

SUSTAINABLE COMPACT CITY AS AN ALTERNATIVE CONCEPT OF URBAN DEVELOPMENT IN INDONESIA

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ABSTRACT

Nowadays urban population particularly settled in cities is more increasing over the world. This trend leads to an opinion that urban area tends to become the hardest places of energy consumption. There is a kind of consensus considered that sustainable development take an essential role to urban development in the future. A sustainable development is a concept of development which synchronize a collaboration between the needs and limited resources. This urban sustainable development indicator could be seen on its balanced factors of economics, social and environmental.

Compact city is one of a growing discourse on examining the patterns in space and form of the sustainable city. In a compact city, there is a high emphasize focused on the program of urban containment, namely to provide a mix-use concentration that socially sustained. Some policies of scenario used to be taken to create a compact city are not only to improve hi-densed settlement with its assimilation and to develop a mixed land use between residential and commercial but also to maintain a clear boundary between housing and farmland.

The idea of Compact city is originated by compact model development of most historic cities in Europe. However, the problem of the idea remarkably questioned whether the concept is suitable in accord with the urban development character in developing countries. The UNCHS has predicted that in 2015 about 22 of 26 mega-cities will be in developing countries. Infact, mega-cities in developing countries seems to be compact enough, which means it is already rigid, found its own shape. But this fact also doesn't mean that those cities are sustained on the same way.

Compact city policies in Indonesia perhaps better emphasized to achieve a sustainable conditions through the efficient infrastructure supply; Balance activity of the urban area; Close urban-rural linkage; and security of social equity. Some opportunities toward the sustained Compact city could be challenge; to improve and to build vertical; a supportive mass transportation system; double core city afford; to arrange buildings and environment for energy saving; and to maintain a friendly urban space to pedestrian.

Key Words : *compact city, sustainable development, urban containment.*

1. The City and Energy Consumption

At least half of world population is now estimated to have lived in the city. In 1995, about 45% of world population lived in urban areas, and about 1 billion of the world's 2.6 billion people have lived in big cities (Jenck, 1996). This trends of the world population living in urban areas is predicted will be more increase in the future. The population of cities in developing countries is about 2 billion in 2000 by the number of 40% of all proportion of the population.

The UNDP statistics show that the number will increase to 50% in the year 2025 and 60% in the year 2050 or in another words it will be increased more than twice, from 2 billion to 4.8 billion of people.

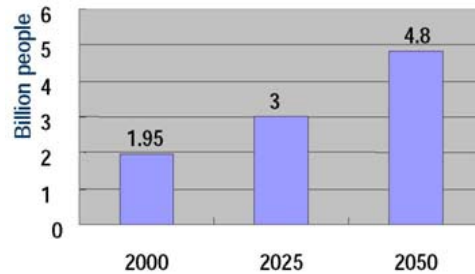


Figure 1. Population of the cities in Developing Countries.

The growth without limit is become a phenomenon of big cities in the world. The emergence of new cities which spread in outlying areas has resulted such less support of the sub-urban to provide prevalence services. In the other hand, it is due to the expensive cost of infrastructure development, traffic jam, the loss of more agricultural land, reduction in comfort of living in both the city and the outlying areas, and rural un-stability.

Eventually, the energy consumption of the city will also be bigger than before and it is hard to avoid. By this situation, the cities are going to become the location of the most energy consuming.

In Indonesia, it seems that private vehicles growth as a consequence is an answer that can not be tolerate. The growth number of vehicles reach out of five million units per year in Indonesia. The cities burden is more heavy every year. This growth has also impacted to the amount of pollution and this has put Jakarta as the third of world's polluted city.

The population density made the concentration of environmental issues, consumption of natural resources including oil, and those will be accumulated as city problematic. Therefore, a good plan in managing the form and space of the city, also the right public policy would be key factors of energy saving. If the policy and its practice has founded and executed correctly, the city will receive the large benefits of efficiency.

2. Sustainable City

Cities are important for various human activities, and it is made them as the big consumer of natural resources. There is a kind of consensus considered that sustainable development take an essential role to urban development in the future. Because it is believe that human activities can not exploiting those resources forever without threatening opportunity for the next generation.

