revisited composition
Implementation Strategies for Mobility Oriented Development in Bandung, Indonesia

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abstract

Urban sprawl, as one of the implication of city growth, is one of the commonly renowned urban phenomena which have drawn a lot interests, discourses, and criticisms. It is often addressed as a problem because of its tendency in deriving certain impacts such as massive land use change, low quality housing complexes, and severe traffic jam (Devas and Rakodi, 1993). For almost the same reasons, urban sprawl is usually perceived as an unsustainable model for urban development (Bruegmann, 2005). Numbers of reactions have been raised against the sprawl especially in the attempt to search more sustainable urban form, including the discourse of ‘compact city’ and polycentric urban model.

Although numbers of researches around polycentricity and its implementation strategy have been done extensively, further translation of these strategy into a specific urban design remains to rely on the designer’s interpretation. Some of the studies have incorporated, even emphasized on, the imporance of governance and socio-cultural aspect in polycentric urban model implementation. However, futher actions on strategy implementation remained highly dependent to the context.

A context chosen for this project is Bandung, Indonesia, the second largest cities in West Java, Indonesia. Bandung
has been acknowledged as Jakarta's backyard and experiencing quite massive urbanization since 1960's. The city has grown into one big agglomeration of 17,000 hectares area where almost 3 million people live in. Regretfully, the urban development in Bandung has outpaced government's efforts in providing adequate infrastructure to connect the new (housing) complexes in the peripheries to the existing urban core, or providing new urban cores. The development trend has resulting certain tension between the city centre and the peripheral areas and caused severe daily traffic jam.

This project will focus on the transformation strategies, from monocentric to polycentric urban model, by promoting mobility oriented development and urban regeneration in the attempt to encourage more sustainable development. The strategies take both tangible and intangible feature of the context into account, which are included but not limited to the nature, built environment, land price, and the stakeholders on site. In addition, I would like to pursue the operability feature of the strategies. In order to do so, I am going to take the stakeholders – the people – into account and rather to delve more into the implementation strategies than merely providing urban design guidelines.

The expected outcomes of this project are a structure vision in city scale supported by a key project on local neighborhood scale exemplifying the implementation strategies.

KEYWORDS
polycentric urban model, mobility oriented development, urban redevelopment, Bandung, Indonesia
introduction
"If development is not acceptable to those who are affected by it, it is unlikely to be sustainable."

(Jenks, Williams & Burton, 1996, pp.299)
MOTIVATION OF THE STUDY

I have been born and raised in Bandung, Indonesia and witnessed how the city has transformed and retransformed over and again through the time. Regardless the fact that urban transformation in Bandung was mainly done without massive make-over and has influenced the economic growth of the city, I do not think it is actually improving the liveability of the city.

In my personal opinion, Bandung is dragging itself towards urban catastrophe. One of the most apparent symptoms is the worsening of severe traffic jam in and to the city. There has been significant increase in the number of vehicles operating on the streets in the past 20 years. In the contrary, the number of public transport user, is noticeably decreasing.

Most of the drivers of urban development in major cities in Indonesia are the real estate development. Despite the government’s effort in controlling and channelling the urban development, they are outpaced by the developers. This condition has resulted splintering development which later on led to urban sprawl. The condition is applied in
most of the cities in Indonesia, and has become more severe in big cities and metropolitans such as Jakarta.

The most apparent problem in Bandung is severe traffic congestion, especially during peak hours. In my opinion, this situation might be resolved by reforming the existing public transportation. Although this opinion is also upheld by numbers of researchers and practitioners in Bandung, the rectification seems to remain as an idea. Thus, out of curiosity, I would like to take this opportunity to study the possibility of address this matter.

PROBLEM ANALYSIS

Problem Field
As of today, most of the world’s population is living in urban areas. Large amount of people are either migrating or commuting to the city every day. In developing countries like China and India, for example, the urbanization rate could reach the number of 30 – 50%. To cope with this migration wave, cities need to provide more living space. These spaces are usually provided by promoting new development both within the existing built environment and in the vacant spaces around urban peripheries. The latter type of development is often recognized by the term of urban sprawl.

Although there is no single definition of ‘sprawl’, it is often defined as “low-density, scattered, urban development without systematic large-scale or regional public land-use planning” (Bruegmann, 2005, p. 18). In developing countries, urban population is growing more rapidly and
often, if not always, put a lot of pressure to infrastructure and increasing demand on services. This rapid development has outpaced urban management efforts, causing both physical and socio-economic consequences (Devas and Rakodi, 1993).

Urban sprawl is one of the commonly renowned urban phenomena which have drawn a lot interests, discourses, and criticisms. It is often addressed as a problem because of its tendency in deriving certain impacts such as massive land use change, low quality housing complexes, and severe traffic jam. For almost the same reasons, urban sprawl is usually perceived as an unsustainable model for urban development. Numbers of reactions have been raised against the sprawl especially in the attempt to search more sustainable urban form, including the discourse of compact cities and polycentric urban model.

“Defining ‘sprawl’ is a little bit like defining pornography, you know it when you see it. There is no consensus on any one single definition of ‘sprawl’.”

(Dunham-Jones in Hustwit, 2011)

Diagram of interrelation between urban sprawl phenomenon and its effects to urban areas (illustration by author, icons see reference)
**Problem Statement**

Urban sprawl in many cities in the world tends to trigger severe urban mobility challenges because it is often not supported by adequate infrastructure. In addition, the monocentric characteristic of the city worsen the fact that urban sprawl has encouraged massive commuting activities from peripheral areas to the city centre. In the case of high dependency to privately owned vehicles, as posed in both developed and developing countries in the world, traffic congestion have become inevitable vernacular reality.

**CONTEXT OF THE STUDY: BANDUNG, INDONESIA**

**Location, Role and Position in Regional Scale**

Bandung is the capital city of West Java province, Indonesia. It is located approximately 150 km south east Jakarta. Bandung is inhabited by nearly 3 million people residing within 17,000 Ha areas.

*below: Position of Bandung City towards the nearest urban agglomerations (source: Google Maps, 2015)*
Bandung has become Jakarta’s backyard since the Dutch occupation era and later on emerged to be one of the most prominent conurbations in Indonesia. Bandung was granted its gemeente status on 1906 and reached its golden age on, 1920 and become so well-known both in Indonesia and in the Netherlands, especially among the VOC (Vereenigde Oostindische Compagnie, Dutch's chamber of commerce for East-Indie) officers. After the independence of Republic of Indonesia in 1945, Bandung has been struggling and surviving several revolts which cause numbers of urban transformations, especially on the southern part of the city and along Cikapundung River. On 1980’s, the municipality has expanded the city’s boundary mostly to the east, merging the city to Ujung Berung district. The area remained the current boundary of Municipality of Bandung City up until today.

Shown on the opposite page is the illustration of Bandung City’s position towards other neighbouring major cities. Jakarta, Bandung, and Cirebon are three of the main urban agglomeration in West Java and DKI Jakarta provinces with the indication of the distance to one another.

