DOCTORAL DISSERTATION

A Study on Population Growth and the Effect on the Urban Area in Indonesia

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LIST OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1 - INTRODUCTION

1.1 Background

Many writers see the phenomenon of population growth as a challenge to create a more attractive city. Moreover, there is a lot of research on population growth which states that the majority of the population will live in an area called "city". However, the authors see that there are many cities that do not pay attention to city development based on the population. In fact, if the population is not controlled and is not used as the basis for the construction of city facilities, the city will face crucial problems as written below:

*By 2045, the world's city population is predicted to exceed 6 billion. ... Rapid population growth and cityization will have a dramatic effect on the increased demand for jobs, housing, energy, clean water, food, transportation infrastructure, and social services (*UN Secretariat, 2008).

Some cities have not determined the number of people who will live within the city administration boundaries. Thus, the population grows in accordance with the trend but is not controlled. Residents in the city also carry out internal distribution (internal to internal migration) that changes the composition and population of a district. This change has an impact on the changing needs of various types of infrastructure. Every city manager must calculate the capacity and carrying capacity of the city so that the manager can find out the population needed by the city to meet all of their needs. At the same time, city managers can calculate the city infrastructure needs to be distributed and built in the city.

Population growth provides opportunities. But at the same time, population growth raises problems. Because, residents need jobs, need skills to work, need income and recognition, require the establishment of family economic conditions, and so on. Because the needs of the population are very large, the city manager needs the right steps to avoid the population and their needs. Population control is urgently needed, especially in increasing population, population distribution, and its effects on city development. The ability of each city manager to control the population (growth and distribution of the population) and the ability of city managers to control the needs of the population (jobs, money, food, other activities) becomes an important element. Managers no longer only see population growth as economic growth, but quality growth that will advance city welfare and improve the city's economy. Cities that can utilize the human resources they have will benefit economically and socially. city resources will tend to creative resources. Creativity is only possessed by humans. Therefore, human resources are very important for the city.

*200 years ago there were less than one billion humans living on earth. Today, according to UN calculations there are over 7 billion of us. Recent estimates suggest that today's population size is roughly equivalent to 6.9% of the total number of people ever born. This is the most conspicuous fact about world population growth: for thousands of years, the population grew only slowly but in recent centuries, it has jumped dramatically. Between 1900 and 2000, the increase in world population was three times greater than during the entire previous history of humanity—an increase from 1.5 to 6.1 billion in just 100 years (*UN Secretariat, 2008).

The problems of city development that occur in many parts of the world are the weaknesses and limitations of the ability of city managers to control the population (number, quality, and distribution).

The limitations of city managers have an impact on the diversity of city conditions. Cities that have economic capabilities and the ability to control the population will have an attractive, clean and organized city. However, cities that do not have a strong economy will be trapped in uncontrolled population growth that can contribute to the quality of city space and city life.

Therefore, a statement from UN-Habitat (2008) that the city needs a detailed and strong concept of city planning in terms of vision is very important to be compiled and implemented by city managers. Until now, we can say that there are many cities that do not have city planning documents that are in accordance with the purpose of the plan. Especially for cities in developing countries. This phenomenon occurs as a result of limited human resources and financing resources so that city planning documents become superficial documents (United Nation Expert Group Meeting on Population Distribution, Cityization, Internal Migration, and Development, Population Division, Department of Econmic and Social Affairs, New York, 2008).

This statement by the UN-Habitat has a background, namely, there is no specific and detailed study with the population and land. Residents who may live in the city are not determined. Though city land has never increased. city residents must be determined by considering the carrying capacity and capacity of city land. Thus, there is a balance between the population and the availability of city land. The balance of city development that considers the population and city land will provide opportunities for the creation of attractive and sustainable cities. Sustainable cities have become a global issue. And the efforts of city managers to realize sustainable cities will only be achieved if city development policies favor the population and the availability (also condition) of city land.

1.2 Indonesia Context on This Study

1.2.1 Population Growth

Figure 1 shows population growth in Indonesia. For 100 years, Indonesia's population increased by 284.3 million people or 468.369% of the people of the first census conducted in 1930 (CBS, 2015). Populations have an influence on cities development concerning food and the environment infrastructure and water supply, economics and human quality itself (Barabai, 2013). Population growth does have an impact on so many things that require population management. The management here understands the understanding of the population, the understanding of the functions and conditions in every city space, the population structure to be the basis for policymaking, and other things. Population growth also has an impact on the condition of the city.

The high population will occupy the available area space in the area where they will live (Agunbiade, 2012). This has resulted in the density of the people in specific areas. This is what happened in Indonesia. The growth of the population that occurred for so long has encouraged the development of other sectors such as infrastructure and business (Asoka, 2013). Gradually, the dense areas will be more extensive. And for cases in Indonesia, density will spread from Java Island to other islands, especially Sumatra Island as the most populous island after Java Island. Indonesia has 416 regencies and 98 cities spread throughout the islands in Indonesia.

This is also driven by the city and non-cities infrastructure development programs on the island of Sumatra. The government has a toll road development program, a port, an international airport, a railway line of Sumatra, and a large-scale power plant. Several dams have been built and operated, some of which are formed with aid from the Government of Japan. This further increases the

likelihood that the development of population density on the island of Sumatra will be higher. Of the ever-increasing population growth every year, the majority of the population will live within the city area. The same thing happens in all islands in Indonesia which have high populations such as Java, Sumatra, Kalimantan, Sulawesi, Bali and Nusa Tenggara. (CBS, 2015). In many ways, rural areas are indeed attractive as residential locations. However, many other factors indicate the advantages of living in the city area (Pateman, 2011). This is evidenced by the increasing number of people living in cities areas rather than in rural areas. The community will tend to gather in a residential area that has life support facilities and daily activities, such as transport facilities, education, health, better security services, and a guarantee of service standards from government and service providers.

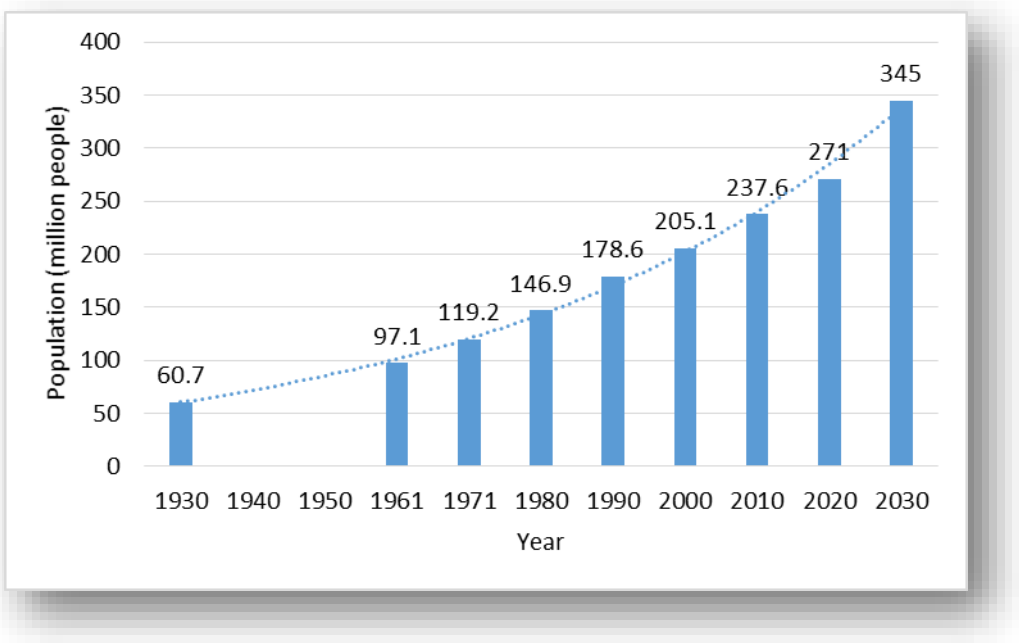


Fig 1 The population in Indonesia until 2030
Source: author

Population growth in Indonesia has indeed increased very rapidly after Indonesia's independence. Data collection carried out in 1961 showed that the population of Indonesia reached 97 million people and every census per 10 years carried out can be seen that the population in Indonesia has increased by 20 to 30 million people per 10 years. And there is a tendency for growth to continue to increase every 10 years to reach 40 to 50 million more people per 10 years. Of course, this phenomenon does not only occur in Indonesia. Other countries also face the same problem, the population is increasing and this has consequences for many factors.

The population distribution in the city and in the village is also a challenge that must be faced by each country. As a country, Indonesia will also face these conditions. There will be many people who live in the city and some will live in the village. The government has made predictions and calculations related to the distribution of the population living in the city and in the village. The government states that there is a tendency that in the future there will be many residents living within the city. The city here can mean a new city, but it can also mean an old city. If the old city is the residence of the population, then that means there will be an increase in the status and scale of the city to become a megapolis. But this can also mean the emergence of new cities, so the location that is currently not yet a city in the future will turn into an administrative city.

The population spread in villages and cities in large proportions does indeed create challenges that are not small for every government. However the distribution of the population is too extreme, it will have consequences for a large number of infrastructure costs and the construction of facilities and infrastructure to serve people who are scattered everywhere. This, of course, makes the financing of development very large. For countries that have sufficient funds to build infrastructure everywhere, this may not be a problem. However, for countries that do not have sufficient funds to finance infrastructure development, of course, this will be a serious problem. Therefore the distribution of population in the city and in the village must be controlled. The trick is to make the city attractive to the villagers so that many villagers enter the city because there are many infrastructure and community service facilities in the city that will facilitate the lives of people living in the city.

1.2.2 Indonesia as an Archipelago

Also, people have economic reasons, so they choose to live in city areas rather than rural areas. Although basically, every city has different economic challenges and policies between one city and another (Turok and McGranahan, 2013). Especially at this time, there is a development policy implemented by the government to reduce the gap between the village and the city. And this policy occurs in many countries, especially in developing countries after awareness that the imbalance between rural and city areas has led to an increase in cityization. However, this policy raises two things: increase the size of the metropolitan regions or the emergence of new cities.

Fig 2 The territory of Indonesia as an archipelago

Source: big.go.id

The city population is increasing rapidly because the city provides many opportunities to the community. city opens various types of opportunities that give people hope to get a better life from all sides. Therefore the city is becoming increasingly the population and its activity. The city managers seeks to provide the best infrastructure in the city to serve the community and their activities. But at the same time facing problems to provide facilities to the residents in the countryside. As a result,

villages are getting left behind and do not provide good opportunities for life in their communities. So, people try to leave the village and choose to live in the city. Although, at first they will be faced with problems of housing, location and daily transportation and economic and work problems because it is different from the conditions in the countryside, but gradually they will adapt to the activities of the city. They will work in sectors that are in accordance with the city's economic model and they will adapt to the standards of the city. This has had an impact on increasing people's income and increasing the chances of high cities population. Because there are many islands in Indonesia, there are many people living everywhere. This does not mean that all islands have inhabitants, but there are also islands that have no inhabitants. But the large islands in Indonesia have indeed been filled by residents. As an archipelagic country, of course, inter-island urban development policies require a strategy that is not simple. The government needs a specific strategy to flatten development on various islands through the construction of cities scattered on each island. To reach each island, transportation infrastructure that is not cheap is needed to build it, starting from the port to the airport. All of this requires a specific strategy that is different from the mainland country.

