Table. 1. Calculation of class interval is processed through the following formula

$$Class\ Interval = \frac{Highest\ Total\ Score - Lowast\ Total\ Score}{Score\ Range}$$

Highest Total Score = 24

Lowest Total Score = 6

Score Range = 4

$$Class\ Interval = \frac{24 - 6}{4}$$

$$Class\ Interval = 4.5$$

Therefore, implementing the result of class interval above, the classification of peri-urban zones or typology is showed as follow;

Table 2.

Peri-urban zone typology

Types	Range
Urban Fringe Zone	<19.5 - 24
Urban Rural Fringe Zone	<15 – 19.5
Rural Urban Fringe Zone	<10.5 – 15
Rural Fringe Zone	6 – 10.5

Applied methods and calculation is completed for comparative analysis of peri-urban typology in West Bandung Regency in 2009 and 2019, depicting 10 years transformation analyzed from physical, social, and economic aspects. The result of this analysis will be presented as a map showing transformation of peri-urban types in relation to urban core development.

Results and Discussions

Regional function of West Bandung Regency as one of peri-urban zone to Bandung City as the urban core in Bandung Metropolitan Area is consequent with the implementation of West Bandung Regency as a new autonomous region expanded from Bandung Regency. Since its implementation in 2008, West Bandung Regency experienced successive growth of Human Development Index (HDI) with 0.50 point of initial growth in 2009-2010 and increased by 0.35 point in 2011-2012. HDI growth itself is crucial as it portrayed development in education, health, and economic aspects Lambelanova (2017). However, under the typology of regional disparity in West Java Province, West Bandung Regency is among type low-3, meaning that even though its human

development is already good, it still has lower quality of infrastructure, investment, and other economic activities (Budiyantini & Pratiwi, 2016) compared to its neighbor (Aprianoor & Muktiali, 2015). Therefore in order to see how West Bandung Regency had been transformed by the influence of external development and per-urbanization, examining the types of peri-urban zone is required. Typology of peri-urban shows whether the characteristic of certain location is leaning toward urban characteristic or rural characteristics. Analysis of physical, economic, and social aspects is also need to be done to expect a comprehensive review of transformation happened in West Bandung Regency within ten years.

1) Physical Aspect

Physical aspect of this analysis outlined the quality of natural environment and built environment required for fulfilling human need. In the analysis of peri-urban typology, physical aspect consist of percentage of agricultural land, sufficient education facility, and adequate health facility. The following table shows changes of those variables in West Bandung Regency both in 2009 and 2019.

Table 3.

Physical Variables Scoring of West Bandung Peri-urban Zone

Year 2009						
Regency	**Land-use**		**Health Facilities**		**Education Facilities**	
	Agrarian Landscape	**Score**	**Category***	**Score**	**Category****	**Score**
Batujajar	55.74%	2	A	4	S	4
Padalarang	51.63%	2	IA	1	S	4
Ngamprah	62.16%	2	A	4	S	4
Cisarua	89.10%	1	IA	1	S	4
Parongpong	20.14%	4	A	4	S	4
Lembang	74.46%	2	A	4	S	4
Cihampelas	76.23%	1	A	4	S	4

Year 2019						
Regency	**Land-use**		**Health Facilities**		**Education Facilities**	
	Agrarian Landscape	**Score**	**Category***	**Score**	**Category****	**Score**
Batujajar	69.1%	2	A	4	S	4
Padalarang	70.5%	2	A	4	S	4
Ngamprah	64.9%	2	A	4	S	4
Cisarua	77.0%	1	A	4	S	4
Parongpong	68.0%	2	A	4	S	4
Lembang	66.2%	2	A	4	S	4
Cihampelas	69.0%	2	A	4	S	4

Note: * A = Adequate   IA = Inadequate ** S = Sufficient   IS = Insufficient

Changes in agrarian landscape in West Bandung Regency does not always indicate decrease as the regency growth. The development in the regency has attracted more people to migrate and seek opportunities in growing businesses. For example in Parongpong sub-districts in 2009, its land-use profile was dominated by forest, then by the time the city developed, forests were converted as plantations that could also be functioned tourism object. Health facilities are generally adequate as well as education facility that is generally sufficient for education participants in the regency. The data were all collected from West Bandung Regency Central Bureau of Statistic in 2009 (BPS, 2009) and in 2019 (BPS, 2019). The transformation of peri-urban typology is seen in the following figure.

Figure 1.