Located on 700 m above sea level, Bandung is very notable for its comfortable climate with breezy fresh air and cool temperature. Most of the people who are coming to Bandung are longing for its refreshing tranquillity. Recently claiming itself as a creative and smart city, Bandung has attracted a lot more people to the city. Its attractiveness has been amplifying since the establishment of several new infrastructures within the last decade, especially Cipularang Highway and Pasopati Flyover established in 2005.
From the economical point of view, Bandung is one of the main contributors in West Java’s Gross Domestic Regional Product (GDRP), with the GDRP of 130 trillion rupiahs (or approximately 7 billion Euros) in 2013 (Central Bureau of Statistic for Bandung City, 2014). Also highlighted in the report is the main economy sector: commercial, trading, hotel and restaurant sector (42.4 %), industry and manufacture sector (13.3 %) and services sector (8.8 %).
Images on the following page portray the vibrant images of Bandung City as well as the location of economy centres (commercial and industrial areas) in the city.

**Challenges in Urban Development in Bandung City, Indonesia**

The urban development trend in Bandung has been driven mainly by demands created by the real estate developers through land speculation, especially on the peripheral areas of the city. The developer has been taking advantage from low land price of the areas outside the city centre. By doing so, they are able to acquire the most profit from the market price. Their approach has set the development trend in at least past 20 years which leads to a massive unstructured urban sprawl, mainly to the east and southeast part of the city. Shown on the following page is the illustration of Bandung City’s urban development and city border expansion as investigated by Siregar (1990).

Regrettably, this development has outpaced government’s effort in providing adequate infrastructure in order to connect the new (housing) complexes to the existing urban core, or in providing a new urban core nearby instead. The more new housing complexes established, the further away they are from the city centre, the harder it is to reach for city centre. This phenomenon has established certain tension between the newly developed area and the existing centre, in terms of proximity to facilities and services, which then caused an increase in private vehicle use on the street to compensate accessibility, whether it is a car or a motorbike.
The growth of vehicle numbers in Bandung reached 10% every year (Polwiltabes Kota Bandung, 2006). The significant increase in the numbers of cars and motorbikes in Bandung within the past 20 years has triggered more mobility problems in the old city centre such as traffic jam and lack of parking space. Most of the central areas
of Bandung were planned as a garden city according to Thomas Karsten’s ‘Uitbreidingsplan Bandung-Noord’ in 1920’s (Siregar, 1990). Despite the fact that the garden city part of Bandung is such a nice place to live – ample front yard, spacious nice house, shaded streets, and cosy ambience – the nature of garden city’s urban structure is somewhat more organic, with narrow and winding streets. The urban structure has been one of the challenges in coping with the massive load of vehicles and the need of parking spaces. In short, the urban structure of Bandung’s old city centre has become obsolete and incompatible to the current demand.

The old city centre has been trying to cope and catch up with these advancements by widening some streets and compromising property lines. However, the growth of vehicle numbers has outpaced the mobility infrastructure by more than 400% in 2006 (Polwiltabes Kota Bandung, 2006). The efforts to cope with the development trends, which also include the attempts to provide more space for economic activities and services in the old city centre, have cost major physical changes in the city. Within the past 10 years, there are more heritage buildings to be demolished and altered into a new function than being revitalized. The old city centre of Bandung is slowly losing its assets, character, and charm.

The municipality has been trying to transfer some of the city centre’s burdens by decentralizing several education facilities, offices, and commercial facilities and induce new sub-centres in the suburban area. However, they seemed to have less impact on de-magnetizing the existing city
centre. The municipality’s plan to develop a new massive sub-centre on the south-eastern part of the city (Gede Bage) has encountered a tremendous setback ever since the land speculation takes control. The land price in Gede Bage has increased immensely since it was announced to be developed up until today, when the development never took place.

below:
Images portraying the key issues and challenges in future urban development of Bandung City (source: multiple; see reference)

1. Traffic jam in Pasar Baru
2. Uncontrolled development & urban sprawl
3. Informal settlements
4. Development in historical area
5. Proposal for new development from real estate developer
6. Light flooding due to inadequate drainage system
7. Annual flooding in Baleendah, Regency of Bandung
Nowadays, there are more developments happening in the city centre, ranging from minor make-over to accommodate the changes of building function to numerous constructions for new apartment towers and hotels. Despite its incompatibility in coping with rapid development and numbers of urban transformations, the city centre is still the place to be, where people invest most of their assets. Meanwhile, plenty of development potentials in the suburban area are remained disregarded.

‘Rencana Tata Ruang Wilayah Kota Bandung’ – the spatial plan for Bandung City area – seemed to have minimum impact on guiding the development of the city. Although the plan is translated to several more detailed planning instruments such as zoning regulation and urban design guidelines, the complicated bureaucracy and the inability of the government’s planners to foresee future development trends are among the main challenges in setting the boundaries for development.

**RESEARCH QUESTIONS**

Analyses on the phenomena and the pre-condition of the context have derived several research questions. For this particular project, a main research question is posited, supported by several sub-research questions which will lead the design and research through iteration processes.

**Main Research Question**

How can redefinition of centrality in Bandung City contribute to alleviate the physical development pressure around the city centre?
Sub Research Questions

1. What makes urban centrality in general?
   *This question will guide the research about urban centre and urban centrality. Thorough comprehension on urban centrality is expected to be gained by answering this question.*

2. What are the drivers of development in Bandung City through the time?
   *By knowing the drivers of development, it is possible to read the trends through the time. This question will be helpful in determining who the influential actors are to the urban development in Bandung City.*

3. How new physical structures (in this case, polycentric urban model) help to alleviate the development pressure?
   *This particular query will be answered through a design (and planning strategy), which will be the final outcome of this project.*

OBJECTIVES OF THE PROJECT

This project will focus on the transformation strategies, from monocentric to polycentric urban model, by promoting mobility oriented development and urban regeneration in the attempt to encourage more sustainable development. The strategies take both tangible and intangible feature of the context into account, which are included but not limited to the nature, built environment, land price, and the stakeholders on site. In addition, I would like to pursue the operability feature of the strategies so as to propose applicable and reasonable options of resolution.
theoretical framework
Diagram of theoretical framework used in this project (illustration by author, icons see reference)
The theoretical framework for this project is built upon the notion of ‘compact city’ and ‘polycentricity’, presented in a review paper on both concepts. The idea is to have a more in-depth understanding on both concepts as well as their correlation to one another and possible implementation strategies derived from the comprehension. This paper was developed in five chapters, including the introductory part, brief description on ‘compact city’ discourse, an understanding on ‘polycentricity’, critical analysis on several case studies, and a concluding remark on the correlation between both concepts.

Presented on the facing page is the logic behind this theoretical framework in its relation to both methodology and the whole research and design processes. First bubbles are representing the design process, followed by leading themes (and sub-themes, if applicable) in each phase. Below the book icons are the supporting literature on each theme (or sub-theme). On the design phase, however, the theoretical framework will be built upon case studies, precedent, and synthesis of previously done analyses.
Shown on the diagram below is the summary of both ‘compact city’ concept and polycentric urban model as reviewed in the theory paper. The full paper is indexed under the Appendix B of this report.

above:
Summary of the basic understanding from reviewing ‘compact city’ and ‘polycentricity’ concepts
methodology
& outcome
RESEARCH APPROACH & METHODS

This whole graduation project is conducted through a research by design methodology. Various degrees of both research and design is performed throughout numbers of methods. In addition, I also try to take an ‘anthropocentric’ perspective in developing this project; which means that in this particular project, people as the stakeholders are taken into account into the outcome.