1.2.3 Distribution of Population Density in Indonesia

Distribution of population density in Indonesia shows the concentration of population on each island (Figure 3). As an island nation, Indonesia has a view on inter-island development. Development inequality in the city scale can only be avoided if there is a national development vision that leads to the insight of the archipelago and that means the Archipelago's Insight (In Indonesia we call it: Wawasan Nusantara).

Fig 3 Population density of Indonesia by island

Source: big.go.id

Indeed, there are currently infrastructure development programs in the countryside. However, it is impossible for the comfort of modern life to be fulfilled by the village. Everything will certainly be in the city. And the city has been built for a long time so that the provision of infrastructure supporting community activities has indeed become more complete over time. Therefore, it can be understood when many people move from village to city. To anticipate the negative impact of the many rural people who come to the city, the policies and programs must be prepared by the government. Because the movement of people from the village to city area is something that cannot be denied. This is a necessity that must be faced by the government and all parties in the future. The amount of cityization

in Indonesia is very high. According to the World Bank, cityization in Indonesia reaches 4.1% per year. As a developing country, Indonesia will be faced with a demographic bonus. If Indonesia can take advantage of the demographic bonus, then Indonesia will become one of the developed countries in the world. Some developed countries have limited human resources, especially productive populations. While Indonesia has a lot of human resources and is included in the productive category. They will become important capital for the progress of the nation.

1.2.4 City Population Proportion

The city always provides a variety of good life to the community. The problem is simple, the government is easy to provide facilities because the community collects a narrow and not spread everywhere, so that infrastructure needed by the community can be provided by distance and number of facilities. It is different from the rural population that are few and scattered in many locations. So the government must prepare additional funds and large funds to build various infrastructure. Distribution of villagers everywhere has shown the difficulty of providing facilities to the community.

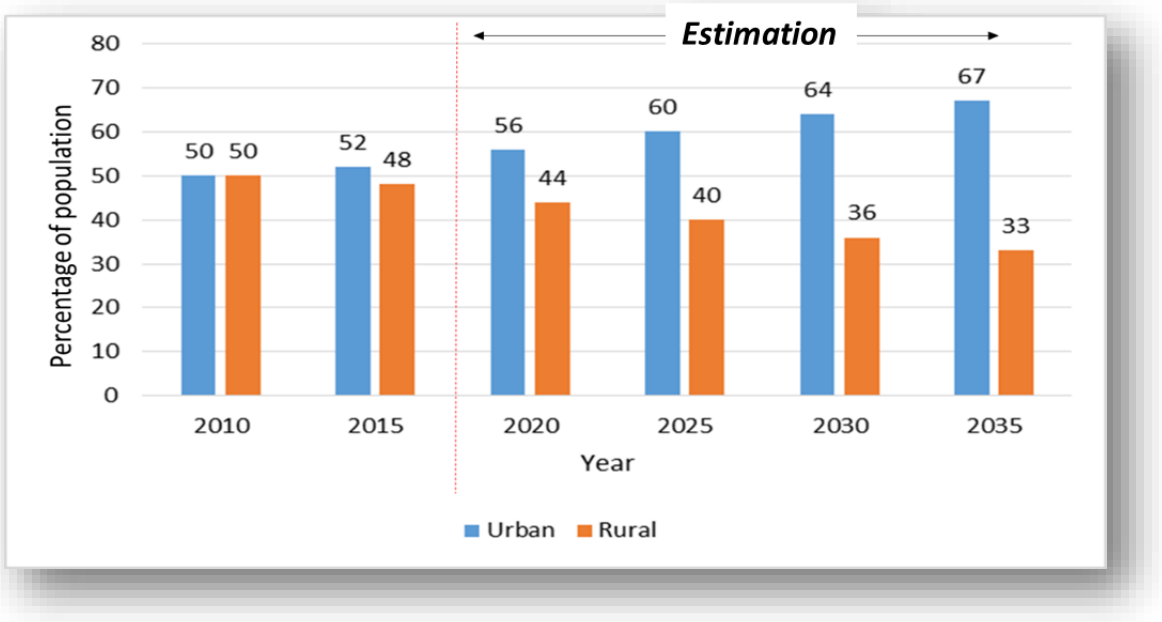


Fig 4 Proportion of city and rural population in Indonesia

Source: Badan Pusat Statistik (BPS) / Central Bureau of Statistics, Rencana Pembangunan Jangka Panjang (RPJP) / Long-term Development Plan, author

Because the government did not provide service facilities for rural residents, eventually villagers moved to the city. Because the city provides a variety of adequate infrastructure in various sides. In addition to the complete and adequate facilities, the city also provides high income. To build various infrastructures to connect one village to another village requires a large amount of money. Because long to make it happen, the entry of villagers into the city bodes well. The projected number of people living in the city shows an encouraging trend because it indicates that the awareness of the community to improve their lives has grown. Because inequality between villages and cities is indeed very high. If there are many people living in the village, this indicates that more and more people are not receiving development and service facilities. Because all human needs are in the city. Indeed, production can be done or must be done outside the city. However, high-income jobs, social services, and

entertainment locations are within the city. Therefore, the higher population of the city indicates that more and more people can feel the service of life. The village will still exist. Especially at this time, the government has a village budget program. However, this will not be easy to reduce the flow of migration of villagers to the city.

Indonesia has 98 cities and 419 regencies. They are a government at the local level that covers all areas of Indonesia. No part of Indonesia is not in its administration. If we pay attention, the number of cities is less than the number of regencies. Even though, as previously stated, the majority of the population will live in the city administration area. If it is not managed properly, the existence of a population within the city will cause problems for the urban area. Because they will be faced with a high population and also high population density which will cause challenges in management and also urban services. The high population living in the city can be a blessing for the city itself if the existence of these human resources can be used to increase activities in various ways that can provide benefits in the form of increasing shared prosperity and can also work together to achieve the desired target, namely a safe, comfortable and prosperous city.

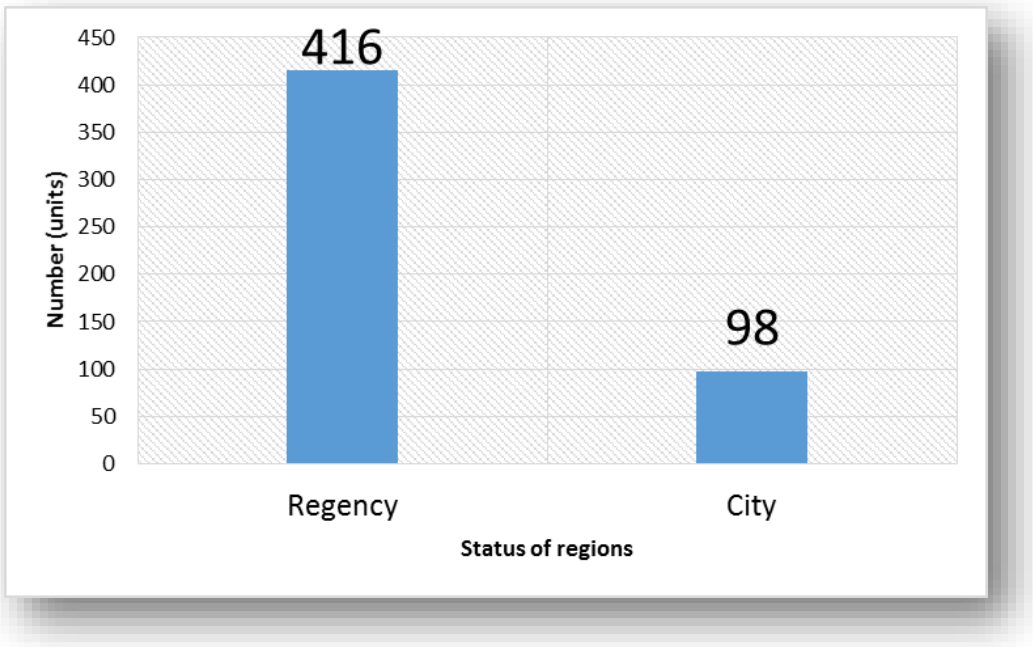


Fig 5 Number of local governments in Indonesia

Every local government will strive to provide the best service to its people. But if the number of people is too large, this will cause problems for the local government. The government will need substantial funding sources to ensure the ability of the government to provide services and security to its citizens. The only thing we have to remember is that when many people live in the city, there will be many new activities emerging within the city. And this means that there will be a new source of income in the form of new taxes or levies that can be withdrawn by the government and the money can be used to provide services and also security to the community. If the Government has a good ability to raise funds from the community, the government will be able to have substantial funds that can be returned to the community in the form of services. And the community will feel that the government's efforts to raise funds from the community provide benefits that can be felt by the community again.

1.3 Research Question

As city dwellers increase rapidly and citizens begin to increase in number and diversity, then there are some questions that require an answer.

1. How is the pattern of population growth in each city area?
2. How is the pattern of population density from the city center to the edge of city?
3. How is the effect of population growth on population structure?
4. How is the effect of population growth on the urban fabric?
5. How is the influence of population to city land use change?

These questions are asked to look at the influence and population relationships on these factors. The author wants to see the interaction and correlation between the population with these factors.

1.4 Purpose of Research

This study aims to find out several things:

- The pattern of population growth in cities in Indonesia and the effects of fertility and migration on population growth.
- The pattern of population density caused by the size of the city and the pattern of district density seen from the distance of the district to the city center.
- Changes in population structure caused by population changes.
- Changes in the urban fabric caused by population changes and population density.
- Changes in land use caused by changes in population and population density.

1.5 Contribution

The contribution of this study is to understand the influence of population growth on cities conditions, especially on issues of growth patterns, density, population structure, influence on urban fabric, and land use changes. This contribution is the starting material for research in other fields in looking at the situation of the city which must be seen in terms of changes in population and land. This research is indeed expected to contribute to the advancement of the field of urban planning population growth in urban areas is a sure thing that there will be many analyses that say that more and more people will live in the city. This will have consequences on the condition of the city physically and also non-physically. For this reason, we need to look at the impact of population growth on some of the things I mentioned earlier. Because after all, every population growth does contribute to the physical and non-physical changes in the city. If we can already see the effect of population growth in prices on the factors that are the object of this research, it is hoped that in the future more detailed research will emerge and in other fields to create a more equitable development policy strategy. Because there are many cities in Indonesia not designed to accommodate populations on a certain scale. Even to this day, the government cannot determine how many populations can and can live in the city and whether the city they manage now has a high population or is still in a population shortage. A population does contribute to the progress of the city in various ways. Therefore an increase in population is a very natural thing, and even very desirable, but on the other hand, each city does not make preparations to accommodate the population that continues to grow within the city. Therefore this research not only contributes scientifically but also is expected to contribute in terms of urban development policies that can be taken by the government in Indonesia or in any country. This research indeed

makes cities in Indonesia the object of research. But what happens to cities in Indonesia can be a lesson and experience for cities and other countries to take advantage and disadvantages and other effects. Therefore, the authors sincerely hope that the results of this study can be used in urban planning anywhere. Because of the problem of population growth and its implications for the development of cities faced by all cities in the whole world. Not only cities in Indonesia.