Sustainable development is based on two the concepts :

- The concept of needs; Creating a conditions that maintaining needs of adequate living for the whole community.
- The concept of limits; To give attention to the environment and maintain its capacity to meet current needs and in the future as well.

Sustainable development policy is directly integrated with the environmental, economic, and social. The diagram below shows the integration of these three values of environmental, economic and social, resulting prosperous life for human. At the application of sustainable development, these three elements are needed to run simultaneously. An imbalance development will occur when one element is higher than the others. The balance could be a sustainability indicators of the development. These principles are also could apply for the establishment of sustainable city.

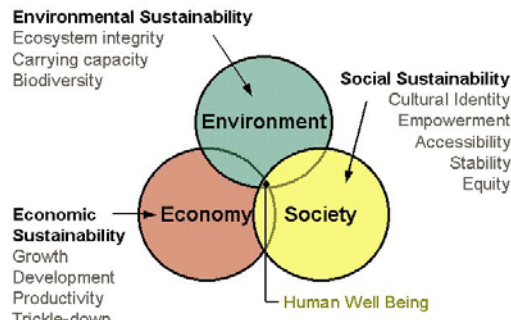


Figure 2. Elements of Sustainable Development.

On a sustainable city the relationship between economic and the community is reflected in the standard of living. Relationships between economic and the environment is reflected in conservation efforts. And Relationships between public and the environment reflected in their co-existence.

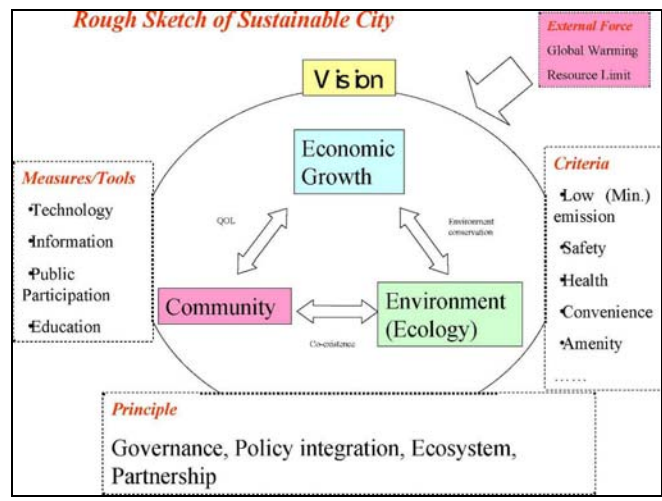


Figure 3. Chart of Sustainable City.

Discourse of sustainability in design and architecture is an old issue which is difficult to apply. It is because there are so many aspects that need to be concern. Following are some aspects of physical design of sustainable cities.

Table 1. Physical aspects of Sustainable Design

Landform/Microclimate	Site Design	Infrastructure Efficiency
<ul style="list-style-type: none"> ▪ Topography ▪ Light-colored surfacing ▪ Vegetative cooling ▪ Wind buffering/ channeling ▪ Evaporative cooling 	<ul style="list-style-type: none"> ▪ Solar orientation ▪ Pedestrian orientation ▪ Transit orientation ▪ Micro climatic building/ siting 	<ul style="list-style-type: none"> ▪ Water supply and use ▪ Wastewater collection ▪ Storm drainage ▪ Street lighting ▪ Traffic signalization ▪ Recycling facilities
Land-Use	Transportation	On-Site Energy Resources
<ul style="list-style-type: none"> ▪ Use density ▪ Use mix ▪ Activity concentration 	<ul style="list-style-type: none"> ▪ Integrated, mulimodal street network ▪ Pedestrian ▪ Bicycle ▪ Transit ▪ High-occupancy vehicles ▪ Pavement minimization ▪ Parking minimization 	<ul style="list-style-type: none"> ▪ Geothermal/groundwater ▪ Surface water ▪ Wind ▪ Solar ▪ District heating /cooling ▪ Cogeneration ▪ Thermal storage ▪ Fuel cell power

Reduced travel time and saving energy is a part of sustainability. In the context of the structure of the city, there are some spatial models that can be apply to achieve the sustainability:

- Central city core structure
- Galaxy structure
- Star shape structure
- Linear city structure (Curitiba)
- Satellite city structure
- Multi-pole structure

