Urban Agglomeration and Extension in Northern Coast of West Java: A Transformation into Mega Region

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Abstract. In the past decade, at least three neighbouring metropolitan areas in the north-western part of the island have been merging with each other: Jakarta Metropolitan Area (Jabodetabek), Bandung Metropolitan Area (Bandung Raya), and Cirebon Metropolitan Area (Ciayumajakuning). It is expected to be the first island-based mega-conurbation. This paper explores the potential emergence of mega region as a ground study, where mega region can be used for economic, logistic, transportation development. Authors use scoring analysis from economic and demographic indicators. The outcomes found a new and larger formation of city-region in the northern coast road networks (Pantura) – specifically western part of Java Island.

1. Introduction
The paper explores the latest urban dynamics across Java, the most developed and most densely populated main-island in Indonesia. It is where Indonesia’s largest metropolitan areas located. According to McGee, extended metropolitan region like Jakarta-Bandung Corridor is dominating the urban system of Indonesia [1]. In Indonesia there is an Extended Mega Urban Region that combines two metropolitan region of Jakarta Mega Urban Region (JMUR) and Bandung Metropolitan Region that has been developed by Firman [2] and Firman [3] according to McGee in 2012 “In 2010 this Extended Metropolitan Region of JMUR and BMA had a population of 35 million which made it the second largest EMR’s in the world second only to the Tokyo Metropolitan Area.” [1]. However, in the past decade, there is a conjecture that at least three neighbouring metropolitan areas in the north-western part of the island have been merging with each other: Jakarta Metropolitan Area (Jabodetabek), Bandung Metropolitan Area (BMA) / Bandung Raya, and Cirebon Metropolitan Area (Ciayumajakuning). These three metropolitan areas are integrated based on Local Government Regulation Number 12 / 2014 about Managing Metropolitan Construction, Development, and Growth Centre in West Java. This policy is possible trigger for the extension of the JMUR and BMA in Indonesia to reach Cirebon Metropolitan Region with the population of more than 30 million and increasing, it is expected to be the first island-based mega-conurbation in Southeast Asia. This paper updates the previous research about mega region in Java.

This article is presented in four parts, following this introduction, the concept of mega region, discussion, and summary. The study discussed one major: delineating mega region. In delineating mega region, the authors use demography, economy, infrastructure, and socio politic analysis. This analysis is focus on deciphering spatial form of mega region in Indonesia that estimated in the area of
northern coast of west java as the most populated, capital intensive, high performance economic concentration, socio-political importance, global role importance, and also most infrastructure importance settlement area in Indonesia

2. Theoretical Transition to Asian Background

2.1 Theoretical Evolution
The evolutions of mega urbanization agglomeration theory start from conurbation to mega region. Conurbation theory coined by Geddes (1915), it is a region that comprising a number of cities, large towns, and other urban areas that merge to form one continuous urban and industrially developed area as a result of population growth and physical expansion [4].

In the following years the theory evolve to a bigger more detailed explanation of settlement type, named Megalopolis coined by Gottmann (1957), defined as a region with national and international national and international significance because of the size and weight of megalopolis in economic and social matter [5]. In the following years, (Gottmann, 1961) elaborate the theory Megalopolis as a bigger region than metropolis – a vast area that encompasses many great cities, the most active crossroads on earth with the population close to 38 million [6].

In the early period of millennium, the theory evolves into new concept named Mega region. Prior from many forms of urbanization: city, metropolitan, megacities, and now mega region. Mega region also corresponds with several terminologies such as megalopolis, Global city Region, Mega-city region, Metro (politan) regions, and Mega Urban Region. Mega region is defined as in several perspectives. First, network of metropolitan centres and their surrounding areas that spatially and functionally linked through environmental, economic, and infrastructure interactions’ (Ross et al. 2009). Second, this definition then adapted by America 2050 that defined this region as a region with interlocking economic systems; shared natural resources and ecosystem; and population centres that linked by transportation [7]. Different from previous perspective, Florida, Gulden, and Mellander (2008) define mega region with different perspective, differentiate urban mega region unlike urban in the past, that the city system has become global – compete in global terrain in the way that metropolitan regions relate to national economies. Furthermore, Mega region is defined not only as an area with a large population, but also possess large market, significant economic capacity, substantial innovative activity, and highly skilled talent [8]. Thus, there are many large megacities that do not meet the criteria for being a mega region.

