Characteristics of peri-urbanization of a secondary city: a challenge in recent urban development

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Abstract. Urbanization process creates a tremendous spatial phenomenon since the last century. Especially for the country of the South, the phenomenon is still relevant to the situation today and the processes will still going until the foreseeable future. The metropolitan-based of urbanization process involves the development of peri-urban areas, which could be defined as transitional zones between city and rural areas characterized by integrated mixed-structures of agricultural and non-agricultural activities. This article reveals the characteristics of peri-urbanization process of an emerging secondary city in Java, which uses Surakarta, the second largest city in Central Java Province based on the population size, as the case. During the last ten years, there have been significant changes in peri-urban areas regarding urban population, land use, and urban activities that strengthening the contribution of the urban component into peri-urban system.

1. Introduction
The UN Desa’s data of 2014 show that 49.8 per cent of the world’s urban population (about 1.94 billion) live in cities with a population of less than five hundred thousand, and this number is expected to increase to 2.26 billion in 2030, which means that this kind of secondary cities will accommodate 44.6 per cent of the predicted global urban populations in 2030 [1]. Furthermore, especially in developing countries, secondary cities will be the place for the rapid growth. Thus, as Cohen argued, the global urbanization process will increase the role of secondary cities [2].

In the context of Indonesia, the urbanization process is particularly challenging. In this fourth largest country by population, secondary cities also function as an important living space for its urban population. Indonesia’s total population is 237.6 million (Census 2010), which of 58.5 per cent living on the island of Java (136.6 million). Nearly 80 million of the population of Java are residents who live in its urban areas. Among them, according to the result of Census in 2010, there are more than 50 million urban inhabitants of Java live in cities with a population of less than 500 thousand, including those who live in the non-statutory cities in the kabupaten. Thus, small and medium cities in this country, especially in Java, will play important roles in the urbanization process of the country. In this context, researches that aim to understand small and medium-sized cities in Indonesia as well as their roles in urbanisation process should become important agenda in the area of urban planning sciences in Indonesia. The aim...
of the researches should also involve the improvements of understandings the spatial structure of the cities in the urbanization process as the good management of process also offers a transformative process of the cities in performing a more productive process in providing better economic development, welfare and quality of life [3].

Another important phenomenon in urban growth in Java, as suggested by McGee, is the development of the extended metropolitan region that is today has not only taken place in the primary metropolitan area, but also in the much smaller secondary metropolitan in the region [4, 5]. Concerning this phenomenon, Firman has revealed a decreasing urban population growth in the core area of metropolitan areas in Indonesia has also happened in small and medium municipal cities with a tendency of increasing urban population growth in the surrounding districts since the 1990s [6]. These processes create an extended urban formation, in which the urban development activities are not only concentrated in the core area in the municipalities, but also extend towards adjacent districts. It is a phenomenon of extended metropolitan region building in Asia, emerging in the second half of the twentieth century (suggested in the 1970s) [5]. The peri-urban development of extended small cities in Java is also a transformation process of rural areas on the outskirts of established small cities into more urbanized areas. This transformation process is reflected through the presence of urban symbols and urban activities in densely populated areas.

The objective of this paper is to comprehend such process through an analysis of demographic and economic or sectoral shift, as well as land use change in a peri-urban area of secondary city-based extended metropolitan region in Indonesia with the case of Surakarta Metropolitan Area, which consists of the constellation of Surakarta Municipality as the urban core surrounded by three kabupaten, i.e. Sukoharjo, Karanganyar and Boyolali. This paper is organized into five main parts: introduction, data and methodology, literature review, and analysis of Surakarta Metropolitan Area, followed by some discussion and conclusion.

2. Data and Methodology
As argued by Yin, single case study method is a method that can be conducted to confirm or to challenge a theory, or to represent an extreme or a unique case [7]. Using that argument, this paper applies a single case study method in achieving its aim, to analyze the characters of the urban development process in peri-urban area of a secondary city. However, since Flyvbjerg argues that it is difficult to generalize from a single case study, instead of doing a generalization of what has been experienced by Surakarta Metropolitan as a common phenomenon for a secondary city region in a densely populated area like Java, this study is intended to make an example of such phenomenon [8]. The importance of this case as what Flyvbjerg said as the “force of example” in urban development discourse is increased by the strategic choice of the Surakarta Metropolitan, which is characterized by the strategic geographical location and strategic role of the region in regional constellation [8].

This paper will explore the phenomenon of the transformation process in peri-urban area of a secondary city, by identifying spatial shifts of economic activities and demography, as well as land use change in Surakarta Metropolitan area, which consists of Surakarta Municipality and three districts that are bordering the city: Boyolali, Surakarta, and Karang Anyar. The analyses will employ statistical data on demography and GRDP from Census 1980, 1990, 2000, and 2010, and other features that were representing urban development process.