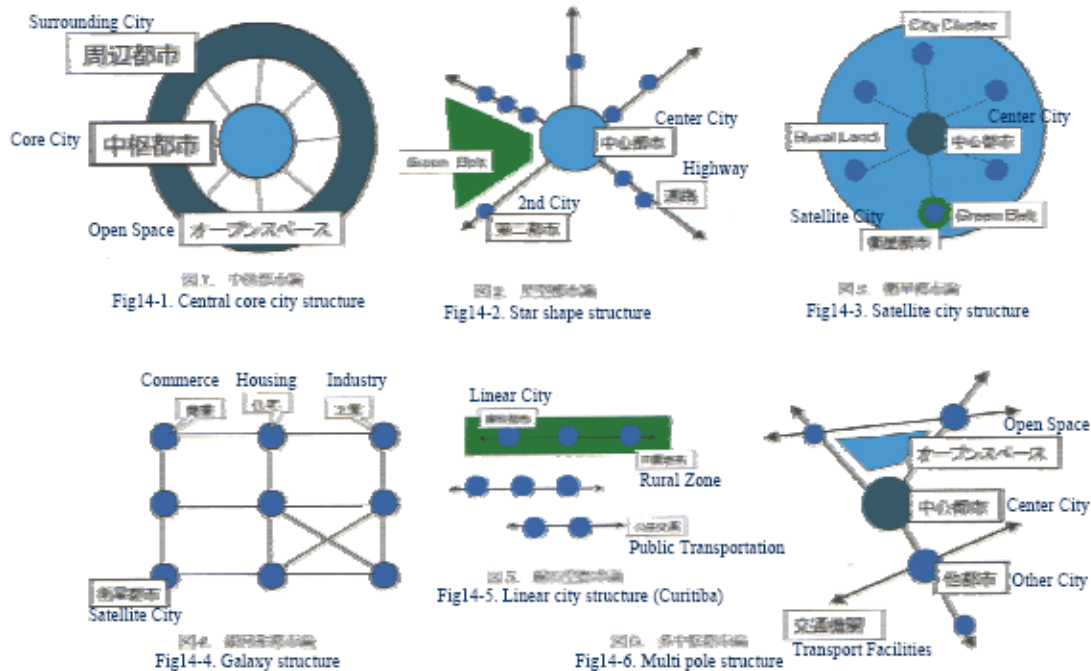


Figure 4. Spatial Model of Sustainable City

3. Compact City

Recently, most attention has focused on the relationship between the form of cities and its sustainability. Some discussions on the patterns of city spaces and its development had one issue which was introduced by Dantzig & Saaty called compact city. Lots arguments are come up upon this issue, and one said that a compact city is considerable to be the most sustainable one. It is also expressed by Mike Jenks, Elizabeth Burton and Katie Williams (1996) in their book entitled Compact City: A Sustainable Urban Form?

Form of space	<ol style="list-style-type: none"> 1. High-dense settlements 2. Less dependence of automobile (<-high density) 3. Clear boundary from surrounding area
Space Characteristics	<ol style="list-style-type: none"> 4. Mixed land use 5. Diversity of life (<-complex land use) 6. Clear identity
Function	<ol style="list-style-type: none"> 7. Social fairness (<-high dense settlements) 8. Self-sufficiency of daily life 9. Independency of governance (<-clear boundary)

Table 3 Characteristics of compact

According to Dantzig & Saaty (1978) the compact city spatial can be seen at least from three aspects; space characteristics, form and its function. Base on that, it can conclude that there is a close relationship between the form of a compact city and sustainability, including:

- Reduction of dependency on vehicles

- Provision of infrastructure and an efficient public service
- Community participation through high-density settlements.
- Revitalization of downtown