The research by design process for this project, by far, is done throughout several analyses which then led to the central questions as guiding themes for further iteration in the analyses. The analytical processes are including:
1. problem analysis,
2. Dutch Layered Approach analysis on the existing,
3. literature review, and
4. critical analysis on case studies.

Besides, there are also several other exercises performed to support the analytical processes, such as:
1. brainstorming and SWOT analysis with fellow students from Bandung, Indonesia in Delft,
2. small survey through social media (Facebook, Twitter,
above:
Working timeframe and methodology
(illustration by author, icons see reference)
Whatsapp Messaging) on how people perceive Bandung, Indonesia in general as well as the perceived current and foreseen future challenges in Bandung.

3. analysis on traffic congestion in Bandung City through WAZE mobile apps / real-time map on the website,

4. stakeholders interest analysis by mapping the current projects in Bandung, which is done (or initiated) by several different actors, and

5. pitch presentation in ‘Pecha Kucha’ style with other fellow students from Urbanism and Landscape Architecture graduation lab.

All of the researches and exercises were done based on various kind of data which was collected through different channels. The data involved in this project are mainly in form of:

1. document data (statistical data, reports, newspaper articles, research projects, master thesis, etc),

2. surveys (in this phase, mostly qualitative),

3. interviews and discussion with experts and actors,

4. observation and self-documentation, and

5. workshop result.

In order to support the desk analyses done in the university, a site visit is also to be done during the ideation process. The site visit is meant to gather actual information, especially those unavailable or inaccessible through the internet. It is also important to have a hands-on interaction with the actual stakeholders in order to propose an operable strategy. Several research and design actions to be done during the site visit are including interviews, focus group discussion with the stakeholders and site observation.
The whole research and design processes for this graduation project is expected to be done within 42 weeks (including presentation weeks), starting on the first week of September 2015. Time-table below is showing the proposed time-working schedule in developing this project. The presentation weeks are as highlighted.

**EXPECTED OUTCOME & DESIGN GOAL**

The intended outcome of this project consists of interventions in two different scale, i.e. city scale and neighbourhood / district scale. Both products will be complementary and be used as evaluation tool to one another. More detailed list of intended outcome of this project is as followings.
1. Strategy for redistribution of development pressure from the city centre in city scale
   - Vision for Bandung City 2040
   - Spatial development framework
   - Expected impact map
   - Stakeholder map
   - Phasing plan

2. Implementation of the strategy in smaller scale
   - Urban design guidelines
   - Map of possible interventions
   - Implementation strategies
   - Phasing plan
   - Visualization

**SCIENTIFIC, SOCIETAL & ETHICAL RELEVANCE**

**Scientific Relevance**
City is a multifaceted entity where every single aspect is very much interrelated to another. Thus, I strongly believe that in planning and urbanism practice a thorough analysis as well as comprehensive understanding on the existing system (governance, economic, network, environment, etc.) will help to unravel the essential challenges for the city.

Taking this point of view into consideration, I also believe that Complex Cities research group will be suitable to develop my project with. I would like to delve into the governance and operability aspect of my project, supported by multi-layered and multi-scalar approach for the analyses; two things which are very much pursued in Complex Cities research group.
I see an opportunity to develop a project which is balancing research and design aspects. Moreover, this project could contribute in the governance as part of spatial planning strategy, especially within the context of developing countries. It would also provide new knowledge on the implementation of mobility oriented development in Bandung City, Indonesia both to the university and the city itself.

**Societal Relevance**
I would like to take this project as an opportunity to tackle actual problems in real life. The issues chosen for the project’s focus is very much based on the day-to-day challenges found in Bandung, making it highly relevant to the socio-cultural need of the city. Through this project, I would like to explore the possibilities to provide alternatives to urban development of the city as a part of public education attempt. The publication will add up information and new knowledge, especially for the society in general, offering another possible vision for the city in the future.

**Ethical Relevance**
Aside from the fact that the project is highly driven by my personal motivation, I strongly believe that the urban development phenomena addressed in this project is publicly recognized. There are no personal interest, in term of profit, is aimed by developing this project. On the other hand, I see this project as an opportunity to express my contribution as part of civic society in Bandung City, both as a native inhabitant as well as a qualified professional who is educated and working within the associated field.
"Bandung for me is beyond geographical matter; it engages certain emotions."

(Pidi Baiq, 2013)
INITIAL RESEARCH & ANALYSES

As mentioned previously on the methodology part, several exercises were also conducted along with the analytical processes in this project. These exercises were used as an analytical tool, mainly in problem analysis phase, which was very helpful in determining and clarifying the problems from other's point of view. Detailed description and complete result of the exercises are indexed under Appendix A at the end of this report.

DEVELOPMENT TREND IN BANDUNG CITY

The development trend in Bandung City is closely related to its history. The city gained its city right (gemeenteschap) from VOC government on 1906. By that time, Bandung barely had 40,000 inhabitants within the city. However, it has been recognized as the weekend-getaway destination especially for VOC’s higher rank officers residing in Batavia (Jakarta) back in the dawn of 20th century. In its early development, Bandung rest its economy mostly on agriculture, especially tea plantation (Kunto, 1984).
In 1911, the city was prepared to replace Batavia as the capital city of Dutch East-Indie. Numbers of important buildings, including military clusters and government buildings, were established in Bandung (Siregar, 1990). The city reached its golden era on 1920’s, with the area around city centre (Alun-Alun, Groote Postweg, and Braga Street) as its urban core. Later on 1923, a spatial expansion plan to the northern part of the city was proposed. The plan is commonly renowned as ‘Uitbreidingsplan Bandoeng-Noord’, consists of the idea of providing more living space around Dago Street. The plan was, however, only partially established due to world-wide political turmoil in 1940’s (Siregar, 1990).

Republic of Indonesia claimed its independence on 1945, followed by several revolts between 1946 and 1950. On one of the revolts in 1946, almost half of the city – the southern part of the railway – was set on fire. On 1950’s, DI/TII revolts in neighbouring villages triggered massive migration to Bandung City. Within this era, people from neighbouring villages and regencies were moving to Bandung to seek for the safe place. They started to squatter and reside on unoccupied piece of land, such as those along Cikapundung River (Siregar, 1990).

Bandung City’s economic driver started to shift towards industries from 1960’s on. Numbers of manufacture were established on the southern part of the city. This trend was followed by a construction boom on 1971, when the government started to introduce large scale housing project commonly known as ‘Perumnas’ (Siregar, 1990). Among many others, the milestone of government’s housing project in Bandung is often related to social
housing in Sarijadi (1977) and housing complex in Sukaluyu. The real estate projects by private sectors were following this trend on 1980’s with the housing projects on suburban area, slightly outside the city border. On 1987, the municipality of Bandung expanded the city border to the east, merging Bandung City with adjacent Ujung Berung region (Siregar, 1990).