3. Urbanization and Peri urbanization of the South
Over the last twenty years, patterns of urban change worldwide have been focusing on the regional scale in which urbanization processes takes place. Soja defines regional urbanization as a new urbanization process initiated by the end of urban crises of the 1960s, which then promotes a morphological change in the most of world's major metropolises [9]. The increasing performance of the economic activities of the metropolises has brought a reduction in population density in the core areas, as the outmigration of internal populations to the outer areas of the metropolises. In some cases, this process has been
compensated by the influx of transnational immigration that has maintained or increased the real density of the core areas.

The enhancement of automobile and other transportation technologies, as well as the information and communication technologies, has facilitated motorized travel and mobility that increase the possibilities of urban activities to be located outside the core areas. This process increased the roles of outer cities in the regions as living space for the urban population as well as the right place for their activities. It has not only changed the lifestyle the people in urban areas, but also changed the relationship of the individual to the territory by improving the geographical accessibility of urban areas [10]. However, Soja argues that this new form of urbanization is not an extension of the metropolitan model of urbanization process, which still has clear separation or distinction between urban and suburban areas [9]. He argues that this process is a sign of an emergent new form of urbanization in the type of regional urbanization that slowly erodes the boundary between urban and suburban and also blurs the differences between urban and non-urban areas [9]. The evolution of practices of the relations of individuals in urban areas triggered a change in territorial dynamics that brought impacts in the evolution of spatial organization of the urban areas by changing the notions of distance, proximity and remoteness, which facilitate the emergence the phenomenon of suburbanization, peri-urbanization or urban sprawl [10].

Peri-urbanisation refers to the urban transformation process in the urban peripheries that is characterized by rapid and fragmented growth [11]. Allen argues that the concept of ‘periurban’ is constructed by three spatial concept, urban, rural, and regional fields [12]. The growing process of urbanization in many parts of the world from single-city-scale into regional-scale urbanization has developed a mix spatial feature of urban form in predominantly rural areas in the surrounding of many large metropolitan centers with a rapid growth of urban population and substantial change in the physical, economic and social features of the areas [13]. Gant, Robinson, and Fazal mentions that debate about peri-urban started by the term of ‘urban fringe’ in 1930s, that at the first time was used to discuss the loss of agricultural land in the peripheries that has already been a great concern at that time [14].

In the peri-urban areas, urban and rural activities were mixed in the same area in the peripheries, and formed a transitional zone between the dominantly urban activities in the city to the dominantly non-urban activities in the rural areas. In addition, especially for the debate of urbanization in the South, de la Luz Hernandez-Flores et al argues that the concept of periurban has been stronger enriched by the many evidences of metropolitan developments that grow into their fringes area, and indicating that their fast urbanization process have formed synergetic mix of agricultural and urban activities in creating the growth in the transitional areas [15]. The debates on the concept developed later by using many terms like edge cities, urban sprawl, suburbanization, rurbanisation, extended metropolitan region, and also mega-urban region. All of the terms involve spatial development in areas where the ‘urbaness’ diffuse to the places where ‘ruralness’ has been the main characters in their physical, social as well as economic features [16]. Especially in many cities in the fast growing economic regions like East Asia, the process has become an important phenomenon since peri-urbanization offers the opportunities in contributing to regional development by creating new economic activities and attracting massive employment [17].

4. The constellation of Surakarta Metropolitan

The municipality of Surakarta is the second largest city in Central Java Province based on the population size. The municipality is located about 120 km to the southeast from Municipality of Semarang, the capital of the province and the largest city in the region. Surakarta is about 60 km to the east from Municipality of Yogyakarta, the capital of the Special Province of Yogyakarta. In the regional development context, the three cities that are often called as Joglosemar, the abbreviation of Jogyakarta (Yogyakarta), Solo (another name of Surakarta) and Semarang that form a triangle of growth as the leading centers of urban development activities in the central region of Java.

The municipality of Surakarta also located as the growth center of Subosukawonosraten Region. This region consists of Surakarta and its surrounding kabupaten: Boyolali, Sukoharjo, Karang Anyar, Wonogiri, Sragen, and Klaten. However, the intensity of extended urban growth is concentrated in three districts that adjacent to Surakarta, which are Boyolali, Sukoharjo, and Karanganyar. This extended
urban growth has created peri-urban formation and peri-urbanisation process. Surakarta and the three adjacent districts which experiencing the most intense of urban growth process is defined in this paper as Surakarta Metropolitan Area.