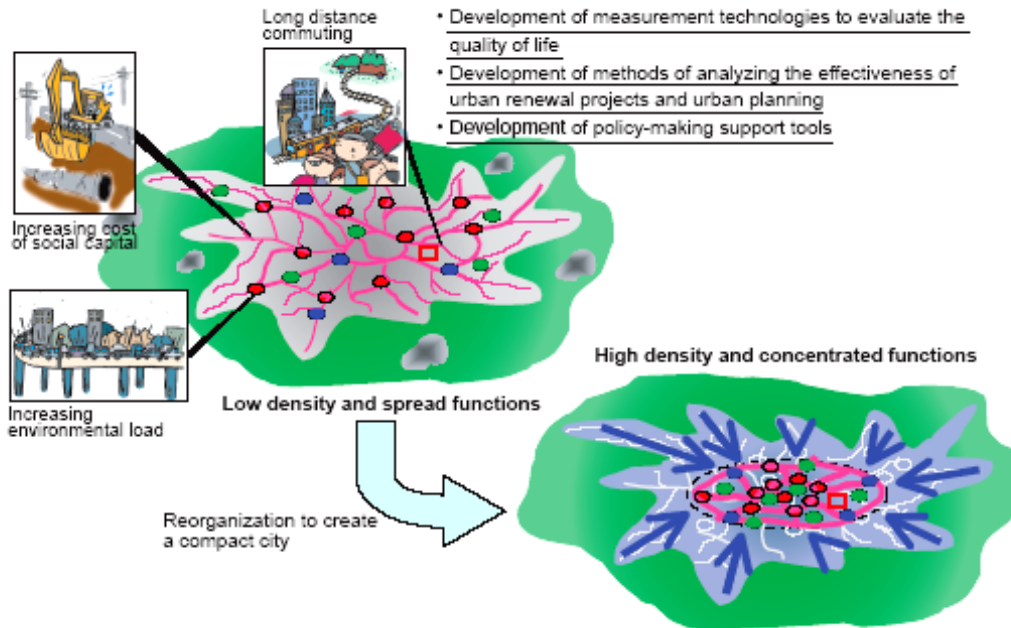


Figure 4. To create a compact city

This compact city is initiated not only to save energy consumption, but also to ensure the sustainability for the next generations. Jenks said that there is a relationship between a form of the city and sustainable development, but actually it is not that simple. However, in this compact city there is an emphasized idea on urban containment planning, which is to provide a concentration of socially sustainable mixed uses, to concentrate development, and to reduce travel needs and vehicle emissions. Therefore, the promotion of public mass transportation, convenient traffic, walking and cycling is often cited as a solution (Elkin, et.al., 1991).

PLUS	MINUS
<ul style="list-style-type: none"> ▪ Energy saving ▪ Reduced emissions ▪ Improved standard of living due high density areas and mix-use 	<ul style="list-style-type: none"> ▪ Oversaturated ▪ Pollution ▪ Lack hospitality ▪ Less Disaster Prevention

Table 4. Impact of City of compact

A compact city have a certain impact. Its form have benefits and weakness depends on how is it implemented. Some common policy used to achieve a compact city, namely:

- To increase the cost of private transport.
- To develop high-dense settlements and its assimilation as well.
- Combining commercial functions
- To develop a mixed land use between residential and commercial
- To maintain a clear boundary between housing and farmland

4. Implementation of Compact City in Developing Countries

It is obvious that the idea of compact city is originated by compact model development of most historic cities in europe. So it is no wonder if the main promoter for the compact city is the Commission of the European Communities. The now question is whether the concept is suitable in accord with the urban development

character in developing countries. In fact, urban situations in developing countries is very different from in the developed countries. But somehow, mega-cities have its own discours in developing countries. The UNCHS has predicted that in 2015 about 22 of 26 mega-cities will be in developing countries. A mega-city formed through the process of population concentration, the city started from a small core, merged and become great. In its growing process the mega-cities usually taking out rural area and making it as new part of region.