Bandung survived the national economic crisis and political turmoil in 1998 by nurturing micro economy. During the recovery time, there were numbers of local clothing distribution store, small restaurants, and other home industries emerging in the city.

Another game changer in the development of Bandung City is Cipularang Highway and Pasupati Flyover, which connect the existing Padalarang – Cileunyi highway to the heart of Bandung. Both have shortened the travel time from Bandung to Jakarta (and vice versa) in an extreme way; at least when it was firstly opened 10 years ago.

The development in Bandung City is almost always initiated by either government or the private sector (in this case, real estate developers). Not until the year of 2008 has the initiative ever comes from the community. However, the emergence of creative movement introduced by British Council in Bandung City from 2006 on has encouraged younger generation of Bandung City to take action both in expressing their identity as well as in influencing urban development in Bandung City. Currently, the mayor of Bandung City is performing numbers of revitalization and governance restructuring to cope with the future development demand.
(this diagram is redrawn and reinterpreted from Siregar, 1990)
Shown on the diagram in this page is the population growth in Bandung City through the years. The orange line on the graph represents total area of the city. It is clearly indicated how the city grew. The dark blue line represents total built area, sourced to Siregar’s dissertation on Bandung City (1990). The key events, which considered being highly influential to the urban development in Bandung City, are also indicated below the graph.
Layers explored on the analyses through DLA
DUTCH LAYER APPROACH (DLA)

The Dutch Layer Approach (DLA) is used as one of the analytical tools in this project due to its robustness in unravelling the complexity of the city by presenting each relevant issue in different layer. There are five main layers analyzed in this project, which are the natural condition, governance, urban network, urban centre, and settlement. These layers are important because they represent the main features of the context, in this case Bandung City, Indonesia. Illustration and other supporting images are presented after the description.

First Nature

Analyzed in this layer is the natural condition of the city, which consists of topography, water bodies, and green...
area around the city. Bandung is located on a plateau, with the lowest point around 670 meters above sea level on the south and the highest point of 1,100 meter above sea level on the north-most part of the city. It is surrounded by mountains, placing the greater metropolitan area in a basin. Cikapundung River, which flows from north to south, is dividing the city into two and has become one of the most notable natural features in the city.

During VOC occupation in Indonesia, the northern part of Bandung is resolved as preserved area, with a natural reserve located adjacent to the northern city border. However, the current development has affected this area. Some of the hills are now filled with luxurious housing complexes. The green areas adjacent to Cikapundung River started to transform into (informal) settlement complexes after 1960’s, when the first wave of migration struck Bandung.

**Governance**

As mentioned earlier on the problem analysis part, Bandung City is the capital city of West Java Province. Several provincial offices, including the Governor’s office, are located in the city itself. Bandung City is divided into 30 districts (Kecamatan), which later on divided into 153 sub-districts (Kelurahan). However, on the planning instruments (such as Spatial Planning Documents for City Scale (RTRW Kota)), the city is sub-divided into 8 main sub urban-regions. The sub urban-regions are made up of several districts (Kecamatan).

As any other cities in Indonesia, the governance structure in Bandung is actually divided into three main categories,
i.e. private sector, public sector (provincial, municipal, district, sub-district), and civic society (community forum, community empowerment service, borough, neighbourhood, youth & community forum, and women empowerment services).

Although the division was meant to decentralise the power and decision making processes (as well as the fact that the smaller unit should act as a supporting entity to a larger unit), the role and function of each units are often overlapping and unsynchronized.

**Urban Network**

The urban network in Bandung City consists of two main systems, i.e. the inter-urban network which connects Bandung to other adjacent cities and regencies, such as Cimahi, Bandung Barat Regency, Bandung Regency, Jatinangor, and Jakarta; and the intra-urban network which mainly connects areas within the city border.
Bandung City is reachable from its neighbouring regions through the highways (with total of six exits) or the railway. The inter-urban public transport consists of regional train, inter-city bus, and the ‘travel’ shuttle bus. There are four train stations in Bandung City; all of them are currently in use for daily commuting. The two bus terminals (Leuwi Panjang and Cicaheum) are also fully functioned as the entry points to the city.
After the establishment of Cipularang Highway and Pasupati Flyover, there was an increasing demand on shuttle transportation from Bandung to Jakarta, and vice versa. The demand was mainly coming from the university students (who were originally from Jakarta but was studying in Bandung) as well as the businessmen (whose office are in Bandung but demanded to travel to Jakarta for meetings, or vice versa). Numbers of private transportation companies saw it as a business opportunity and started Bandung – Jakarta shuttle services for an affordable price. The shuttle service is considerably convenient because of its regular schedule, lack of delay, affordable, and reliable services.

On a day-to-day basis within the city, Bandung is served by public transport network consists of ‘angkot’ or the mini-van, and the buses. ‘Angkot’ is the most popular public transport in Bandung City. It comes in a form of mini-van with a capacity of 12 – 15 people. There are 5,521 units of ‘angkot’ serving 38 routes in Bandung City (Aminuddin, 2008). ‘Angkot’ is usually privately owned or leased by the owner to the driver. Although there are association for ‘angkot’ drivers, such as Kobanter Baru, Kobutri, and Kopamas, the drivers are self-employed. Their earnings depend on numbers of passenger they have per day. However, these driver associations have very strong position in terms of negotiation with local government. They are highly dominant and resistant, especially against the development of urban transportation infrastructure which threaten their being (Aminuddin, 2008). According to Aminuddin (2008), this attitude leads to ‘low-cost low-quality’ equilibrium when it comes to public transportation matter in Bandung City.
Aside from ‘angkot’, buses are also operating in Bandung. There are 214 buses serving 11 routes. The capacity of each bus varies from 40 – 62 seated passengers. The current municipality program to promote public transport includes free bus ride for students with uniform every Monday and Thursday.

There are some areas, mostly housing clusters, which are not serviced by any public transport. People living in these areas are usually either travelling with privately owned vehicles or using ‘ojeg’ as a feeder to get to the nearest public transport services. ‘Ojeg’ is a public transport with motorbike as the transportation mode. The concept is quite similar with taxi. However, despite the service price which usually is quite expensive, ‘ojeg’ service is quite robust and reliable.

**Urban Centre**

According to Polydorides (1983), an urban core is “… that particular area of the city in which urban activities and flows of people, vehicles, goods, and messages are most concentrated” (Polydorides, 1983, p. 12).

On the following paragraphs he also indicated that urban centre is usually functioned as the central focal point of the city where the land values, density, employment opportunities are the highest. It is the place where most activities are located and transport network is focused (Polydorides, 1983).

This particular layer shows the location of working clusters (offices and industries), commercial area (including hotels, cafe, and restaurants), as well as higher education and
research institutions. From the analysis it is concluded that most of these functions are located in the old-town of Bandung. Although there are clusters of offices and industries in the southern and eastern part of the city, most of the working clusters are situated in the heart of the city. Commercial function consists of traditional market, shopping malls, shopping street, and horeca. A strong commercial corridor is visible on the north-east side of the city and on north-south direction starting in the city centre.