1.6 Research Flowchart

This study aims to examine the influence and correlation of cities population on some of issues, namely population growth, density, population structure, cities fabric pattern, land use change and factor of population distribution. These things are seen from the perspective of cities populations growth.

CHAPTER 1

The authors explain the background of the research, the problems, the research objectives, and the methods of conducting the research. In this chapter, the author will explain the background of the research conducted at this time. Especially related to population growth. The author estimates that population growth that occurs in many cities will have implications. This will be conveyed by the author in this section of the chapter.

CHAPTER 2

Describes the literature that the authors use in this study. The literature concerns the population's influence on others topics. All of these literature became the basis of the analysis and became a comparison for this study. There is a lot of literature that can be used as a reference for this research. Some literature will be presented by the author in this chapter. This literature will be the background of thinking and steps as well as consideration for determining the research theme to be taken. This reference will also be a measure of the difference between the research that the authors did with research that has been done by other researchers.

CHAPTER 3

Research methods will be discussed in this chapter. The method used will lead us to the results of the research that will be shown in another chapter. This chapter will describe step by step and logic in research to get the results of data analysis as will be achieved through the research process. In this chapter, the author did not make a new method of analyzing data and images that the author obtained from various sources. The author uses general analysis methods, uses statistical calculation tools, and other drawing tools that can help the author understand the discussion and also the problems related to the research theme.

CHAPTER 4

Its explains the trend of population growth. The discussion will be conducted by looking at the population growth in each city and compare it also classifying it. This comparison will be made by the size factor of the city. So the author will get the results of the relationship between population growth and the size of the city. The wider of the city is the higher population growth will be. In this part of the chapter, we will understand the pattern of population growth as well as several causes of population growth in cities being the object of research. Population growth is caused by many factors but in this study, the authors will look at fertility, birth and death factors and population migration factors.

CHAPTER 5

Discusses population density in cities area in Indonesia. The author wants to analyze the pattern of population density that occurs in each city and generalizes the pattern of population density. Population density is done by looking at the population density in each district when compared to the distance of the district to the city center. Thus, the author will analysis the graph of population density patterns based on the distance of the center of the district to the city center. The graph will help our understanding of population density patterns. This chapter describes the population structure. This is an influence on cities population changes. Thus, the population that works affects the city changes. The author will look at population changes and population structure changes in each city from 1980 to 2010. Changes in population structure will be seen in the three age groups of the population. Later, we will be able to see population structure changes occurring in any group. This change in population and population structure will be another research material in other fields.

CHAPTER 6

describes the effect of population on urban fabric pattern. The author makes it a change in land use for each particular group. Each block measured the built-up area by using a composition according to the method already delivered in the method. Changes in the urban fabric will be seen from changes between built-up land and land not built. Because the urban fabric does show the formation of city space in such a format. Therefore, we will see changes and compared to changes in the population of the city. So, we will get a reference to the influence of population growth and changes in the urban fabric. This chapter describes land use changes that are affected by population changes. Land use has five categoryes: building, agriculture, forest, pasture, and others. The five types of land use are analyzed along with changes in population changes. The authors used built-up data areas in 1980 and 2010 to compare land use changes in the year and compared with the current population. Each land use function has a different influence on population growth. Not all of them grow positively, some also grow negatively. Therefore, we will see, what are the uses of land that change and how much change is due to the growth of the city population.

CHAPTER 7

This chapter will discuss the results of research obtained from the research process and discussed in each chapter. The author will compile data and analysis to get findings in each discussion in each chapter. All the results that the author gets from analyzing the data and also drawings carried out in the previous chapters will be concise to be the results of research which is then discussed in this chapter. The main themes of the discussion that will be discussed in this chapter are several things related to population growth that affect other factors that exist within the city, including population density, population structure, urban space or urban fabric, and land use change. The issues will be the discussion of the author in this section by making the results of the analysis carried out in the previous chapter as a reference or reference in discussing the results of the research.

CHAPTER 8

Explains the authors' conclusions on the results of the entire study. In this section, the author will draw conclusions related to factors that are influenced by population growth within the city. The conclusions that will be taken will refer to the results of the research that has been carried out in another chapter and added with the findings of the qualitative conditions that the author gets directly in the field and refers to the objectives of this study. The conclusions taken are expected to gather all

information and also provide opinions related to the results of the research. In this chapter, the author will also provide recommendations as a proposal to various parties to conduct further research in the future. The aim is for more comprehensive development and study to occur in the future.

The summary or flowchart of research to be carried out by the author in the preparation of this report can be seen in the chart below. This section briefly describes the process that will be carried out or has been done by the author so that this research report is prepared. In the next part of this discussion, the author will explain in detail, step by step, the entire research process which will then produce an analysis that is expected to clarify the influence of population growth on urban development in several parts.

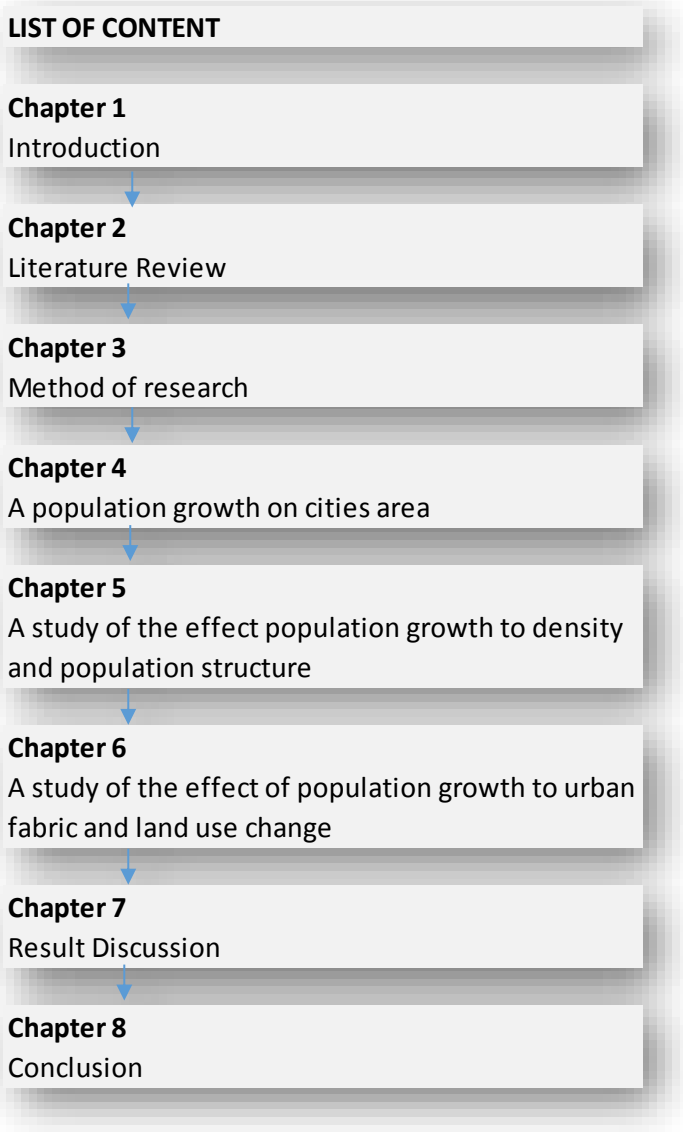


Fig 6 Chapter and research flow
Source: author

This study emphasizes population growth which has an influence on population density, population structure, change in the shape of space and also the function of the land. The phenomenon that can be seen in plain view so far and can also be felt by the changes, I will try to convey it quantitatively

and visually. The phenomenon of population changes that can have an influence on various things is generally known by various parties. But the authors assess that there has been no quantitative and academic analysis that states the existence of this influence or how much influence the population growth has on the city.

So the logic of thinking used by researchers In this study is logically related to the influence of population growth on several issues. Population growth that will continue to occur throughout the year will have an impact on various things. One of the things that want to be examined in this study is the impact on the condition of the city. The impact on the condition of the city will be seen in several factors, namely density, population structure, space form, and land use. The picture in the next section will give us an idea regarding the logic of the research that will be carried out in this research document. So population growth that occurs in several cities in Indonesia, which is the object of research, namely 15 cities, will be seen in the data and also images to see changes that occurred in 1980 to 2010. Furthermore, the authors will conduct a review of the growth of the population itself and then see the impact on several issues that are the focus of this research.

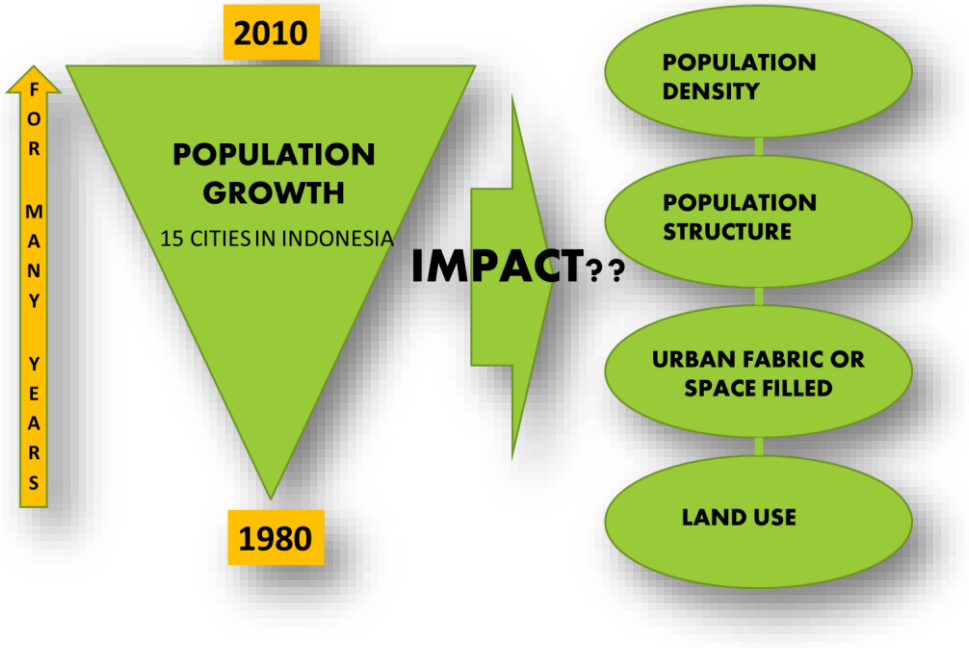


Fig 7 The process carried out in the study

1.7 Hypothesis

The author's initial hypothesis is that population growth is a result of fertilization and migration. Fertilization is a natural process for the increasing population. Fertilization has a deduction factor, namely death. If fertilization is greater than death, population growth occurs. If fertilization is smaller than death there will be a reduction in population. Population growth is also caused by migration. Within certain boundaries, there will be direct or indirect population migration. Migration has two types, namely in-migration or immigration (entering into the city area) and out-migration or emigration (out of town) (https://family.jrank.org/). Of course, the city has certain administrative limits. Exit and entry of the population in the city is very dependent on the limits of the city

administration. Furthermore, the author has a hypothesis that population growth has an influence on the condition of the city. In this study, the authors investigated several conditions in the city, namely population density, population structure, urban fabric form, and land use change.