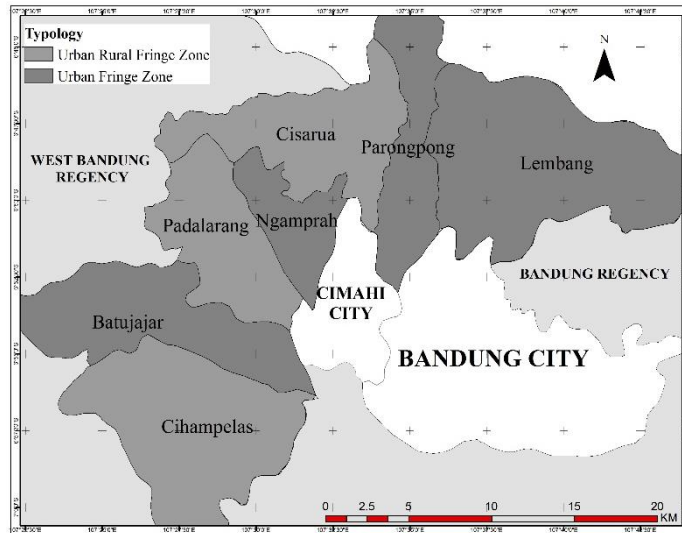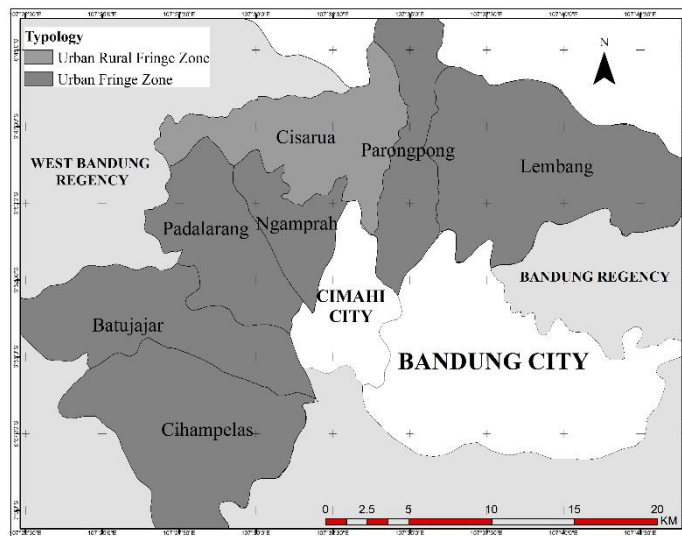West Bandung Peri-urban Typology Based on Physical Aspect in 2009

Figure 2.

West Bandung Peri-urban Typology Based on Physical Aspect in 2019

2) Social Aspects

Social aspects of this analysis examine the demographic feature of the region. Demographic feature can determine the urban growth as agricultural landscape gradually converted into settlements and attracted more intense movement of its people. Social aspects consist of population density and population growth. The following data shows demographic feature of West Bandung Regency in 2009 and 2019.

Table 4.

Social Variables Scoring of West Bandung Peri-urban Zone

Year 2009				
	Population Density		**Population Growth**	
Regency	**Density (people/km^2)**	**Score**	**%**	**Score**
Batujajar	806	1	1.99%	2
Padalarang	1447	2	1.71%	2
Ngamprah	1435	2	1.86%	2
Cisarua	622	1	1.21%	2
Parongpong	909	1	1.75%	2
Lembang	1613	2	1.51%	2
Cihampelas	954	1	2.06%	2

Year 2019				
	Population Density		**Population Growth**	
Regency	**Density (people/km^2)**	**Score**	**%**	**Score**
Batujajar	3142	2	7.27%	4
Padalarang	3412	2	4.06%	4
Ngamprah	4714	3	1.61%	2
Cisarua	1360	2	3.51%	3
Parongpong	2326	2	-0.83	1
Lembang	1929	2	-1.84%	1
Cihampelas	2626	2	5.41%	4

On the analysis of peri-urban growth, the population growth and density per kilometer square indicates the need of land. Development in urban core has caused land scarcity therefore external development should be carried to build new urban activity centers (Budiyantini and Pratiwi, 2016). As showed in Table 4, most of sub-districts in West Bandung Regency were becoming densely populated in 10 years. Compared to the 2009 data, which population density is no more than 1700 people per kilometer square, population density in 2019 grew into 4000 people per kilometer square. Population growth not only indicated the need of land, it also indicate better health quality and job opportunities to sustain the life of family. It also shows heterogeneous society as migration to the regency happened intensively with settlements changed agrarian landscape and closeness to the urban core

Figure 3.