The location of these functions has confirmed the monocentricity nature of Bandung City, where most of the economic activities happen in the city centre.

**Settlement**

On the contrary to the location of economic urban functions, housing and settlement clusters in Bandung City is dispersed to the peripheral areas. New housing complexes are situated further away from the city centre. The map indicated that the development on the eastern and southern part of Bandung is mainly low density and that there might be some reserved lands owned by private sectors in both areas. Numbers of vertical housing are also found in Bandung. Most of them are currently established, in form of mid-high class apartment. However, there are also some vertical housing dedicated to people with mid-low economy level; one of them is the oldest vertical social housing in Bandung built in 1970's.
above:

Natural condition of the city, shown in map are topography, rivers, green /unbuilt area in and around Bandung City.
above:
Administrative border and location of each administration service offices in Bandung City
above:
The city divided into Sub-Regions, which is usually used as a planning unit
above: Inter-urban network, showing the main network infrastructure used in (daily) inter-city commuting (highway, railway, bus terminal, shuttle bus services)
above:
Intra-urban network, showing the roads, public transport terminals, corridors with the most public transport service, and areas with the least access to public transport
above:
Location of working clusters as one of the key determinant in urban centre
above:
Location of commercial areas (market, shopping centres, shopping street) as one of the elements in urban centre
above:
Location of hotels, restaurants, and cafe as one of the elements in commercial urban centre
above:
Estimated location of existing housing clusters, including vertical housing
above:
Indication of population concentration in each sub-district in Bandung City
Source: West Java Provincial Planning Board’s Survey on Village Potentials (Survey Potensi Desa Bappeda Prov. Jawa Barat), 2008
By combining one layer with another, or the five layers altogether, there are several conclusions to be drawn from this analysis. Shown below are the description and map illustrating the conclusion.

1. The fact that most of the urban facilities and services are located in the city centre confirms the monocentricity nature of Bandung City.

2. Although most of the working-clusters are located in the city centre and around the area which is well-served by public transport, most of the industrial areas are located ‘off-grid’. Furthermore, there is also an indication on linear development of offices along Soekarno-Hatta corridor. Most probably, people
working in these offices are using private vehicles or utilizing the two public transport routes passing through this corridor.

3. In its relation to mobility infrastructure, the commercial facilities are divided into two groups. The first one is located around Central Station, with high accessibility by public transport. The second cluster is situated along and around Dago Street and Cihampelas Street. Although this cluster are also well-served by the public transport, the presence of Bandung – Jakarta shuttle services adjacent to the commercial areas are expected to have reciprocal influence to each other.
4. Most of the housing clusters are not fully connected to the public transport service. ‘Ojeg’ (and probably rickshaw) has become one of the key transportation modes in connecting the housing clusters to the public transport hubs.

5. The city centre consists of mixed land use, which may vary from private function (housing) to public functions (offices, shops, etc.). On the other hand, housing clusters surrounding the city centre seems to be more mono-functional. The working cluster along Soekarno-Hatta avenue seems to be a buffer zone between the existing housing complexes and the new development on the southern part of the avenue.
POTENTIAL LOCATION FOR FUTURE DEVELOPMENT

Aside from the analyses on existing condition, literature review on urban development potentials in Bandung City (and Bandung Metropolitan Area) was also conducted. Among the studies are critical analysis on the possibility of technology-oriented development cored in Bandung by Bimarsono (2009) and study on Transit-Oriented-Development (TOD) potential and opportunity in Bandung Metropolitan Area by Widyahari and Indradjati (2015).

Bimarsono (2009) posited that despite the presence of existing hi-tech research-based industries in Bandung City, the key driver in economic development in Bandung City still relies on textile industry and services.

Nonetheless, Widyahari and Indradjati (2015) posited that there are strong potentials for TOD in Bandung City, especially in metropolitan scale. Widyahari and Indradjati examined the existing transit mode and transit frequency combined with mixed of land-use, building density, and retail characteristics in four different urban centres, i.e. regional centre, urban centre, sub-urban centre, and transit-town centre. The study shows that most of the transit locations are situated within Bandung City area and all of the 14 potential locations are within Bandung City area. Although this research doesn’t take the existing socio-cultural condition into account, it has been a sound foundation to base a planning strategy upon. Illustrated on the map on facing page is the location of the potential TOD points according to Widyahari and Indradjati.
above:
Potential location for TOD in Bandung Metropolitan Area, specifically in Bandung City
"Decentralization is a must for sustainable development on the local level."

(Keiner, et. al., 2006, pp. 232)
PROPOSED STRUCTURE FOR NEW CENTRALITIES

The initial ideas proposed in this project are mainly constructed upon the layered analysis done earlier. There are four strategies proposed to address these issues described as following.

1. Promote centralities along Soekarno-Hatta Avenue which will perform as ‘arrival points’ from the neighboring areas on the southern part of Bandung City.
   These centralities are including the existing inter-city terminal, Leuwi Panjang, and the existing cargo station,

right: Proposed new centralities along Soekarno-Hatta Avenue to serve the housing cluster on the southern part of Bandung
Gede Bage. Two other proposed new centres are also part of the existing urban centre constellations, which are Elang / Hussein Sastranegara located adjacent to the airport, and Buah Batu. These points are crucial to provide services especially to the housing clusters located on the southern side of the avenue. Since there are no continuous public transport networks working along this corridor, improvement in connectivity and accessibility by providing public transport facility is also part of this strategy. Furthermore, feeder transport system from the housing clusters to the centres also play important role for the connectivity matter.

2. Promoting new form of urban centrality in the existing centres especially those located in the eastern part of the city
Role and functions of these existing centralities need to be redefined according to the larger polycentric framework. Urban redevelopment projects might be the most significant part of the strategy in order to

*left:*
Potential existing centralities to be redeveloped & reconnected to the new urban structure
revaluate the attractiveness of these centres both in terms of economic point of view and the physical built environment quality.

3. Rethinking the role of existing urban centre
This particular strategy is applied to existing urban centre, which located in the heritage district of the city. The idea is to demote the attractiveness of this existing centre and eliminate the centre into two main centres: Alun-Alun in the heart of the old city centre, and Dago which will serve the most of northern part of the city. It is also important to look at another centre in neighbouring city: Cimahi. These centres must be somewhat connected and developed according to the same framework in order to be able to perform better in regional scale. Should it be required, new centrality on the north-most part of the city, around Ledeng, could also be developed especially to function as the connection from Bandung City to West Bandung Regency and vice versa.

*right:* Rethinking of the existing centralities, especially in terms of role and function will benefit the new polycentric structure by providing variety of centrality
4. Optimizing the railway function for daily commuting system
Although it is currently used for daily commuting, the railway has more potential to be developed. There are at least two inactive existing stations which are currently not in use. Reactivation of these stations might be beneficial for the city because it adds up the service coverage of public transport in Bandung City. Furthermore, with new stations establishment along this present railway, it is possible to improve the connectivity of the south-eastern part of the city, such as Gede Bage.