2.2 Bridging to Asia
Urbanization in Asia and in Europe or America is inherently different. Asia urbanization has a lot of megacities; cities as the economic engine; the cities are built upon internal migration; high disparity; and non-environmentally friendly city growth are the urbanization trend in Asia based on study conducted by ESCAP [9]. Meanwhile, most of the theory that mentioned before was emergent from Euro-American cities which has different urbanization character. There has to be a recalibration and bridging of theory to urbanization in Asia cities with the theory rooted from Asia.

The similar theory emergent from Asia is Mega Urban Region (MUR), interaction of metropolitan centres to extend beyond administrative and traditional core-suburb agglomeration into rural areas along inter metropolitan corridors extending upwards of 100 kilometres from metropolitan centres because of the growth of vehicular transport and trunk highway system (McGee & Robinson, 1995). In 1995, there are studies which study the MUR in Indonesia. The merging of two metropolitan regions, Jakarta and Bandung, this Indonesian context of this concept has been developed by (Firman & Dharmapatni, 1995) that these two metropolitan and the corridor between them have become integrated into a fully functional MUR. However, as the time passes by the development of this megaregion after 20 years, after major changes like megaproject, foreign investment, decentralization, new regulations, and more. A new update of prior research need to be done.
### Table 1 Theoretical Evolution Frame

| Concept         | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Foundation Literature                   |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Conurbation     | A region that comprising a number of cities, large towns, and other urban areas that merge to form one continuous urban and industrially developed area as a result of population growth and physical expansion.                                                                                                                                                                                                                                                                                         | Geddes (1915)                            |
| Megalopolis     | 1. Megalopolis defined as a region with national and international national and international significance because of the size and weight of megalopolis in economic and social matter.  
                 | 2. Megalopolis as a bigger region than metropolis – a vast area that encompasses many great cities, the most active crossroads on earth with the population close to 38 million.                                                                                                                                                                                                                                           | 1. Gottmann (1957)                      |
|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2. Gottman (1961)                        |
| Mega Urban Region| Interaction of metropolitan centres to extend beyond administrative and traditional core-suburb agglomeration into rural areas along inter metropolitan corridors extending upwards of 100 kilometres from metropolitan centres because of the growth of vehicular transport and trunk highway system                                                                                                                      | T. G. McGee and Robinson (1995)          |
| Megaregion      | Network of metropolitan centres and their surrounding areas that spatially and functionally linked through environmental, economic, and infrastructure interactions A region with interlocking economic systems; shared natural resources and ecosystem; and population centres that linked by transportation                                                                                                                          | Ross et al. (2009)                       |
|                 | 1. City system has become global – compete in global terrain in the way that metropolitan regions relate to national economies.  
                 | 2. An area with a large population, but also possess large market, significant economic capacity, substantial innovative activity, and highly skilled talent                                                                                                                                                                                                                                                                   | (Hagler, 2009)                           |
|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Florida, Gulden, and Mellander (2008)   |

Source: Authors Collection

### 3. Approach and Methods

The approach in this research is a deductive research, the research formulates the mega region indicators and see if the realization of the indicators. Here’s the brief explanation:

#### Table 2 Summary of Method

| Objectives | Analysis Method |
|------------|-----------------|
| Delineating the Distribution of Megaregion in Java Island | Demography:  
  - growth rate  
  - Population density  
  Local economy:  
  - Economic growth  
  - GDP per capita  
  Demography and local economic indicator score |

The analyses in this article are literature review, statistic, and spatial analysis to show the development of mega region in Indonesia. The statistical data then developed into spatial map to illustrating distribution of demographic and economic activities in mega region.

### 4. Result and Discussion

#### 4.1 Defining Structure and Pattern of Mega Region

In deciphering structure of mega region; demography, economy, infrastructure, and socio-politic aspect is used.

#### 4.1.1 Demography and Urban Area

The pattern of population distribution can also explain the pattern of settlement that indicates the distribution of people in this area.
Figure 1. Average of 10 Years Population Growth in City and Regency of Java Island (Year 2000 – 2010)

It can be implied from the map above that most of Java Island experience medium range of population growth all across java. However, there are some parts that are having the most growth in Cirebon Metropolitan and also in Jakarta Metropolitan.

Figure 2 Population’s Density in City and Regency of Java Island (Year 2010)

As for population density, it’s clear that the high-density population is located around in metropolitans and their surrounding city or regency. This condition is happening in all metropolitan in Java Island.