![Surakarta Metropolitan Area](image)

**Figure 1.** Surakarta Metropolitan Area.

5. **Demographic shift of Surakarta Metropolitan**
Metropolitanization of Surakarta city involves the shift of urban population growth that increases roles of the three kabupaten—the peripheries, as urban places where urban population resides in the Metropolitan of Surakarta. The analyze on the result of Census 1980 to 2010, and Inter-census Census (SUPAS) 2015, shows that the distribution of the urban population in the region has reversed from concentrated in the Surakarta Municipality into a spread to the kabupaten since 1990. In 1980, more than 66% of the urban inhabitants of the region lived in the Municipality of Surakarta, while its share of the total population was only about 19%. These figures show the domination of Surakarta as the leading
urban concentration in the metropolitan region at that time. Starting at 1990, the domination of Surakarta has been decreasing with only has about 45.6% of the urban population of the metropolitan region. The urban population of the three kabupaten started to exceed that of Surakarta, the urban core, with a share of 54.4% of the urban population of the metropolitan region, even though the distribution of the total population is not changing too much, 80.9% in 1980 to 81.5% in 1990, for the peripheries. Later, the urban population share of Surakarta was continuing decline to 30.6% in 2000, then 27% in 2010, even though its number was still slightly increasing from 469.5 thousand urban inhabitants in 1980 to 490.2 thousand in 2000 and 499.3 thousand in 2010. Today, Surakarta has only 25% with about 504.2 thousand urban population, while the majority of the urban population of the metropolitan area, which is 1.51 million, resides in the three kabupaten as the peripheries.

As Firman [6] has revealed as a phenomenon in many metropolitan areas, Surakarta as the core area has also faced a decreasing urban population growth, from 0.7% annually between 1980 and 1990 to 0.2% per year between 2000 and 2015. In contrast, rapid urban population growth occurs in the surrounding kabupaten, especially since 1990, with an average growth around 5% per year from 1990 to 2015. As one of the results, Kabupaten Sukoharjo is the peri-urban area that has the largest urban population since 2000, replacing Municipality of Surakarta that was previously the place where largest number urban population was concentrated. Later in the foreseeable future, Kabupaten Karanganyar and Boyolali are also expected to have a larger urban population as well, as their annual growth is still high and increasing until now.

6. Land Use Change

The urbanization and peri-urbanization process in Surakarta Metropolitan Region also characterized by an important land use conversion. The most important features in these land conversion are the increase of built-up areas and the decrease of paddy fields. Land use conversion discussed in this paper is that taking place at nine kecamatan bordering the Municipality of Surakarta. They are Kecamatan Kartasura, Baki, Gatak, Grogol and Mojolaban in the Kabupaten Sukoharjo; Kecamatan Jaten, Gondangrejo and Colomadu in the Kabupaten Karanganyar; and Kecamatan Ngemplak in the Kabupaten Boyolali. The nine kecamatan can be considered as the ‘little corona’ of the urban core of the metropolitan while the rest of the kabupaten’s territory as the ‘large corona’ of the metropolitan region.

The three kabupaten peripheries of the metropolitan have experienced a considerable increase of their built-up areas, and a significant decrease of their paddy fields, in the last ten years. Kabupaten Sukoharjo, which has the largest number of bordering kecamatan, experienced the highest increase of the built-up areas and the highest decrease of the paddy fields. Among the three kabupaten, Kabupaten Boyolali, which has only one bordering kecamatan, has a much lower increase of the built-up areas and a lower decrease in the paddy fields. In this regard, it can be considered that the number of kecamatan adjacent to Surakarta City influence to the level of land conversion in the peripheries of Surakarta Metropolitan Region.

The nine kecamatan of the little corona experienced more significant land conversion compared to that of the kabupaten as a whole as well as to the rest of kecamatan individually. Kecamatan Colomadu of Karanganyar, Kecamatan Grogol of Sukoharjo, and Kecamatan Ngemplak of Boyolali have experienced the highest increase in built-up areas between 2005 and 2015. Colomadu experienced 221.5 hectares increase of its built-up areas, which represent 30 per cent of the built-up areas increase in its kabupaten. Grogol and Ngemplak experienced more than 100 hectares increase of built-up areas (representing 14.5 and 48.7 per cent of their kabupaten increase of built-up areas respectively). The two kecamatan experienced more than 100 hectares decrease of paddy fields (representing 24.2 and 67.1 per cent of the paddy fields’ reduction of their kabupaten). The declines of paddy fields in the three kecamatan become more important since all of paddy fields in Colomadu, Grogol and Ngemplak are categorized as irrigated paddy fields, which can be considered as the most important paddy fields.