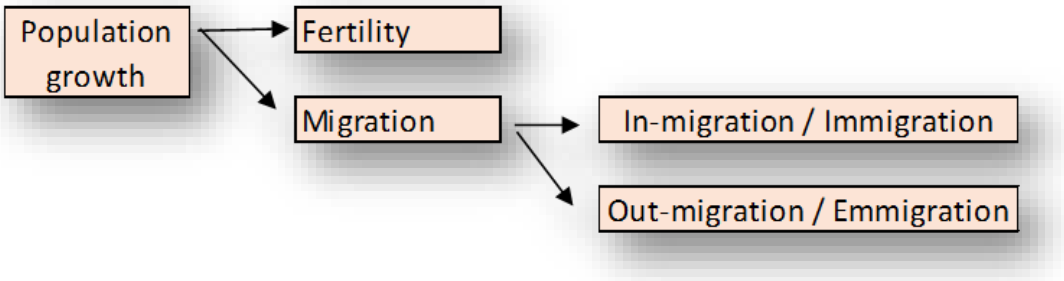


Fig 8 The elements of population growth
Source; author

Population density occurs as an effect of the comparison of the total population and size of the city. The size of the city will not change but changes will occur in the population. The author investigates and compares population density in the time period of the study, namely 1980 and 2010. The population structure will have an influence on the condition of city activities and this can be seen in terms of three categoryes of population, namely the productive group and the post-productive group. The author will make a comparison of the effect of population growth on each group earlier.The author also hypothesizes that population growth will have an influence on the shape of fabric victims. The author divides the entire city space in a block area of 500m x 500m.

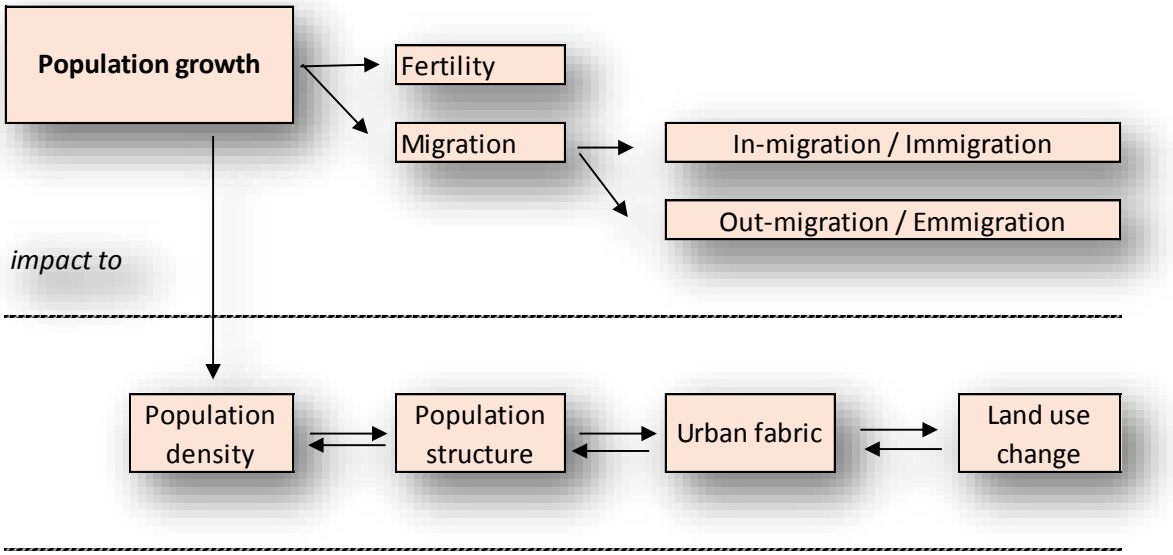


Fig 9 The impact of population growth on the city area (Hypothesis)
Source; author

Each block is analyzed for the contents of the space. For block areas that are included in certain categoryes will be combined in the category group. The results of the quantitative analysis of area blocks that have the highest density in each category will be used as analysis material. The results will show the effect of population growth on the shape of the urban fabric. The author uses the analysis

of the form of the city by using a map of the earth that is owned by the local government and Big Data Indonesia. Also use maps on Google Earth. The author analyzes maps in 1980 and 2010. Some maps are the result of aerial photography of forest areas (especially for cities in Sumatra, Kalimantan, and Sulawesi). So, the author does have a hypothesis that population growth has an influence on many things in cities in Indonesia. In this study, the authors used 15 cities as research objects. Associated with population growth, as mentioned earlier, can be caused by birth and death, and also migration. This condition then gives effect to the population growth in a city. Meanwhile for the influence of population growth on other things, will be the object of in-depth research for researchers. And to do this research, the author will involve many parties and also many sources of data as material for analyzing the influence of population growth on urban development. Regarding the correctness of the data generated from this study or the correctness of the data from the references used by the researchers in this study, everything is indeed relative. But the authors believe that the existing data can be used as material to analyze the issues that are the object of this research.

The author also hypothesizes that population growth influences the change in land use. Of course, this suspicion has indeed become a general guess. But, the author wants to see the proportion of land use changes. The author divides the function of land use in five categoryes. They are building, agriculture, pasture, forest and others (not identified). The last category is an analysis of land which is not analyzed by analysis software. To do this image analysis, the author involved map reader practitioners using the software they had. The author submits a list of analysis and land use changes that the author wants to get. The practitioner analyzes according to his expertise and produces land use change data based on satellite maps and aerial photographs owned. The results of reading the map are used by the authors to analyze quantitatively land use changes as a result of population changes.

The hypothesis in this study found an association between high growth and low density. If the population experiences a high increase then population density will be low. Likewise vice versa if the population experiences slow growth, population density will increase high. This condition provides an understanding to us that there are factors that influence the high growth and low growth in population density associated with population growth. If the population experiences a high increase and low population density, this condition is affected by the size of the city. So the size of the city has a very large influence on increasing population density. If the population is high in a city with a small size, the population will be high on the side of population density. This study found that high population growth occurred in cities of large size.

Meanwhile, cities with small sizes do not experience high population growth. This is related to the administrative capacity of urban space to accommodate populations that continue to grow high in a city. This study found that cities in Indonesia have high growth in cities of large size. Meanwhile for cities with small sizes will have a low population growth. This phenomenon shows that there is a tendency for population growth in a city to be influenced by the pattern of residential buildings in the city. Indonesia tends to have a 1-storey housing development model, different from cities in other countries that tend to have residential buildings in the form of apartments. This ultimately has an effect on the level of urban population density which is influenced by the size of the city.

Cities that have developed models of vertical settlements tend to have high populations within cities, especially in parts of the city that are close to the city center. But for cities that have not yet developed vertical settlement models, settlements will spread throughout the city and even settlements are spread out to the limits of the city administration. Because settlements tend not to be vertical, the

size of the city has a huge influence on the density of urban populations. This condition is then considered by the author to make the size of the city a factor that has a large influence on the pattern of population density in each city that is different from each other. Indeed cities that Indonesia tends not or have not developed vertical settlement patterns. The assumption that is often used by the public is the availability of vast tracts of land throughout Indonesia which then influence the settlement pattern. Moreover, land for settlements is still relatively cheap, making the pattern of non-residential settlements the most realistic choice built by the developer and for purchase by the community. If we look at the existing data, it even shows that the prices of vertical buildings are far more expensive than the prices of nonvertical buildings. This has an effect on the slow development of vertical building patterns in Indonesia. If only the price of non-vertical buildings is more expensive than the price of vertical buildings, a new settlement pattern will emerge which will lead to the form of vertical residential areas. Policies related to vertical and non-vertical settlements must be made by the government because increasingly limited land conditions can have an influence on environmental balance. If open land and protected areas are threatened by land use for settlements then there will be injustice and imbalance in land use which can then cause problems in the future. Especially problems related to environmental balance.

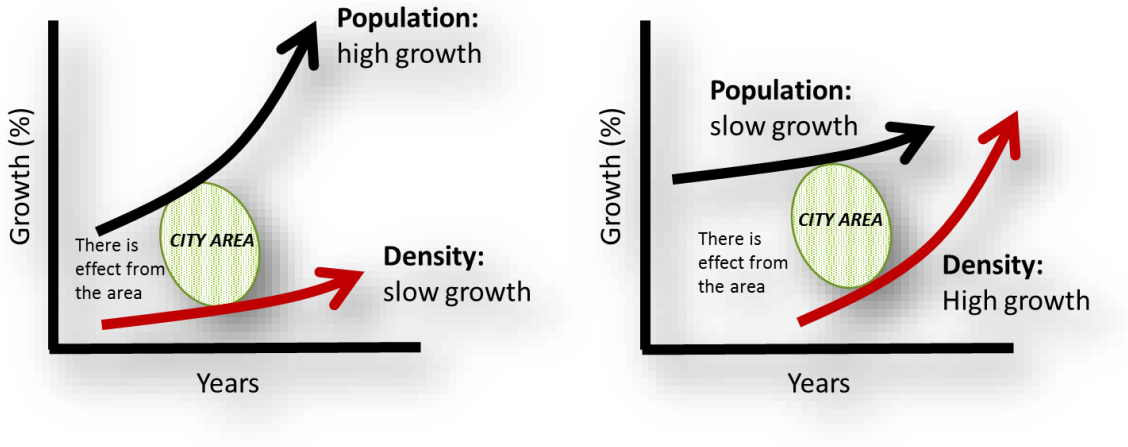


Fig 10 The hypothesis of effect of city size on population density

The author also found that there was a tendency for population densities in the city center to be higher than population densities in the suburbs. The densely populated population in the city center is influenced by activities in the city center. The city center is the economic center and also the center of government so there are many people who are trying to live close to the location because of economic considerations. In addition there is also a tendency that the city center needs a large workforce so that there are many people who try to live close to the city center in order to work in various activities in the center of the city. Meanwhile there are many people who also live in the suburbs. But they live on the outskirts of the city because of the limited space in the city center. They live on the outskirts of the city because there are many buildings that are sold at low prices so that people can reach the price of buildings on the outskirts of the city. If the prices of buildings in the city center tend to be = the price of buildings on the outskirts of the city, people will tend to stay in the city center as long as there are buildings to buy or inhabit. But in reality cities in Indonesia show that

population growth in the city center is higher and population density in the city center is also high when compared to population densities in the suburbs. And this is influenced by various factors including the housing development model of housing and also the price of buildings as a place to live.Associated with population growth compared with the trend of population growth is based on the population structure of the opinion of the author say that population growth in the scale of any size will give effect to the high growth of the population structure of pre-productive and population productive and simultaneously also give effect to the reduction in the growth of population structure for post-productive age.