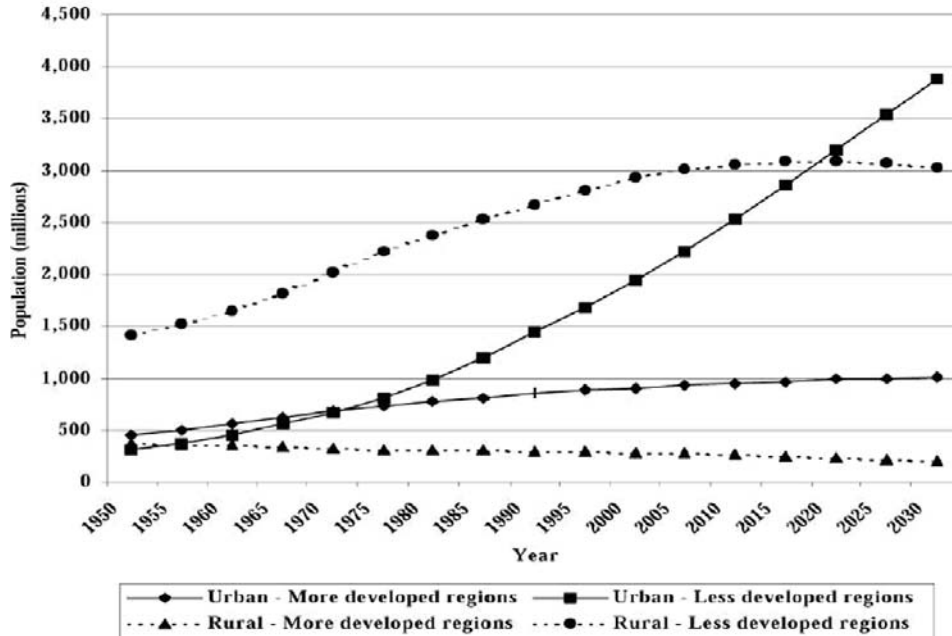


Figure 5. Population growth in urban and rural area both in Developed Countries and Developing Countries

Infact, mega-cities in developing countries seems to be compact enough, which means it is rigid already. But this fact also doesn't meant that those cities are sustained on the same way.

High-dense settlements in developing countries is actually a phenomenon of poor families who live together and have lack services. Lack of public transportation hold those population to move to sub-urban.

	Population Growth (1975-2025)	Condition	Goals
DEVELOPED COUNTRIES	Urban population ratio : 69.8% → 84% Urban population: 730 million → 1 billion	<ul style="list-style-type: none"> ▪ Increase in amount of land area per capita ← decrease in population density ▪ Increase in energy use ← increase in average travel distance, electrification of life ▪ Increase of waste and pollution ← 53.6% of CO2 are discharged by 16.7% population 	Advance in quality of life
DEVELOPING COUNTRIES	Urban population ratio : 26.7% → 57.1% Urban population: 2 billion → 4 billion	<ul style="list-style-type: none"> ▪ Efficient infrastructure supply ← To catch up with rapid population growth To keep close urban rural linkage ▪ Poverty → Deteriorating urban environment, ▪ Security of social equity 	Social services and poverty alleviation

Table 5. Urban Conditions in Developed Countries and in Developing Countries

It is difficult to apply the fully concept of compact city to a town planning in developing countries, obviously because so many problems to encountered. Common problems in developing countries are:

- Lack of social infrastructure (caused by the population growth exceeding the economic growth)
- Increased slum area or squatter
- Land speculation
- Difficulty in slums area redevelopment (to demolish or to relocate)
- Weakness in public transportation system
- Lack capacity in planning

The success of compact city policies in developing countries should be measured through these perspectives.

5. Opportunity to apply the Sustainable Compact City in Indonesia

It is clear that an advanced research required to fully Implement the idea of compact cities in Indonesia. However the concept of compact city is not a rigid or even a simple vision. Different character of each cities and its multi cultural community should be articulate as the context of specific identity in cultural, economic, and physical. Those specific identities are important to change the urban area to be better and efficient in the future.

Compact city policies for cities in developing countries including in Indonesia should be applied as a strategy of urban development to control the expansion of the city due the rapid population growth. Compact city policies in Indonesia should be more emphasized to achieve sustainable conditions on several aspects:

- Efficient infrastructure supply
- Balance activity of the urban area considering collaboration with surrounding rural areas.
- Close urban-rural linkage
- Security of social equity

Some opportunities toward the sustained Compact city could be challenge; to improve and to build vertical; a supporting mass transportation system; double core city afford; to arrange buildings and environment for energy saving; and to maintain a friendly urban space to pedestrian.

a. Vertical development of the City

Recently, there is a phenomena that occur in large cities in Indonesia, such as Jakarta and Surabaya. They are become dense city and widely spread in horizontal with no clear boundaries. The spreading resulted in the emergence of new cities in outskirts, and these new cities become the supporting city of the main core. Jakarta for example, have surrounded by Depok, Bogor, Bekasi and Tangerang. In this case, numbers of employees work in Jakarta but stay in the outskirts. This situation is certainly causing an in-efficiency for work time, money, energy, etc. Therefore the vertical development of the city have become a necessity for Jakarta and other big cities in the future.