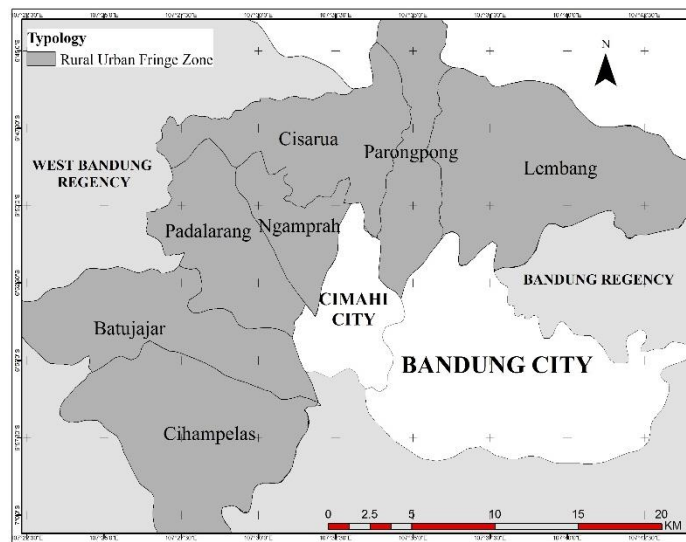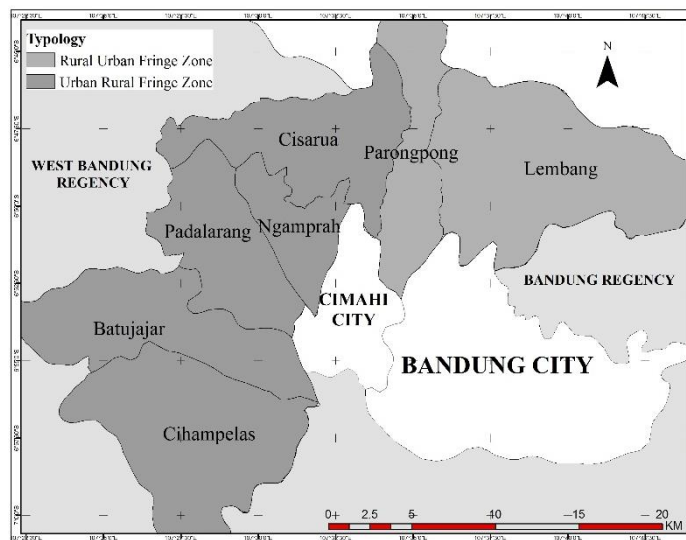West Bandung Peri-urban Typology Based on Social Aspect in 2009

Figure 4.

West Bandung Peri-urban Typology Based on Social Aspect in 2019

3) Economic Aspects

Economic aspects examined in this research is the percentage of people working in agriculture sectors. The percentage depicts job diversity in the region, indicating shift of rural to urban characteristics. In West Bandung Regency, which is directly affected from development out of land scarcity in the urban core, most of people had left agriculture job since 2008, yet further analysis should be done to overview the motives and its driving factors. The following table shows the percentage of people working in agriculture sector both in 2009 and 2019.

Table 5.

Economic Variable Scoring of West Bandung Regency Peri-urban Zone

Regency	Year 2009	
	Livelihood Activity	
	Percentage of people working in agriculture sector	**Score**
Batujajar	1.76 %	4
Padalarang	0.69%	4
Ngamprah	1.03%	4
Cisarua	2.68%	4
Parongpong	1.49%	4
Lembang	3.81%	4
Cihampelas	1.05%	4

Regency	Year 2019	
	Livelihood Activity	
	Percentage of people working in agriculture sector	**Score**
Batujajar	0.48%	4
Padalarang	0.5%	4
Ngamprah	1.43%	4
Cisarua	3.24%	4
Parongpong	1.47%	4
Lembang	3.70%	4
Cihampelas	1.22%	4

Since West Bandung Regency established as the expansion of Bandung Regency, economic development started to be initiated, such as infrastructure, new settlements, government building and built area for tourist destination. This development had left agrarian land be converted. With people have more access toward education and life-skills, jobs in agriculture sector started to be abandoned as it is perceived as an occupation with low income. Therefore since the region retained its autonomous status, people are already seeking other occupation alternatives. In ten years, industrial sector dominated the portion of livelihood activity in the studied sub-districts in West Bandung Regency, followed by entrepreneurship sectors, factory labors and trades (BPS, 2018). In peri-urban analysis, region with lower percentage of people working in agriculture sector indicate the transition from rural to urban characteristics. Migration from other region also added the number of people not working in agriculture sector, this phenomenon caused by rapid urban growth of an urban area. Rapid urban growth had increased the interest of people living in more remote areas or not directly connected with the urban core to move in live in urban areas so that urban space become crowded (Jupri & Mulyadi, 2017). The following table showed the changes if livelihood activities in agriculture sector in 2009 and 2019.