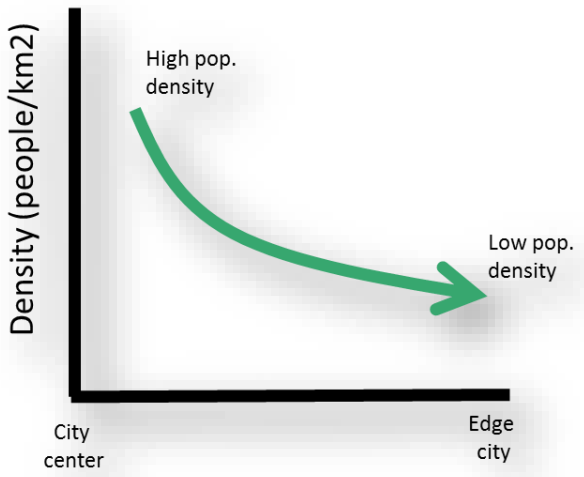


Fig 11 The hypothesis of of population density in the city center to the edge of the city

Cities in Indonesia do have a tendency to have a population with a very large workforce population structure. This has an effect on urban development because productive groups tend to be high and continue to grow high and this has an influence on the development of the city in various ways. Because after all, we have to admit that the development of the city is very much influenced by the pattern of the tendency of the people to change and the desire to change in these communities is in the productive age group. So if the population of productive age is higher when compared to other groups, there will be a tendency for urban development to occur faster. Young people do have an influence on the trend of urban development because of the high desire to change the space and function of space in the box which is considered no longer relevant to the needs and desires of the community.

That's why we need to pay attention to the population structure for urban areas because this population structure influences the trend of urban development. If we can understand the structure of urban populations and are associated with changes in the shape of urban space, we can see that certain age groups have high influence and some have a low influence on the development of urban physical conditions. High population growth will have an influence on changes in the shape of space in several categories of space. The research I did shows a change in the shape of space in category 4 when cities have high population growth. But for relatively low population growth, changes in the shape of space will occur in Category 1. Changes in the shape of space and also population growth

does have a significant influence on each other. And this is related to the use of land in each city space which is influenced by population growth which continues to increase from year to year.

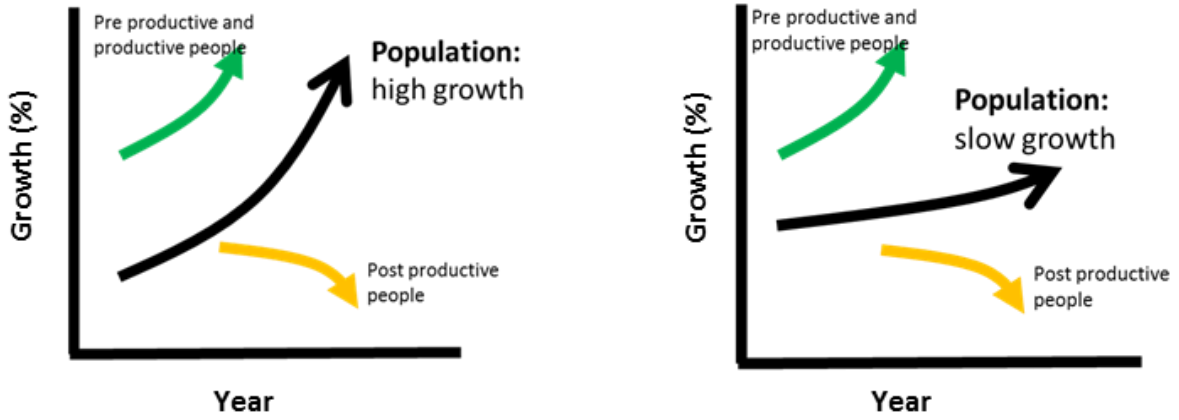


Fig 12 The hypothesis of effect of population growth on population structure proportions

Population growth does have an influence on various things including changes in the shape of space. Indeed, all forms of space experience change when population growth occurs both positive and high growth and negative and low growth. In various forms of population growth, it does have an influence on changes in the shape of urban space.

Fig 13 The hypothesis of effect of population growth on changes in the shape of space

This condition is then shown from the results of the analysis related to population growth and changes in the shape of space in several categories. The population can be said that high growth gives influence In a category with a high level of space occupancy while low population growth will have an influence on the form of space filled with buildings on a low scale. The space category does indicate the filling of space by the building. Buildings that appear from year to year are estimated to be influenced by population growth which also experiences growth from year to year. In a certain timeframe according to what is the object of this study shows that changes in space occupation have an influence on the shape of space and the category of space and also this can be caused by an increase in the need for space utilization for settlements or other buildings.

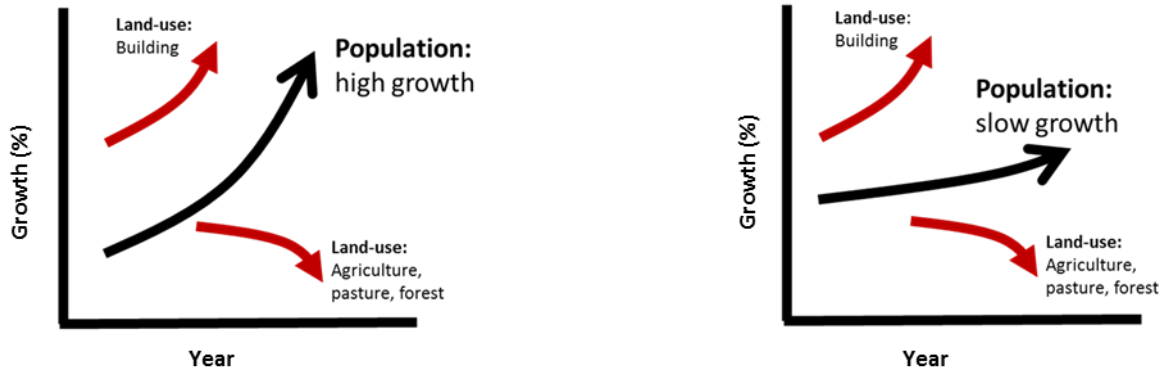


Fig 14 The hypothesis of effect of population growth on land use change

If we pay attention to changes in the shape of space associated with the growth of urban populations, we can say that population growth has an influence on the shape of urban space. This form of urban space is an effect of the pattern of physical development carried out by the community when they decided to live in the city. And simultaneously the government has an obligation to provide service facilities for its people. To guarantee adequate facilities, the government needs to build various buildings with a service function to the community. In addition, the private sector also shows that there is a tendency for them to invest in providing services to the community and simultaneously this also shows the existence of business opportunities when population growth occurs. So when population growth occurs, the Government strives to build various types of public facilities to provide services to the community and simultaneously, on the other hand, there are investors who need to build certain buildings to make population growth part of the business development they handle.

Population growth also turns out to have an effect on land function change. Just as land use changes in various cities in which countries have not consistently applied regulations on the use of space and land, changes in land functions due to population growth occur in all land functions. Positive change or increased change for the function of residential land is very large when population growth occurs on a high scale. And on the other hand, when population growth is low, changes in land functions for settlements also occur on a positive scale. But for other land functions experiencing decreased growth or even decreasing the proportion of land. From the results of this study we can say that population growth has an effect on increasing the proportion of land for residential or building land functions but simultaneously also has an effect on decreasing the proportion of land for other functions. Population growth will continue to occur in any city and in any form because of that there will be a threat of land function change in each city in various forms and in various proportions of land. Therefore, regulations are needed to maintain the proportion of land. The proportion of each function of land must be fixed so that there is no injustice in land use or unbalance between the functions of certain land and other land functions. If the land function is not balanced, it can have a negative effect on the overall urban environment. If the condition of the urban environment is not protected and can change at any time, there will be an increase in threats to human life in the city, because changes and imbalances in the function of land can have an influence on various things, especially those related to human life in the city.

CHAPTER 2 – LITERATURE REVIEW

2.1 Population Growth

Long Zhou etc. (2018). The shape of city and population growth has an effect on the size of city that will be increasingly widespread. If city becomes wider, there will be challenges for accessibility problems. Because vital objects (schools, health facilities, police stations, government service buildings) will not be available in all areas. Thus, the community must access the object from the right location. Broader city size indicates that the location of the settlement is further away from the public facilities. So they have differences in the scale of accessibility. This research shows that there are differences in the scale of accessibility because of the distribution of populations that increasingly increases the size of city. Therefore, population control must be carried out together with city size control. city size can be controlled by increasing community accessibility to homes close to the center of city or public buildings. The trick is to build apartments in areas close to public facilities. Spatial policy and price control will greatly influence the process of controlling city size and accessibility of citizens. However, if the size of city cannot be controlled quickly while the accessibility needs are higher then simultaneously the government must be able to develop an city public transportation system that provides easy access for people from settlements to other locations (offices, schools, markets, tourist attractions and so on).

Abdul Rehman and Zhang Deyuan (2018). Another influence of population growth is the increasing population needs for electricity. This increase is indicated by the difference in increasing demand in rural and city areas. Electricity is a form of versatile energy that plays an important role in meeting the daily needs of human life. The main objective of this research is to investigate and explore the relationship between economic growth, access to electricity, energy use, and population growth in city area for the period 1990-2016. Distributed deadlines to investigate causal relationships between research variables. These tests explain long-term relationships between variables; Furthermore, the results revealed that electricity's access to the total population, access to electricity for city residents, energy use, population growth, and city population growth had a significant impact on economic growth, while access to electricity for rural residents and rural populations had a negative impact on economic growth.

Muhammad Tajuri Ahmad and Naim Haie Water (2018). According to their findings, the government pays more attention to the increase in population that has an impact on electricity production, energy must be taken from various sources, including hydro, solar, oil and gas, and nuclear power plants to fulfill demand as a result of increasing population growth in city areas. The availability of energy influences the increase in the city's population. Because people need energy as a source of economic activity. Improving the performance of the water use system is very important to overcome the pressure on water resources for sustainability. Although the potential impact of population growth and global warming is mainly in semi-arid regions, knowledge and understanding of resource management and the main driving impacts of performance change can have an influence on population growth through immigration (incoming residents). This paper assesses the effects of the quantity, quality, and benefits of using water resources on increasing city populations. Because the city has the infrastructure to serve the basic needs of the community. They found that resource management performance is very sensitive to population growth and global warming in scenarios that

are considered in the future. Natural conditions are relatively less sensitive to the effects of global warming, while high population growth has a dominant influence. In addition, their combined effect will result in a reduction in downstream water by 70% and potential demand will far exceed the supply available in 2050 as an impact of population growth. It is recommended that efficient water management regarding qualitative and quantitative aspects is very important in the management of city populations. This study can be considered as the first step, and further research can adopt the methodology described and can utilize smart technology because this study shows there is an influence of natural resources on increasing city populations.

Cornelius Okello etc. (2015). Population growth influences freshwater demand, changes in land use and climate variations, which causes uncertain water availability in the future. Population leads to exploitation of natural resources which leads to increased consumption of other resources. The purpose of this study is to identify the influence of population growth caused by changes in land use and climate change in the future where major infrastructure facilities are being built. The results of this study indicate that the development scenario "no industrial development" (assuming infrastructure is not built) is expected to reach ~ 50,000 people by 2050, while the projected population after completion is estimated at 1.25 million in the same year when large infrastructure continues built. Increased population puts pressure on the availability of ground water per capita every day, while demand is expected to increase in 2050 according to the projections of "population development and projections". The development of industrial estates has an impact on increasing population, and the ahl has an impact on aquifers that are the main source of water, and could be affected in 2065 when the population scenario "development of the industrial era", was running. The modeling results show that the population influences climate change Conservative Concentration which will have a smaller impact on the volume of clean water reserves mentioned in the Special Report on Emission Scenarios which suggest "no industrial development", so as not to rapidly increase the population. Population growth exacerbated by changes in land use will be a more significant driving force than climate change in influencing the availability of fresh water.