These strategies need to be combined with the existing transportation infrastructure, such as busses and ‘angkot’ (mini-van) to provide more robust and operable response for implementation.
FURTHER RESEARCH

In order to be able to determine more detailed possible strategies to promote polycentricity in Bandung City, despite the analyses that have been done, further research is essentially important. As this project focus more on the urban mobility, it is highly relevant to take a closer look on case studies such as Randstad Metropolitan Area (the Netherlands), Hong Kong (Hong Kong), Curitiba (Brazil), and Portland (USA). Other than that, basic understanding on Transit Oriented Development (TOD) is also important for more comprehensive proposal on implementation strategy. In addition, a site visit will be extremely helpful to comprehend both social processes and the existing built environment quality.
references
LITERATURE


**ICONS**


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**IMAGES**


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Siregar, 1990.

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MOTION PICTURE

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Appendix
INITIAL RESEARCH & ANALYSES

As mentioned previously on the methodology part, several exercises were also conducted along with the analytical processes in this project. These exercises were used as an analytical tool, mainly in problem analysis phase, which was very helpful in determining and clarifying the problems from other’s point of view.

Detailed description and complete result of the exercises are shown on the following pages.
**Bandung on the News**

The exercise was done by observing the issues coming into view on the first 20 pages of Google News with “Bandung” as the keyword as per September 15th, 2015. There are 9 main topics emerged from the observation, i.e. urban development, infrastructure and mobility, discourse on ‘creative city’, governance, safety and law reinforcement, sports, tourism, economic growth, and climate-related topics. This exercise was conducted as a part of the problem analysis and determining societal relevance of the issues addressed in this project in actual condition. The sum up of this exercise is presented in a mind-map consists of the issues found on the news.

*above: Mind-map Bandung on the News*
Bandung in One Word

This particular survey was done through the social media, such as Facebook, Twitter, Path, WhatsApp Messenger, and Youtube. The respondents could give multiple answers, as long as the answer consists of only one word. There were more than 150 responses to the question, which were then illustrated in a ‘word-cloud’. This exercise was done to comprehend what are the characteristics that identify the city among the people who is living or have lived in Bandung.

Small survey: “What are the problems in Bandung?”

On this survey, there were two questions posed to the respondents:

1. Name three things that you perceived as Bandung’s current main problems;
2. Name three main challenges that you think Bandung
There were 39 responses to these questions which recorded through Google Form. According to this survey, the top-five most challenging issues for Bandung are traffic and mobility, socio-cultural issue, air pollution, (human) development, and density.

**Workshop: Collective SWOT Analysis**

The collective SWOT analysis workshop was done with several other fellow TU Delft students from Bandung, Indonesia. The animated workshop aimed to brainstorm anything perceived as strength, weakness, opportunity, or threat for urban development in Bandung City in
general. This brainstorming session was conducted within sustainability corridor. Thus, there are three issues addressed in this SWOT analysis, i.e. economy, socio-cultural, and environmental issues. Shown on the following images are the documentation and the result of this SWOT analysis workshop.

left: Combined result from collective SWOT analysis on economy aspects
This exercise was conducted in order to gain initial insight on urban mobility in Bandung City. By recording Waze live map provided from www.waze.com/livemap, there is some recognizable mobility pattern from housing cluster to the city centre. The recording was done mostly during
the peak hours in the morning, afternoon, and evening (GMT +7.00), both during weekdays and weekends. The observation shows different mobility pattern on weekend and weekdays. During weekdays, most of the urban mobility happens from the peripheral area to the city centre, resulting traffic congestion in several main corridors. However, during weekends, most of the traffic congestion happens around the highway exits and commercial facilities in the city centre.

below: Comparing the location of traffic congestion during weekdays (upper image) and weekends (lower image)
Pecha Kucha Presentation

The presentation was organized along with other fellow graduation studio students both from Urbanism and Landscape Architecture. There were 20 presenters, presenting their graduation ideas in 20 slides; each slide must be presented only within 20 seconds. It was a fun and interesting exercise because the presenter is forced to reduce the information he/she presented into the essence of it.

right:
Documentation from Pecha Kucha presentation on Friday, November 20th, 2015
appendix B
Abstract — Urban sprawl, as one of the implication of city growth, is one of the commonly renowned urban phenomena which have drawn a lot interests, discourses, and criticisms. It is often addressed as a problem because of its tendency in deriving certain impacts such as massive land use change, low quality housing complexes, and severe traffic jam (Devas and Rakodi, 1993). For almost the same reasons, urban sprawl is usually perceived as an unsustainable model for urban development (Bruegmann, 2005). Numbers of reactions have been raised against the sprawl especially in the attempt to search more sustainable urban form, including the discourse of ‘compact city’ and polycentric urban model.

This paper will focus on the polycentric urban model as one of the alternative tool to encourage more sustainable urban development. Thus, it is developed around the question of “how polycentricity promotes sustainable development”. It aims to summarize the basic understanding on polycentric urban model in order to be able to implement the concept in urban development strategies. In order to do so, a review on theories and discussions on polycentric urban model will be presented. Also, as ‘compact city’ concept is highly relevant to polycentricity, a concise review on this concept will also be exposed. It is important to see both concepts side by side and in a complimentary way to comprehend relation of both concepts and get a thorough understanding on possible strategies to promote more sustainable urban development.

Key words — polycentric urban region; ‘compact city’; development strategies; sustainable urban development

1 Introduction
As of today, most of the world’s population is living in urban areas. Large amount of people are either migrating or commuting to the city every day. In developing countries like China and India, for example, the urban population percentage comes to 30 -50 % by the year of 2014 (The World Bank, 2014). To cope with this migration wave, cities need to provide more living space. These spaces are usually provided by promoting new development both within the existing built environment and in the vacant spaces around urban peripheries. The latter type of development is often recognized by the term of urban sprawl.

Although there is no single definition of ‘sprawl’, it is often defined as “low-density, scattered, urban development without systematic large-scale or regional public land-use planning” (Bruegmann, 2005, p. 18). In developing countries, urban population is growing more rapidly and often, if not always, put a lot of pressure to infrastructure and increasing demand on services. This rapid development has outpaced urban management efforts, causing both physical and socio-economic consequences (Devas and Rakodi, 1993).

Urban sprawl is often seen as the opposing force of sustainable urban development because of its tendency in deriving certain impacts such as massive land use change, which put more pressure on environmental sustainability (Bruegmann, 2005). Furthermore, in the urban areas where privately owned vehicles are the main transportation mode, urban sprawl has triggered massive traffic jam, especially between the urban centres and sub-urban areas.

Ever since it is noticed as one of the main challenge in urban development, urban sprawl has raised a lot of interests and discourses, including criticism. Concepts such as ‘compact city’ and polycentricity
have been actively promoted within the discourse of sustainable urban development. The ‘compact city’ concept puts two opposing point of views on sustainable urban form as its starting point, while polycentricity was initially focused more on urban economy and urban geography.