Figure 5.

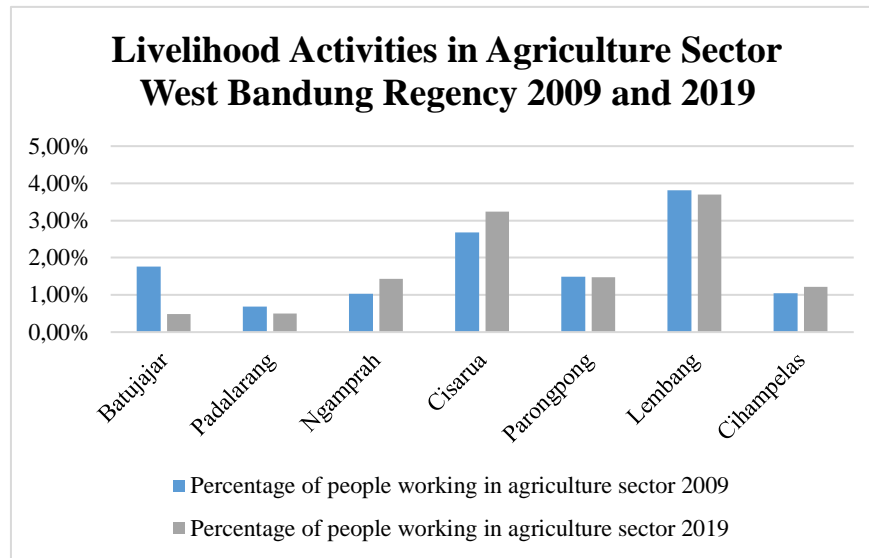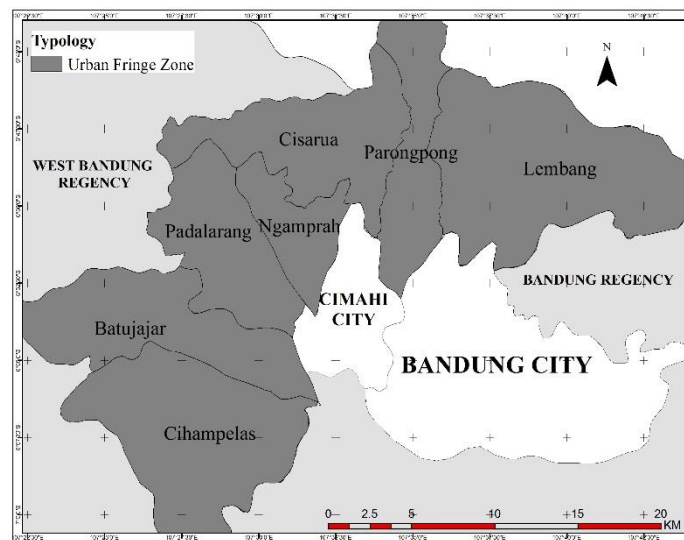Comparison of Livelihood Activities in Agriculture Sector in West Bandung Regency 2009 and 2019

Figure 6.

West Bandung Peri-urban Typology Based on Economic Aspect

4) Conclusion

Each sub-districts in West Bandung Regency has different types in peri-urban typology. It resulted from the development and spatial interaction between sub-districts affected by the urban core. To examine how urban core development affects peri-urban growth, the analysis is done by comparing 2009 and 2019 data. In physical aspect, three sun-districts were categorized as urban-rural fringe zone. By 2019, only Cisarua which categorized as urban-rural fringe zone while others are identified as urban fringe zone. In social aspect, all sub-districts were initially categorized as rural-urban fringe zone and then developed as rural-urban fringe zone by 2019. In economic aspect, all sub-districts had been categorized as urban fringe

zone, portraying non-agrarian livelihood activities. This research can be utilized as the reference of regulations and programs regarding to peri-urban development growth in West Bandung Regency.

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