Colomadu and Ngemplak are side-by-side kecamatan that are located about 7 to 20 km from the Surakarta’s city center to the northwest. The urban development trends in the area are influenced by the improvement of Adi Sumarno Airport, located in Ngemplak of Boyolali, which also serves international
flights to Singapore and Kuala Lumpur in addition to many cities in Indonesia. Meanwhile, the urban development of Grogol has started in the 1990s by the development of Solo Baru, a large scale residential development, which has changed the previously agricultural areas into urban areas (industrial, residential as well as business, commercial, and services areas).

7. The spatial-sectoral shift
There is a spatial-sectoral shift in the Surakarta Metropolitan as peri-urbanization process continues during 1980-2010, which is calculated based on the share of sectors of each city or kabupaten to the Surakarta Metropolitan Region as a whole. This shift is mainly recognized by the increasing of kabupaten’s industrial, electricity, gas and water as well as commercials sectors. However, for building and property as well as financial sectors, the share of Surakarta City has increased during 1980 to 2010 (see Figure 2).

| 1980 | 2010 |
|------|------|
| **Total Share** | **Total Share** |
| Surakarta | Surakarta |
| Sukoharjo | Sukoharjo |
| Karang Anyar | Karang Anyar |
| Boyolali | Boyolali |
| Industry | Industry |
| Commercials | Commercials |
| Financial | Financial |
| Building Property | Building Property |
| Electricity, gas, water | Electricity, gas, water |

Source: Calculated from BPS data on GRDP of kabupaten and kota.

**Figure 2.** The Shift of GRDP of Surakarta Metropolitan.

This spatial-sectoral shift shows that urban activities have extended to the peri-urban area of Surakarta. However, during the process of peri-urbanization for the last 30 years, Surakarta has kept its domination as the center of Surakarta Metropolitan. This domination is shown by the total share of its GRDP that is increasing in two sectors of urban activities: financial and building and property sectors, while holding its domination in producing the largest GRDP in the region. It can be said that the peri-
urbanization of Metropolitan Surakarta for the last 30 years remain to benefit Surakarta as the core city the most.

8. Discussion and Conclusion
The nine kecamatan in the ‘little corona’ of Surakarta Metropolitan can be categorized peri-urban area of the metropolitan, as the kecamatan remains consists of large area of agricultural activities represented by the existence of paddy fields, but at the same time they experience significant penetration of urban development. These conditions show the place where urban and rural activities were mixed in the same location, and form a transitional zone between the intensive urban activities in the Surakarta Municipality, as the core area of the metropolitan, and the other kecamatan in the three kabupaten that most of them are still highly characterized as rural areas.

The case of peri-urban development in Surakarta Metropolitan has not only demonstrated a shift of urban population growths into the periphery, but also in some sectors of the urban activities, like in the sector of electricity, gas and water, and those of industry, and commercials. In addition to provide potential labors for the development of industrial sector, the increases on urban population in the peripheries put triggers for a stronger development of other urban activities in the areas, like providing larger consumers for the development of the commercial sectors as well as the sector of electricity, gas and water. Limited area of Surakarta City or urban core (4.4 km²), triggers the surrounding kabupaten to develop their most potential kecamatan as the place for urban activities’ extension. In this regard, Sukoharjo develops Kartosuro and Grogol, as their prioritized urban development areas; Karang Anyar develops Jaten and Colomadu; and Boyolali utilizes Ngemplak. All of the prioritized kecamatan are traversed by the regional road from Surakarta, and Ngemplak is the kecamatan that has Adisumarmo International Airport, one of the main infrastructures of Surakarta. This evidence informs that the periurbanization process in Surakarta Metropolitan leads to the extension of urban core into the bordering kecamatan in the periphery, as the secondary urban centers in the metropolitan.

However, the case of metropolitan development in Surakarta Metropolitan has also shown the strengthening of the core area, Surakarta Municipality, as the main center of the region. The share of the municipality in financial sector and in building and property sector increased. Even though the values of all of the three kabupaten in these two sectors have also increased, the increasing values of the municipality are much higher. This implies that the urban core does not only the most important area in these two sectors, but also the largest contributor of GRDP in the region.

The phenomenon confirms the replication of extended metropolitan development in a secondary city in Java. In this regard, the extended metropolitan development, introduced since 1970s in large metropolitan region in Java, has been replicated in much smaller city like Surakarta. However, this process is different from that of large city-based metropolitan process, which created several urban cores, the metropolitanization process in this smaller cities remains positioning Surakarta as the single core of the region.

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