Bin Gao (2015). The emergence of cityization and the existence of high levels of cityization as measured by various indicators still have not reached consensus, which can hinder our understanding of the process of cityization and its impact on the environment. The aim of this study was to describe a reliable method for estimating cityization levels based on the Operational Line Scanning System at night on the Light Meteorology Defense Program and to analyze the dynamics of cityization in 1992 to 2012. They calculated a comprehensive level of cityization at the national, provincial and district scale by using a compound night light index and comparing rates of change with people from two other conventional cityization level indicators, the proportion of non-agricultural populations and the proportion of regions built. The results show that a relatively reliable and accurate measure of the level of comprehensive cityization can help analyze population growth in certain cities.

Over the past two decades, cityization has taken place very rapidly and has created large regional variations. The imbalance between population growth, city expansion and socio-economic development can affect sustainable city development, we must pay more attention to these components with large differences between various indicators. This indicator can have an impact on the future of city areas that have major challenges. Often, this big challenge is not seen as a challenge for the city, even as a normal phenomenon. Finally, when something bad happens, the awareness of city management about big challenges is too late and can no longer be handled in a normal way.

2.2 Population Density

Al-Gabbani Mohammed (1991). This paper examines and assesses changes in patterns of population density in the city of Riyadh, the capital of Saudi Arabia where the city has undergone dramatic changes in its physical as well as social structure. Data analysis revealed a decrease in population density at the exponential rate of the city center with variations between city and zonal sectors. Horizontal expansion and rapid city spreading are the result of factors such as city population increases and the size and number of single family dwellings, widening of roads, increasing incomes and levels of housing mobility, massive car use, changes in family size, zoning regulations, leaps and big city government development projects. The low pattern of population density makes it difficult for city officials to provide the services and facilities needed for the development of dispersed housing. Residents spread to all areas of the city because people have high incomes, have vehicles to serve mobility, and housing development is done in places far from the city center. So that the whole area of the city has a building settlement and cause the existence of sprawl city. The difference with the research that the authors do is the authors make comparisons of population density of several cities in Indonesia as one of the developing countries.

Kyle Fee, Daniel Hartley (2012). In this paper they compare the spatial patterns of population density and other demographic changes in growth versus depreciation from 1980 to 2010. They found that, on average, the highest decline in population density occurred near the Central Business District (CBD). Motivated by this fact, they explore the relationship between changes in population density at its core and productivity. We found that changes in population density in almost CBD were positively associated with growth in per capita income. city Center as an economic center faces new challenges in the form of several new city centers. The new city Center was formed as a result of city economic development. Accumulation of city economic activities that encourage the establishment of centers of economic activity and offices in new places. The formation of a new economic center has caused a group of high-income people. Changes in public comfort, they tend to not like housing close to the center of economic activity. So population density decreases from downtown to out of town. The city Center does have a high density at the beginning of city economic development. And it will gradually decline to become an economic center with low population density because people are more prosperous and people choose to use the area outside the city as the location of new settlements. Because it is far from the problem of congestion, noise, city crowds. They consider the economic center no longer feasible as a housing location.

Martori, Joan Carles; Suriñach-Caralt, Jordi. (2001). city density analysis examines the spatial distribution of populations (large or small) in city areas. This analysis provides a measure of concentration that is very helpful when examining city structures. In this paper, they studied sixteen classic functional forms regarding the relationship between spatial density in the city center. city structures can be measured by trends in city density. The study of the structure of cities and populations in one study is the most relevant step in city studies. Because, city was formed to serve humans. If the population of the city is more and more diverse, they will need different things according to the needs of their individuals or groups. Therefore, it is necessary to sort the population according to the real conditions in the field to make an city study. Because when people are grouped by type of work, their needs will be different from the unemployment group. Population groups at a certain age will also be different from other age groups. All city development programs should have a correlation and comparison with the conditions of the city population.

Alain Bertaud and Stephen Malpezzi (1999). The most common city-size form of city economists is the population density gradient of the negative exponential function. Investigations of city densities have been largely undertaken by scholars. And they always find exponential functions in every study of population density. Some indicate high population density conditions in the city center, but there are also findings that show low density in downtown and high in the suburbs. This diversity raises its own interest to address the cause of the difference in conditions. Of course, every city has different conditions with the conditions of other cities. And it could be, all can not be equated with each other. Because every city has its own characteristics. The government of every city requires an understanding of the condition of the city which is distinctive and different from other cities. So the policy made is a policy that is in line with the needs of the city itself. Not equating a city program with other cities. Although, in some cases a similar condition will be found. Research conducted on 35 cities around the world shows the economic contribution, city planning and landscape conditions caused a difference between one city to another.

David I. Stern (1993). Recent research has emphasized the dependence of pathways and the influence of antique factors in city development. Jerusalem and Tel Aviv are cities where the modern CBD is not in its historic location. The distance from the historic center is taken as a proxy of housing and vintage infrastructure. The poly-sentric city population density function is used to assess the relative importance of distance from the CBD and from the historic center in explaining population density. In addition, the author examined econometrically the validity of a number of population density functions, and analyzed the structure of error variance and the appropriate size design of the goodness of fit test and the hypothesis for the population density regression model. The results show that the distance from the historical center is an important factor in explaining population density but the explanatory power has decreased over time. This is more significant than the distance from the CBD in explaining the density of housing in Tel Aviv and the gross density in Jerusalem. This explains the greater proportion of the gross density diversity in the city center than the distance from the CBD, but vice versa in the suburbs.

Hafiza Khatun, Nishat Falgunee, Md. Juel Rana Pole (2015). The increase in city populations worldwide attracted special attention to research on the density of city populations. Based on Thana level census data for 2001 and 2011, this study attempts to analyze the density of the city population gradient in the Metropolitan Region of Dhaka using Geographic Information System (GIS). Four mathematical functions have been considered to examine population density changes with distance from the CBD, after the classic work of Colin Clark in 1951. The density of the gradient appears to follow a negative exponential function. The results show that the horizontal density curve over time, indicating a greater increase in population density in areas located further away from the CBD than adjacent areas. GIS-based surface modeling using density contours indicates the spatial pattern of population density has changed substantially. This study further reinforces that history and economic factors affect the pattern and changes in population density in the Dhaka Metropolitan Area (DMA). This study shows an interesting condition where high population density occurs in the suburbs. Whereas before happened in many cities there is high density in the middle of downtown.

Research that has been done has differences with the research that the authors do. Although in some ways the author did a combination. Among others are; this study was conducted by looking at the combination of population data in each district. Then analyzed the distance of the central district to the city center. From there the authors obtain population density (district) based on the distance of the district to the city center.

2.3 Population Structure

Team F. Liao (2013). Gender reality in the local area is a major problem in the current global economy. However, the process of globalization at the end of the 19th century involved Nagano local women in a very important role in the Japanese raw silk industry. This paper examines the interaction between population growth and resources which were relatively limited in Nagano vis-à-vis demand for female labor during the Meiji era, when Japan became a major producer of raw silk. Local / regional constraints in Nagano interact with economic globalization and give Nagano its position in the global market. Therefore, we cannot ignore the consequences of local / regional constraints / advantages in the global process for women workers. Population pressure and environmental stress have been found as important forces that integrate local and regional processes in industrialization and global trade, and together, they produce social outcomes, such as gender hierarchies in the process of globalization and globalization.

Sha Cao, Dingde Xu and Shaoquan Liu (2018). Based on survey data collected in 2016 from 100 villages in five provinces in China, this paper uses a binary logistics model to explore the main factors related to the supply and quality of solid waste collection services, especially those that focus on the characteristic role of village population structures. This is indicated by the results that the characteristics of the village population structure are significantly correlated with service; in particular: (1) the total population of registered villagers is significantly positively correlated with waste service provision, but the correlation between the registered population and negative service quality and the more workers work and live outside the village, the less likely the village to provide services; (2) the education level of villagers and services does not show a significant correlation at this stage; (3) preferential policies caused by superior population structure play a positive role in service delivery but are not clearly related to the quality of waste treatment services, especially in villages with a larger minority population. In addition, this study found that, the level of village economic development and characteristics of village heads also positively correlated with the supply and quality of waste management services and; Natural conditions and traffic do not have a significant correlation with service. This study can act as a reference for further promotion of rural and city waste service development.

Martin Hilbert (2017). In our information age, information alone has become a driver of social growth. Information is the fuel of the "big data" company, and the decision-making compass of policy makers. Can we measure how much information leads to how much potential for social growth? Information theory is used to show that information (in bits) is effectively a quantifiable growth material. This article presents a single equation that allows both to describe natural selection of developing populations and to optimize the fitness of populations in uncertain environments through intervention. This arrangement analyzes the communication channel between a growing population and an uncertain environment. The role of information in population growth can be considered as optimizing the flow of information through these noisy channels (more or less). Optimized growth implies that populations absorb all environmental structures communicated during evolutionary renewal (measured by their reciprocal information). This is achieved by adjusting endogenously the population structure with exogenous environmental patterns (through hedging / portfolio management). Arrangements can be applied to describe discrete population growth in a stationary, stochastic (economic, cultural or biological) environment. Two empirical examples of information

economics reveal inherent trade-offs between the amount of information involved during growth optimization.

Wen Guo and Tao Sun (2016). This paper extends the Logarithmic Mean Divisia Index (LMDI) model through the introduction of cityization, population consumption, and other factors, and changes in decomposed carbon emissions in China to the effects of carbon emission factors, effects of energy intensity, effects of factors inhibiting consumption, effects of cityization, the effect of population consumption, and the effect of population scale, and then explore the level of contribution and mechanism of action of the above six factors on changes in carbon emissions in China. Then, the effect of population structure changes on carbon emissions was analyzed by taking 2003-2012 as the sample period, and combining this with panel data from 30 provinces in China. The results show that in 2003–2012, total carbon emissions increased by 4.2117 billion tons in China. The effects of consumption inhibition factors, the effects of cityization, the effects of population consumption, and the effect of population scale encourage an increase in carbon emissions, and the contribution ratios are 27.44%, 12,70%, 74.96%, and 5.90% respectively. However, the effect of carbon emission factors (52.54%) and the effect of energy intensity (−18.46%) on negative carbon emissions. Population cityization has become the main population factor affecting carbon emissions in China. The "East Merger" phenomenon causes the effect of population scale in the eastern region to be significantly higher than in the central and western regions, but the contribution rate of the effect of its energy intensity (−11.10 million tons) is significantly smaller than in the center (−21.61 million tons) and the western region (−13.29 million tons), and the effect of carbon emission factors in the central region (−3.33 million tons) significantly higher than in the east (−2.00 million tons) and western regions (- 1.08 million tons) . During the sample period, changes in the age structure of the population, the structure of population education, and the structure of population employment eased the growth of carbon emissions in China, but the effects of changes in population, city and rural structures, regional economic levels, and population size increased in carbon emissions. Finally, changes in the population's sex structure do not have a significant effect on changes in carbon emissions.