4.1.2 Local Economy
New Formation of Economy is emergent in Java Island. Most of the city and regency in Java Island experience high GDP growth. However, when we take a closer look to GDP per capita, there is unequal GDP per capita. Inequality differs greatly between highest and lowest GDP per capita. The capital accumulation mainly located in major cities suitable to new formation of urban.
The map above shows the area with GDP growth rate from 2010-2012 based on constant price 2010. We could see the growth rate is high in area inside metropolitan. The surprising condition is the most economic growth is happening inside and in the hinterland of Surabaya Metropolitan.

There is income inequality in Java Island. The annual GDP per capita is very contrast in the cities on Java Island and the non-non-city area. Most of cities have a very high income compare to regencies in Java Island.

4.2 Merging Metropolitans into West Java North Coast Mega Region
In deciding delineation of mega region, we use scoring analysis. The scoring analysis identifies basic character of mega region from available secondary data. The explanation of scoring method is in the table below:

| Indicators                                      | Score   | Score   | Score   |
|-------------------------------------------------|---------|---------|---------|
| Average of Annual GDP per Capita Year 2010-2012 (Million Rupiah) | Below 30 | 30-90   | More than 90 |
| Average of GDP Annual Growth Rate Year 2010-2012 (Million Rupiah) | Below 4% | 4-6%    | More than 6% |
| Population Density Year 2010                     | Below 500 person/km² | 500-1000 person/km² | More than 1000 person/km² |
| Average of 10 years Population Growth (2000-2010) | Negative Growth | 0-5%     | More than 6% |
From the scoring regulation above, then we score each city and regency in Bandung then accumulate the score. From the score accumulation, we could see the pattern that presented in the map below.

![Figure 5. Mega Region Scoring Analysis](image)

Map above show the total score that has been classified into three classes: low, middle, and high score. The higher the score, it’s possible that area to be a mega region. In contrary, the lower the score, it is not possible for that area to be a mega region. In conclusion, there are two salient urban centres in Java: Jakarta and Surabaya. Jakarta Area influence sprawls to three metropolitan: Jabodetabek, Bandung Raya, and Cirebon Raya. Meanwhile, Surabaya mostly influences area Gerbangkertosusila. Later on, this paper will discuss about Western Java more intensively, where Jakarta as the prime mover of the urbanization in Java Island that influence the development of metropolitan around it, all the way across the island. The influence of mega region must have limited distance, not too far from Jakarta and also have physical continuity and tight connectivity, so Surabaya Metropolitan who is also the second most influential metropolitan is not accounted in this mega region because Surabaya is too far from Jakarta and also there are some physical discontinue between them. For those reasons, it can be concluded that the area of mega regions are encompassed these territory:

- Jakarta, Bandung, and Cirebon Metropolitans form a mega region situated in Northern Coast of West Java.
- The other areas, Banten Province, such as: Cilegon City, Serang City, and Serang Regency are not entitled as a metropolitan but share a quality to become a megalregion from the Figure 6. If we took a closer look this region has a great deal in foreign investment and also industrial sector.
- West Java North Coast province regencies, such as: Subang Regency, Karawang Regency, and Purwakarta Regency are not entirely entitled by national metropolitan system, but only in West Java metropolitan’s version. However, they have a good score in the map above and also connect Metropolitan Jakarta to Bandung Metropolitan and Cirebon Metropolitan. Moreover, they are passed by Pantura Road System.

Meanwhile, southern part of West Java – the non-metropolitan area of West Java Province such as Sukabumi Regency, Cianjur Regency, and Garut Regency has a low score. It can be because they located in Southern Road System of Java, different from other three areas above that located in Pantura road network. Pantura is the most develop road network in Java Island where most economic activities take place. Moreover, Pantura road network is forming a very strategic network and have intriguing upcoming development programs from government and private institution, such as Karawang airport; and Majalengka Airport and Aero city. In conclusion that the development of mega
region in Northern Coast of Java is situated and influence by fast growing development in Pantura Road System.