This paper will focus on the application of polycentric urban model as one of the working concept in encouraging sustainable urban development. The aim is to summarize basic understanding on polycentric urban model in order to be able to implement the concept in urban design and urban development strategies. In order to do so, a review on theories and discussions on polycentric urban model as well as ‘compact city’ concept will be presented.

Structure of this paper consists of an overview of the paper presented in this introduction, followed by a concise review on ‘compact city’ concept. The third part of this paper will delve into polycentricity and Polycentric Urban Region in general. Afterward, an overview on implementation of polycentric urban model will be offered. All of the comprehension will be summarized in a conclusion at the end of this review paper.

2 ‘Compact city’: a discourse on sustainable urban form

As mentioned earlier, urban sprawl has not only triggered series of impacts in the city, it has also raised questions among the academia and practitioners. Discussions on the most sustainable urban form as well as the most suitable urban model to be implemented have been going on for decades.

‘Compact city’ concept is basically tries to pinpoint the relation between urban form and sustainability. The concept is very much focused on “increasing the density of development, ensuring a mix of uses, containing urban ‘sprawl’ and achieving social and economic diversity and vitality” (Jenks and Jones, 2010, p. 1). Even though there has been research suggesting that there might be more than one sustainable urban form (Williams, et.al., 2000 in Jenks and Jones, 2010), the discussion on sustainable cities and urban form has been evolving around the above-mentioned issues. Furthermore, ‘compact city’ is particularly exercising the reduction of travel distances (Jenks et al., 1996).

Among the most arduous discourses is the one on urban concentration and centrality distribution. Breheny (1996) categorized these point-of-views into two: ‘decentrists’, who favour urban decentralisation, largely as a reaction to the problems of industrial cities; and ‘centrists’, who believe in the virtues of high density cities and decry urban sprawl.” (Breheny, 1996 in Jenkins et al., 1996, p. 10). He later on added the third emerging category, i.e. the compromisers, whose position arose from their realistic stance, performing an advocacy role between centrists and decentrists (Breheny, 1996 in Jenkins et al., 1996).

The ‘compact city’ theory in general aims for sustainability and often seen as a reaction to the unfavourable impacts of planning in the nineteenth-century cities (Hall, 1988 in Breheny, 1996 in Jenks et al., 1996). Breheny (1996) took extreme examples such as Le Corbusier’s La Ville Radieuse, Frank Lloyd Wright’s Broadacre, and Ebenezer Howard’s Garden City concepts to portray the stand points toward this matter. Breheny also summarized the ideas proposed by both Centrists and Decentrists through the time in following table.

The decentrists, represented by Wright’s Broadacres plan, derived from a fundamental idea where the technology advancement can (and will) be used to enable people to access land and facilities even those located far away from where we are living. Wright saw technology, electricity and motor car, as a mean to enable people to reach to the countryside. The decentralisation was, however, meant to be planned carefully. Although Wright’s vision on technology advancement is proved to be correct, his idea on planned decentralisation was never happened. Thus, (physical) decentralisation tend to be perceived as the less sustainable urban form, as it is exemplified by the urban sprawl itself (Breheny, 1996 in Jenks et al., 1996).

Quite opposing to Wrigt, Le Corbusier’s Le Ville Radieuse was based on the idea that decongestion of the urban centres must be done by increasing density, demoting the use of private vehicles such as car, and promoting urban regeneration. Jane Jacobs is widely renowned among the most obstinate centrists over the century. However, application of this concept in current situation often leads to monocentricity, which causes more traffic congestion the tendency of quality of life degradation in the city centre. Furthermore, as Breheny (1995) proved with his experiment, should there not been any decentralisation occurred for the 30 years from 1961, such compaction will merely resulting 2.5% of national energy saving per week (Breheny, 1996 in Jenks et al., 1996).

On the other hand, despite the fact that the compromiser’s point of view is rarely acknowledged as a “stand point”, it is considerably attractive because it combines both point of view and pointed out certain realistic traits. The Compromisers’ position may adopt the good sides of both centrist and decentrist point of view, such as centrist’s “containment, urban regeneration strategies, and a whole range of new intra-urban environmental initiatives” (Breheny, 1996 in Jenks et al., 1996, p. 26) as well as embracing the idea of “controlled direction of inevitable decentralisation, ... takes into account the grain of the market without being subservient to it, ... allow for some development in the form of environmentally-conscious new settlements” (Breheny, 1996 in Jenks et al., 1996, p. 26). Breheny (1996) also argues that, in this manner, Ebenezer Howard is considerably a compromiser rather than the decentrist as many believes.

Each of these stand points has put forward their arguments, which basically aimed for sustainability and better quality of life in urban area. However, the application of each concept is somewhat lacking a controlling, or monitoring, tools which then leads to the failure to comply with the idea of sustainability itself. While the “Decentrists” positioned as the black sheep for urban sprawl, the “Centrists” themselves are equally guilty of promoting a single centre and causing congestion.

3 Polycentricity: From Urban Geography Concept to Physical Manifestation

While ‘compact city’ concept mainly concerns about the physical manifestation of an agglomeration, polycentricity focused more to the geography of agglomeration: where the centers are located and how they are connected. The concept is widely used especially in urban economy and urban geography. Kloosterman and Musterd (2001) addressed polycentricity to be characterized by existence of multiple centres in one area. However, “... more concrete operationalisations of polycentricity turn out to be rather diverse” (Kloosterman and Musterd, 2001, p. 623).

Although it seems to be a broader translation of what Breheny (1996) defined as “decentrists”, polycentricity is also – at the same time – portrays the ideas of the “centrists”, where (re-)development is done around certain urban core (Hall, 2009). Thus, it is likely to be addresses as “deconcentrated concentration”, as posited in the Second Report on Physical Planning in the Netherlands (Hall, 2002). The term was introduced as a favourable solution which was “... a compromise between the two extremes of concentration – which would give high accessibility to jobs and services, but poor environment for living – and deconcentration, which would use too much space” (Hall, 2002, p. 179). The grouping of urban agglomeration, as described by Hall (2002), was mainly done to promote variety of living environments, i.e. urban, suburban, and semi-rural.

Polycentricity is often related with several other terms, including “‘post-industrial cities’ (Hall, 1997), ‘poly nucleated metropolitan regions’ (Dieleman and Faludi, 1998), ‘polycentric urban regions’ (Kloosterman and Musterd, 2001), ‘global city-regions’ (Scott, 2001), or ‘mega-city regions’ (Hall, 2014)” (Lambregts, 2006, p. 115). Although it might remain interpretative and ambiguous in a way,
polycentricity concept has become more clear and more acceptable for both analysis and normative application (Lambregts, 2006).

The concept of polycentricity was derived following the recently recognized phenomenon caused by globalization: decentralization of urban functions due to the technology advancement (Hall and Pain, 2006). As emphasized by Hall and Pain (2006), the shift in advanced economies, from manufacturing and goods handling towards more information and service handling, has affected multiple core activities happening in the city, such as the political, financial, cultural, professional, information, and consumption centre (Hall and Pain, 2006).