2.4 Urban Fabric

Giles Thomson, Peter Newman (2018). City changes that involve many things have an impact on urban fabric patterns. Rapidly growing cities in various sectors have had an impact on the shape of the city's face. The most visible change is there is the massive land-use. If previously there is still a lot of vacant land that is used only as land is not built, gradually turned into a dense area with buildings and economic activities. The land changes are normal. Surprises of development, for example through the construction of certain projects by the government, on a large scale, hardly found in a city that embraces gradual growth and holds the metabolic pattern of the city. urban fabric pattern is strongly influenced by non-productive land development into productive land. When a land is transformed into productive land, the land itself forms an access road network. This is what affects urban fabric pattern because the pattern of city shape is influenced by the pattern of road network built to support accessibility.

Dagmar Haase, Nadja Kabisch, Annegret Haase (2013). The debate about the changing face of the city has long been done by many scholars. The debate has to do with the effect of population changes on changes in city form. Because the population increase automatically increase the number of households. When the household is formed then by itself it also has an impact on increasing housing needs. And this is what causes the changing shape of the face of the city. Some land is not productive

and even still shaped landscape that has not been formed in accordance with human needs, can be fertilized into land equipped with buildings that are in line with the needs of the population. The rapidly growing population will in itself improve the shape of the city's faces. Therefore, in this study, a study on population and housing provision is adjusted or balanced. Do not let the population much but a little house, or a little population but the supply of excess housing. This balance requires review so that there is no mismatch between one program and another.

Penny Allan, Martin Bryant, Camila Wirsching, Daniela Garcia & Maria Teresa Rodriguez (2013). When a city faces a disaster and there is damage to the city, then the choice of citizens of the city there are two. Survive in that location or build on other land. There are many cities that can survive as a city, and make the city even better, because the people choose to survive in the city and even create better conditions for the city. A city that can survive when hit by disaster, a city that is able to provide the best service to its people amid the existing limitations, and so on. Earthquakes are a very frequent disaster in many countries. Earthquakes can change everything. Community has plans to build houses, usually have begun to consider the location of the factors that are prone to disaster. If the disaster in the location is real, if indeed they have other options, then they will look for another place as the location of the residence. And what makes a city stand is the decision of the local people to remain in the disaster-prone city. It makes the urban fabric pattern unchanged significantly.

Abdol AzizShahraki (2017). Many cities are built without any control from the government. Whereas the control will put a city into the category of city plans. There is a lot of background about the unplanned city. Some of them are city planning created after the city is formed. So control becomes not easy to do. Except for future development. But for buildings that already exist at this time, it becomes very difficult to organize. That is why, property investment becomes one of the alternative government to make changes to the physical form of the city that has been formed without a plan. In addition, part of the city government that is the district actually has the ability to control and organize the city. But every district is faced with the problem of resources and authority. To ensure the district can be organized by the district government itself, the process is also very long. Because there are many things to be prepared. But surrendering the city's future to an agency without authority, will not produce anything to match expectations. Consolidation of planning and authority of building permits and control becomes an issue that needs to be managed and realized in the future. Manuel Wolff, Dagmar Haase, Annegret Haase (2017). Good city planning will actually bring a city into a compact form. Because the population will live in an area that is already established by the government. The capacity of the region can also be managed well because already planned from the beginning. So the home supply has also been adapted. Therefore, cities everywhere should be able to work to build a compact city. The trick is to control the population of the population. Controlling the population. The fastest way to control it is to build houses in accordance with the capacity to accommodate housing construction in accordance with the provisions and the like. So that there is a division of population and population distribution based on the design of the spread by the government. And it is very much related to the distribution of home availability. Therefore, the development of flats is very influential on the level of population density that will encourage the realization of compact city conditions.

2.5 Land Use Change

Richard E. Bilsborrow; Alisson F. Barbieri; William Pan (2004). This paper is about migrants and their influence in the Amazon landscape. We discussed the data collection methodology and summarized key results on the characteristics of settlers and changes in population, land use, land ownership,

technology, labour allocation, and living conditions, as well as the relationship between population changes and land use changes over time. Population in the study area has grown rapidly due to the growth of natural populations (high fertility) and inward migration. This has led to dramatic plot subdivision and fragmentation processes in the 1990s, in contrast to the consolidation of plots that have occurred in most mature border areas in the Brazilian Amazon. This condition causes a change of land within the study area. Land changes caused by the demands of existing conditions. Control of land conversion becomes difficult to do because there are obstacles to the control of the entry of outsiders. While the location of this study shows the attractiveness of the area for residents and outside residents to come and take advantage of all the potential land in the study site. There is an influence on environmental conditions in a broad sense. People use land for the benefit of their life and generation. While on the other hand, the location of the study so far safe from human distcityce, to be disturbed and cause serious problems in the internal location of the study.

I. Ouedraogo M. Tigabu P. Savadogo H. Compaoré P. C. Odén J. M. Ouadba (2010). This paper assesses the impact of the population increase on land use changes in the towing zone from 1986 to 2006. Satellite imagery is used to measure changes in land cover types over time and national census data is used to examine the above population dynamics same. Pearson's correlation analysis revealed the positive role of population size and distribution in explaining land cover changes. Pearson's correlation analysis revealed the positive role of population size and distribution in explaining land cover changes. This research is in line with the research that the authors do today. The study of land change is seen from the side of the land cover. Changing land cover combined with population changes. The analysis is done by regression analysis. The study of land cover and the population within it can give us an idea of the link between land change at the start of the study and at the end of the study, as well as the trend of population change occurring during the year of study. Land cover and population are strongly related to one variable with another. The emphasis on land change will strengthen the study. As for the population data can use statistical data and population projection.

David O. Yawson, Barry J. Mulholland, Tom Ball, Michael O. Adu, Sushil Mohan and Philip J. White (2017). Land use change due to increased food and vegetable ingredients in the UK. There must be an effort to achieve self-sufficiency. Changes in land use are due to changes in agricultural land function. Because there are foodstuffs whose prices are declining so that the agricultural land is abandoned and not taken care of again. Changes in the function of agricultural land cause problems for a city or even a country. These changes have economic and social impacts. So any change of land use should remain under the direct control and control of the government. Because the government has knowledge of the need for a certain area of land use to sustain the economic activities of a city. Also the government knows how strong the carrying capacity of land use is to ensure the survival of all citizens of the city. But the government must also have a plan that can be accounted for. All documents prepared by the government should be accountable scientifically and academically. So in determining the extent of certain land use that must exist within a city area, it is determined based on scientific studies and is indeed required by the city.

Aggrey Daniel Maina Thuo (2013). This paper, using multiple theoretical frameworks and qualitative research approaches, attempts to illustrate the positive and detrimental effects of cityization on land-use planning, livelihoods and the environment on the rural-city outskirts, using the Karuri city Council, in rural Nairobi-Nairobi, Kenya, as a case study. Areas that are prone to changes in land use are areas in the suburbs. Because the city center is already formed into an economic center so that much empowered land into economic activity. But for area on the edge of the city, and use there are still

many non-productive land and conservation land. There are even villages that then change slowly into new business areas with a diversity of functions. As; a shopping center equipped with entertainment and residential centers. Subcity areas have a cheaper land price compared to land prices near the city center. So much new development to meet the needs of new communities is done outside the city center. This causes a change in land use function. And that is inevitable. The only thing you can do is to control those land use changes to a certain percentage level.

Xiaowei Yao, Zhanqi Wang, and Hua Wang (2015). Changes in land use in riverbanks that have been the center of economic activity for a long time, have had an impact on the confusion. Environmental changes will occur when land use changes from previous land types and functions. Land use change affects the environment sector. Biota and other plants become changed or even extinct when a certain land changes function. For example, the swamp, when converted into a port or dock area, eventually the entire activity of non-human beings become totally changed. In the end it has an impact on the environmental balance. It also has an impact on global climate conditions. Because ecosystems that are in a zone will be associated with the ecosystem in other zones. So overall, if an ecosystem changes then another ecosystem that is in another place will also change. Research conducted in the area along the river provides an understanding of land use change and its impact on the ecosystem and its impact on global climate. Moreover, the changes that occur in this river is a large-scale change. So it is natural to cause global environmental problems.

Zhanqi Wang, Ji Chai and Bingqing Li (2016). This study aims to reveal the impact of land use change on the living standards of residents in Yangzhou based on city metabolism with sensitivity and regression analysis. The results showed that during the period of 1995-2014, the fluctuation of energy increased about 156.56% and the ratio of fuel & electriCity flow increased from 2.86% to 9.20% due to greater energy demand. Meanwhile, the constructed land increased 415.05 km2 and the cultivated land was reduced by 417.24 km2. Sensitivity analysis shows that expanding the built land increases living standards of the inhabitants and enriches their material life, while people's lives are also increasingly dependent on energy consumption and reduced sustainability. Regression analysis shows that people's lifestyles are transformed into the use of economical and intensive resources with the expansion of built areas. Thus, the increasing incomes of the community as sustained by adequate city infrastructure, have an effect on increasing land use. And it has an impact on the improvement of city land use function. Associated with this study, the authors have differences with previous studies. The authors conducted a study of land use changes caused by population increases. So the author tries to examine a thing by looking at the root of land use change that is human population. If the city population increases then it directly affects land use. That is why the authors do this research to see the condition of land use change from the perspective of the population alone.

2.6 Population Distribution

Jie Feng (2018). Accurate, real-time and subtle spatial population distribution is very important for city planning, government management, and advertising promotion. Limited by techniques and tools, we rely on censuses to get this information in the past, which is rough and expensive. The popularity of cellphones gives us new opportunities to investigate population estimates. However, real-time and accurate population estimates are still a challenging problem because of rough localization and complicated user behavior. With the aid of passive human mobility and the location of cellular networks including detailed call records and mobility management signals, we developed a bimodal model outside of previous work to better estimate real-time population distribution on a metropolitan

scale. We discuss how estimation intervals, granularity spaces, and data types will influence estimation accuracy, and finding data collected from mobility management signals with 30 minute estimation intervals performs better which reduces population estimation errors by 30% in terms of Average Box Root Errors (RMSE). These results show us the great potential of using bimodal models and mobile data to estimate population distribution in real time.

Minmin Li (2018). With the process of cityization increasingly fast, the population is increasingly concentrating in city areas. Given the large population in China and a series of problems in the rapid cityization process, there are no integrated steps to characterize population patterns. This study explores the pattern of Chinese population distribution and proposes the spatial distribution structure of the population using GIS (Geographic Information System) analysis. The main findings are as follows: (1) In 2015, the distribution of population density in China presents a pattern of high in the southeast and low in the northwest based on the administrative level of the district.

The main population lives in southeast China based on "Hu Huanyong Line". (2) There is a big difference from the spatial correlation between land area, population and GDP (Gross Domestic Product) in China. The economic concentration in China is higher than the population concentration. In areas where population and GDP are collected, GDP per capita is higher. (3) Based on regions with very aggregate populations and GDP, the structure of the spatial distribution of the population "1 + 4 + 11" for Chinese cityization is put forward, that is, one aggregate national level population and GDP, 4 regions - aggregate population area and GDP, and 11 regional aggregate population and GDP. This spatial structure is an effort to explore the direction of China's cityization, and can be used to optimize spatial development patterns and provide scientific guidance for future cityization plans.