In delineating mega region, sure the quantitative scoring map in Figure 6 will be accounted in this research. In addition to that, we also account non-quantitative qualities such as economic condition; physical continuity and accessibility; and also, socio political dynamics that cannot be scored in subsuming city and regency as area of mega region. In brief, Northern Coast of West Java Mega region can be understood from this tabulation:

**Table 4 Mega Region Selection Background**

| Mega Region Area               | Economy                          | Infrastructure                                      | Socio Politic                                           |
|--------------------------------|----------------------------------|-----------------------------------------------------|--------------------------------------------------------|
| Jakarta Metropolitan Area       | Economic centre in Indonesia and also gate for global economy. | Soekarno Hatta airport (main airport in Indonesia)  | Headquarter of regional politic: Asean.                |
|                                | Centre of global capital accumulation in Indonesia. | Halim Perdanakusuma airport                        | A megacity according to National government            |
|                                | National government centre       | Tanjung Priok Seaport                               | Headquarters of International Bank, Finance Institution, and Companies |
|                                | •                                 | Pantura Highway                                     | •                                                     |
|                                | •                                 | Railway                                             | •                                                     |
|                                | •                                 | New Tanjung Priok New Seaport                        | •                                                     |
| Bandung Metropolitan Area       | Economic centre in West Java.    | • Husein Sastranegara Airport                        | A metropolitan according to National government        |
|                                | •                                 | Pantura Highway                                     | •                                                     |
|                                | •                                 | Railway                                             | •                                                     |
|                                | •                                 | High Speed Train                                    | •                                                     |
|                                | •                                 | Cipularang Toll Road                                 | •                                                     |
| Cirebon Metropolitan Area       | Emerging economic centre in West Java | • Cirebon Seaport                                    | A metropolitan according to West Java Metropolitans.   |
|                                | •                                 | Pantura Highway                                     | •                                                     |
|                                | •                                 | Majalengka Airport and Aero City                    | •                                                     |
|                                | •                                 | Railway                                             | •                                                     |
| Banten (Cilegon City, Serang City, Serang Regency) | International and National industrial hub in Indonesia. Manufacture, chemical, and metal industry. | Pantura Highway | •                                                     |
|                                | •                                 | Railway                                             | •                                                     |
|                                | •                                 | Merak Seaport                                       | •                                                     |
|                                | •                                 | Industrial Seaports                                  | •                                                     |
Mega Region Area | Economy | Infrastructure | Socio Politic
---|---|---|---
West Java (Subang Regency, Karawang Regency, and Purwakarta Regency (Bodebekkarpur)) | international labour and investment. • SEZ Tanjung Lesung | • Airports: Budiarto, and Tanjung Lesung | Karawang and Purwakarta are part of Bodebekkarpur Metropolitan according to West Java Metropolitans.

From qualitative and quantitative consideration, we conclude the area of mega region as illustrate by Figure 7. The mega region in Indonesia is illustrated below, named West Java North Coast. It is situated in the area where Jakarta as the major forces in creating mega region. This mega region as illustrated below is having physical continuity; and also share infrastructure, socio, economical, and political connectivity. The main influences for connectivity inside this mega region are the Pantura transportation networks, that open relations inter mega region cities and also relation abroad.

Figure 6. West Java North Coast Megaregion

5. Conclusions
This research is intended to explore latest dynamics in urbanization form across Java Island. This paper initiates to delineate the megaregion and also characterizing megaregion in Indonesia, specifically in the Java Island. In case of Java Island, demography, economy, infrastructure, and socio–politic analysis can lead us megaproject delineation in West Java North Coast: Jakarta Metropolitan Area, Bandung Metropolitan Area, Cirebon Metropolitan Area, Banten (Cilegon City, Serang City, and Serang Regency,). West Java (Subang Regency, Karawang Regency, and Purwakarta Regency).

This area is predicted to be the most salient economic growth center in Indonesia where majority of population and economic activities took place. The advancement of Northern Coast of West Java mega region will continue on to triumph through the ambitious, appreciable, capital intensive, pervasive future development projects in this region. When we discuss about mega region, the scale of project and development is escalating from metropolitan level, we expect more of mega urban and mega project development. Notably, through: Karawang Airport; Jakarta- Bandung Fast Train; Kertajati Airport and Aerocity; and Patimban Seaport.

As the author mentioned in the introduction before, this paper is initial research to identify urbanization in the coastal area in Indonesia. Mega region in nature is has the network and importance to global social, economic, and political affairs. Realizing the important of this urbanization form in
our coastal area, therefore, the further analysis can be done after we have mega region delineation, including the research identifying magnitude on social, economy, and political importance; the environmental impact from this coastal mega region development; governing mega region; and more

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