**Polycentric Urban Region**

Hall (2006) posited that the currently happening extended decentralization has triggered a new phenomenon of polycentricity towards what he addresses as ‘Mega-City Region’ (MCR). It is a constellation of several (physically) individual cities which functionally networked to one another (Hall and Pain, 2006).

On the other hand, Champion (2001) brought up the idea of shifting from ‘monocentric city’ (MC) towards ‘polycentric urban regions’ (PUR) in its relevance to the impacts of demographic development and urban structure, which process happen consecutively. In order to develop this idea, he investigated the central question related to the form and structure of polycentric urban regions. Champion came up with three main problems in identifying PUR, including the degree of interaction between centres, the required degree of interaction and interdependence of urban centre, and the way the centres evolve. Therefore, albeit the multiple centres tend not to be identical, it remains less clear about their size and number (Champion, 2001).

Polycentric Urban Region might emerges in the form of individual metropolitan area (or city and its suburban and hinterlands), region containing certain number of equally dominant cities, or a polycentric pattern of several urban agglomerations at the macro level (‘Megalopolis’). The first type of Polycentric Urban Region is mainly apparent in the North American context (Los Angeles, Portland, San Francisco), while the ‘polynucleated metropolitan region’ – as referred by Dieleman and Faludi (1998 in Champion, 2001) – is commonly found in European context like Randstad Metropolitan Area in the Netherlands and Rhine-Ruhr Metropolitan Region in Germany. The last type of Polycentric Urban Region, the ‘megalopolis’, is actually a hypothetical classification posed by Dieleman and Faludi (1998 in Champion, 2001), who foresaw Rhine-Ruhr Metropolitan Region, the Randstad, the Flemish Diamond, and the current less urbanized areas to generate new form of polycentric urban region in the future.

In addition, Champion (2001) also posited that there are at least three ways in which a polycentric urban region can emerge and evolve through the time. This evolutionary modes have shown that polycentric urban regions are not developing from equally mature cores or from the same urban

**Illustration 2** Champion's evolutionary model of polycentric urban region, Source: Champion, 2001, p. 665
morphology (Champion, 2001; Lambregts, 2006). Thus, the larger agglomeration is only as important as the urban cores within itself (Lambregts, 2006).

In this regard, Champion’s and Lambregt’s idea on these main configurations is aligned with what Nadin and Duhr posited: polycentricity is a scale-dependent concept, where polycentricity in smaller scale may resemble monocentricity in a larger scale (Nadin and Duhr, 2011) in Hall and Pain, 2006).

In addition to the discussion on dispersing centralities, Lang (2003), as mentioned in Arribas-Bel and Sanz-Garcia (2014), believes that polycentricity might only be an intermediary urban model between monocentric urban model, which seems to be less favorable nowadays, and the future urban model, which is beyond the existing models and unlikely to be predicted today.

When coming to researching a polycentric urban regions, Kloosterman and Musterd (2001) recommended to look further into four dimensions in which the manifestation is differ from ‘urban configuration with a dominant city’. These dimensions are “physical or spatial form, political entity, functional relationships, and cultural identity and representation” (Kloosterman and Musterd, 2001, pp. 630–631).

4 Implementation of Polycentric Urban Model
Regardless the fact that the notion of polycentricity is commonly found in North American context, Arribas-Bel and Sanz-Garcia (2014) found out that the most predominant urban model found in the USA in 1990 – 2010 time frame remained the monocentric metropolitan regions. On the other hand, polycentricity in European context also often comes up as an unsuitable urban model for many smaller towns due to lack of population which cause inefficient services (Hall, 2009). However, the aforementioned facts cannot deny the point that regions such as Randstad (the Netherlands), Rhine-Ruhr Metropolitan Region (Germany), Greater Dublin and South East England are exemplified as well-functioning polycentric urban region.

An overview on Hall’s work in “Urban and Regional Planning” (2002) is essential to understand how the polycentric urban region works. Here he explained the concept of ‘deconcentrated concentration’ concisely yet thoroughly. He mentioned that this decentralization should be guided “... to a few selected development corridors along strong public transport links, including high-speed ‘regional metros’” (Hall, 2002, p. 186). But instead of a linear development along the corridors, Hall suggested that the development should be in the form of clustered urban development at certain distance around transit facilities to provide proper accessibility, where some of the sites might be located up to 90 miles (150 km) from the central metropolitan city (Hall, 2002, p. 186).

Hall (2002) also put forward that the polycentricity should, additionally, aim to enhance and improve potential of ‘regional capitals’ and smaller ‘county towns’. He prescribed for enhanced accessibility (both road and railways), investment in service infrastructure, systematic improvement of environmental quality, and strategic marketing to promote polycentricity for remote rural regions (Hall, 2002).

Stretton (1995 in Jenks et al., 1996), who casts critique to the Australian urban compaction, also suggested that the urban consolidation has caused too much loss and that the reformation of transportation system is more important than the urban compaction itself.

5 Conclusion
From a thorough exploration on polycentric urban model and ‘compact city’ concept, there are three essential conclusions to be drawn. Firstly, the notion of polycentricity as a scale-dependent concept is highly important. By realizing this conception, selection on scale and scope of work within a project will be one of the significant determining factors for the analyses and proposed implementation strategy. As polycentricity is often associated with the urban economy, the scale of polycentric urban region will give a significant distinction especially to its socio-economic exposure and position.

The second conclusion comes from the understanding of ‘compact city’ concept. This concept is considerably applicable to be implemented within polycentric urban model because both are encouraging centralized development around an urban core. Although ‘compact city’ concept draws some concern on environmental aspect (especially on concentrated air pollution in the city centre), the application of ‘compact city’ concept is apparent in most of the polycentric urban model such as Randstad Metropolitan Area, the Netherlands and Paris Region, France.

Finally, the third remark will highlight Hall’s suggestion that transportation & mobility infrastructure is one of the key components in promoting polycentricity. Accessibility, especially by public transport, is highly relevant to polycentric urban model because not only people should be able to move easily from one place to another in one
centrality, the centralities themselves should be conveniently located and reachable from one another. Improvement (or establishment) of transportation infrastructure will allow ease of access. However, ideally, each of the centralities should be equally powerful in terms of attractiveness to continuously serve as a centrality, which can be achieved by providing diverse economic environment or specializing in certain function within larger context (Kloosterman and Musterd, 2001).

Shown on the diagram below is the summary of both ‘compact city’ concept and polycentric urban model as reviewed earlier.

![Diagram summary of 'compact city' and polycentric urban models.](image-url)

**Illustration 4** Summary of the basic understanding from reviewing ‘compact city’ and ‘polycentricity’ concepts, Source: author, 2016

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### 6 Recommendation on Further Research

This theory paper has posited three main conclusions which drawn from numbers of literature. However, in order to be able to implement polycentricity concept in an urban planning and/or urban design strategy, further investigation on implementation strategies – especially those related to transportation and mobility infrastructure, such as Transit Oriented Development – as well as more in depth critical analysis on case studies are essential. Among case study options that can be investigated in the critical analysis are Randstad Metropolitan Region (the Netherlands), Paris Region (France), Hong Kong, Singapore, Curitiba (Brazil), South East England, and Portland (Oregon, USA).

### References