The growth of the city which tend to be dense and widely spread should be changed to growing vertically. Such solutions required to make a compact city. Living in high-rise buildings with a mix-function is a certain requirement, especially for large cities. It is aimed to remove the external movement between region into the internal movement in the area.

b. MassTransportation System

Some in-efficiencies occur in the development of big cities in Indonesia. It is because un-adequate mass transportation. The provision of mass transportation is very urgent, such as train, busway, monorail, and etc. Due the increased volume of vehicles especially private car, cities highly experienced traffic jam and it is ironic, something that must be end. Thus the energy consumption of fuel will reduced.

City of Curitiba with the highest level of car ownership in Brazil and numbers of passenger (up to 2.2 million people per day) apply the busway system. This public transportation could occupied up to 270 passengers, in 340 routes and 1902 buses. The busway have successfully reduced the dependency to private cars. In addition, Curitiba is also one of the city with the lowest levels of pollution in the world (because of low energy consumption). The occupancy level of mass transportation should be higher than of private cars and motorcycles, it is also to prevent the fast growing of private vehicles.

c. Double-core City

A compact land use can be made by placing residential and commercial areas in one location. It is to reduce the need for mobility. Therefore a macro urban planning is needed. The application of city center with double

core activities and with spread public facilities will prevent mobility to one center only. This effort will have consequences of short distance traveling, no more congestion, and low energy consumption.

d. Building and Environment Rule to Save Energy

Urban heat island is a term to describe over-heat radiation that burn the city. The heat could reach 30°C higher than rural areas. This situation happened due protracted conditions, such as; high dense buildings that covered land surfaces; asphalt coverage for roads and parking area; and reduced green areas. The over-heat will lead to increase electricity consumption for cooling, while currently in developing countries the electricity still rely on fuel.

In Los Angeles, there is a movement called cool community which required each building to plant at least 3 trees. It is also including roof repairing and changing pavement material that has more absorb in the summer. These efforts in fact can reduce electricity usage up to half giga watt per year which is worth with a half-billion dollars.

If the government seriously concern to this situation, they may require not only to change the asphalt parking lot with a grass block and to shade parking area with trees, but also to make all rooftop as roof garden. In addition, the building also should designed on energy saving principle; Building skin using light color; Sun shading to reduce heat and to reduce AC over consumption; And natural lighting during the day with openings. All of those can reduce energy consumption up to 30%.

e. Space for Pedestrian

Streets in most cities in Indonesia provide larger portion to vehicle than to pedestrian. Sidewalk only 1.2 m wide, and must share with the flower pot, trash cans, street vendors, and others. The stop point of the sidewalk also did not have clear orientation. If offices and its supporting business in down town can be linked by a comfortable sidewalk, workers did not have to use car to have lunch around the central business district.

In Curitiba, Brazil, pedestrians have lots portion for their 24 hours activity. The downtown area arranged quite wide. Its generate a significant income for the city from tourism sector, up to 280 million dollars, 4% of city income. In addition of course reducing the dependence on vehicles.

6. Conclusion

Most of environment damages so far is caused by the paradigm of development that is only intended to increase economic growth. It is highly exploiting the natural resources and no attention to the sustainability.

An empirical studies concerning the relevance of the implementation of compact city in Indonesia in relation with urban sustainability of course require more attention. Such policies related to the structure plan and urban pattern has been partly implemented toward the concept of compact city, namely in the RTRW. But it is actually tended to be speculative because it was not supported by an adequate empirical study.

It is necessary to understand that despite the relevance of the implementation of the compact city, of its challenge and its potential, it could be a basis for the next urban planning policies. This can not produce immediate results. It would take a comprehensive planning which requires commitment and a long time process, in line with the development of the city itself. In addition, timeless effort such as systematic public education and sustained education by utilizing the media would also be the key to success.

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