Sophie Mossoux (2018). Mapping accurate population distribution is very important for policy making, city planning, administration, and risk management in hazardous areas. In some countries, however, population data are not routinely collected and are rarely available at high spatial resolutions. In this study, we propose an approach to estimating the absolute number of people at the environmental level, combining data obtained through field work with high-resolution remote sensing. This approach was tested on Ngazidja Island (Union of the Comoros). A detailed survey of the environment at individual occupancy rates shows that the average population per residence differs significantly between buildings characterized by different roof types.

First, the high spatial resolution of remote sensing imagery is used to determine the location of each building, and second to determine the type of roof for each building, using an object-based classification approach. Knowing the location of each house and the type of roof, the population estimated at the environmental level uses data on house occupancy from the field survey. To correct misclassified bias in roof type discrimination, a reverse calibration approach is applied. To assess the impact of variation in average occupancy between the environments in the model results, a measure of the confidence level of the population estimate is calculated. Validation using the leave-one-out approach shows a low model bias, and 17% relative error at the environmental level. With the increasing availability of high-resolution remote sensing data, population estimation methods combining data from remote sensing field surveys, as proposed in this study, have great promise for systematic mapping of population distribution in areas where reliable census data is not available regular.

Sisi Yu (2018). Accurate and detailed monitoring of population distribution and evolution is very important in formulating population planning strategies in China. The Linescan System Operations

Program (LDSC) operated by the Meteorological Satellite Meteorology Agency (DMSP / OLS) nightlight time drawing product (NLT) offers a good opportunity to detect population distribution because of its high association with human activity. However, their detection capabilities are very limited due to lack of calibration in flight. At present, the synergistic use of NLT products that are systematically corrected and population spatialization is rarely applied. This work proposes a methodology for increasing the application accuracy and versatility of NLT products, explores a feasible approach to quantitatively flattening populations to 1km × 1km grid units, and reveals spatio-temporal characteristics of population distributions from 2000 to 2010. Results are shown that, (1) after inter-calibration, geometric, nonconformity and discontinuity corrections, and adjustments based on vegetation information, NTL product discontinuities and discontinuities were successfully solved. Thus, detailed residential areas and differences in luminance between city core and peripheral regions can be obtained. (2) Population spatial methods can effectively obtain population information per km2 with high accuracy and show more details in the evolution of population distribution. (3) Clear differences in spatio-temporal characteristics exist in four economic regions, from aspects of distribution and population dynamics, as well as population-weighted centroids. The eastern region is the most densely populated with the largest increase, followed by the central, northeast, and western regions. The center of mass of the population from the east, west and northeast moves along the southwest, while the center of the mass-weight mass of the central region moves along the southeast. (4) Distribution of population and dynamics at nine levels of population density differ significantly. In the period 2000–2010, populations in non-human types and high concentrations showed a net decline. The population in seven other regions all increased with a net increase from 25 km2 (moderate concentration type) to 245,668 km2 (general transition type). Unless they are in very rare core and type concentrations, population-weighted centroids in all other population densities move along the southwest.

Hao Wu (2018). city green space is closely related to the quality of life of citizens. However, traditional approaches to planning often fail to address service capacity and actual user requests. In this study, facilitated by mobile location data, features that were more specific to the spatial distribution of city residents were identified. Furthermore, population distribution in relation to the traffic analysis zone is mapped. On this basis, the two-step floating catchment method (2SFCA) was adopted in combination with city green space planning to evaluate the area of per capita green space and its accessibility in practice. Furthermore, the classification of regions per capita and the spatial distribution of green spaces within the study area were obtained; thus, city districts that currently have low access to green areas are identified and can be considered as the main areas for planning green areas in the future. This study concluded that mobile data can be used to map the spatial distribution of the population more accurately; Meanwhile, 2SFCA offers a more comprehensive quantitative measurement of supply and demand for green space. The combination of the two can be used as an important basis for decision making in city green space planning. Because city green spaces can be considered as a kind of public facility, this research methodology is also believed to be applicable in the study of other types of city facilities.

2.7 Summary of All Reference Discussions

A summary of all the discussion about the references above can be seen in the table below. This table can help us understand in a simple way the results of the research conducted by previous researchers

and become a reference for the research that the author will do. A summary of all previous discussions can be seen in the Table 1.

Table 1 Summary of reference reviews

AUTHOR	PLACE OF STUDY	YEAR	TYPE OF ANALYSIS	CITY FORM CONSIDERED	ISSUE OF RESEARCH	EMPIRICAL RESULT
Long Zhou et al	A small to medium city in USA	2018	H	city area	Population growth, size of city, accessibility, price of land, spatial planning	Population growth affects the size of the city. city size affects accessibility
Abdul Rehman and Zhang Deyuan	Pakistan	2018	M	Rural and city	Populaton growth, economic, energy use, access to electric, electric consumption	city population growth had a significant impact on economic growth, while access to electriCity to rural residents and rural populations had a negative impact on economic growth
Muhammad Tajuri Ahmad and Naim Haie Water	Nigeria	2018	H	River zone	Water management system, sustainability, population growth, global warming, water supply	Population growth has an influence on clean water management. If there is no management of population growth, this can reduce water availability.
Cornelius Okello et al	Kenya	2015	D	Non industrial area	Fresh water, population growth, land use change, climate change, ground water, non industrial development	Population growth has an influence on the availability of ground water. If there is no population control policy, then the population will pose a threat to ground water
Bin Gao	Eastern and westen city in China	2015	D	city area	Populaton growth, level of cityization, imbalancing, city expansion, socio economic development	There is an imbalance between regional growth. Factors that cause unbalance are population growth, city expansion, and socio-economic development.
Al-Gabbani Mohammed	Riyadh	1991	D	city area	Population density, population growth, physical and social change, widening road, increase income, family size, massive car use, zoning regulation	Population distribution occurs due to increased economic capacity, car use, housing policies and widening of roads. The city gets wider because the population increases and raises many needs.
Kyle Fee, Daniel Hartley	Cleveland	2012	H	city area	Population growth, density, demographic growth, depreciation, income, comfort	Population density decreases if it is far from the city center. The city center is the center of economic activity. Many residents live in the location of economic activities. The goal is to increase revenue, comfort, complete facilities, and future security.
Martori, Joan Carles; Suriñach-Caralt, Jordi	Barcelona	2001	H	city area	city density, spatial distribution, city structure, diversity, city structure, age	Population density spread throughout the city. Population distribution affects the city structure and functions of inner city space.
Alain Bertaud and Stephen Malpezzi		1999	D	city	city size, density, economic activity, city center city planning and landscape condition	The density of city residents is influenced by economic activity. The city center as a center of economic activity has a high population density. Development policies and the dissemination of activities can affect population density patterns.
David I. Stern	Jerusalem, Tel Aviv	1993	M	city center	Pathways, city center, CBD, regression models	The city center is always interesting to investigate. Population density in the city center has an influence on social factors. The desires and needs of the people are different between residents in the city center and the edge of the city.

AUTHOR	PLACE OF STUDY	YEAR	TYPE OF ANALYSIS	CITY FORM CONSIDERED	ISSUE OF RESEARCH	EMPIRICAL RESULT
Hafiza Khatun, Nishat Falgunee, Md. Juel Rana Pole	Dhaka	2015	M	city area	CBD, density, distance, spatial change and pattern, city center	The density of the population of the city center can be seen and analyzed using GIS. Data shows there is a change in population density in the city center to the outskirts of the city. This affects the shape of city space.
Tim F. Liao	Nagano, Japan	2013	D	Industrial area	Gender, labor, population growth, limited human resource, economic	The limited workforce has an influence on city economic activities. Regional development can be seen from the population structure. If there is an imbalance in population structure, special policies are needed to provide and prepare labor.
Sha Cao, Dingde Xu and Shaoquan Liu	China	2018	D	Village area	Village, population, economic, education, age, rural housing	Village growth will be high if you have development policies that encourage economic activity. The quality of education of villagers (by gender) can accelerate village development. Demand for houses will be high because there are many more families.
Martin Hilbert		2017	H	city area	Sosial growth, environment, population grwth, density, population development	Age of population influences city social conditions. Population structure is influenced by uncertain environmental conditions. Development of the population must be done by paying attention to quality growth.
Wen Guo and Tao Sun	China	2016	H	city area	Cityization, population growth, carbon emission, energy intensity, consumption, population structure	Population structure influences the pattern of energy consumption in the city area. Changes in population will affect changes in population structure. So that population structure, age, education and employment have an influence on energy consumption patterns that affect air pollution.
Corina E. Tarnita		2015	H	General	Mixed population, population structure, strategy to survive, trust, non random interaction	Population structure influences the diversity of social interactions within the city. More and more residents will be increasingly diverse interaction models. Therefore, the diversity of population structures requires rules of play in the social life of city communities to ensure city life becomes more organized.
Giles Thomson, Peter Newman		2018	D	city area	city change, population growth, urban fabric, land use change, metabolic city, development	Large-scale city development has an influence on the city's metabolism. Changes in land use are common events that occur within the city. The study shows that there has been a change in productive land to become the location of city infrastructure development.
Dagmar Haase, et al		2013	D	city area	House hold, population growth, housing, land use change, unbalance	Population growth gave rise to the growth of households. Simultaneously, household growth will increase demand for housing. There is an imbalance between the number of households and the availability of houses. People build houses freely because the government does not provide houses. Freedom of development has an impact on changes in the shape of the city.

AUTHOR	PLACE OF STUDY	YEAR	TYPE OF ANALYSIS	CITY FORM CONSIDERED	ISSUE OF RESEARCH	EMPIRICAL RESULT
Penny Allan, et al		2013	D	city area	Disaster, demage, city, survive, change city pattern	Cities change because there are community adaptations. Adaptation that most influences the shape of the city is natural disasters. Earthquakes determine the shape of the city and the quality of the building.
Abdol AzizShahraki		2017	H	city area	Built the city, government, city plan, controlling	city managers have the responsibility to make city plans. Plans as guidelines for development. The government cannot build a city properly without a plan document
Manuel Wolff, et al.		2017	D	city area	Good planning, compact, city, population growth	The shape of the city is influenced by city development policies. Compact city or flat city influenced by the direction of the physical development of the city. The government's plan documents determine the physical shape of the city.
Richard E. Bilsborrow et al	Amazon	2004	H	city area	Land use change, population, land owner, fertility, migrant	Regional development occurs because there is an increase in the population from migration and vertilation. Changes in the number of residents give effect to changes in environmental conditions and the shape of the city.
I. Ouedraogo M. Et al		2010	D	city area	Land use change, satellite, population, dynamic change, land cover	There is a strong relationship between changes in population and changes in land use. Satellite data and census data provide facts about the strong relationship between these factors.
David O. Yawson, et al.		2017	D	city area	Land use change, population growth, comsumption, vegetable and food, increase of economic and social change.	The increase in population has an effect on the increase in food and vegetable needs. This has an effect on land change. Plantation land will increase but simultaneously the need for land for housing also increases. This dilemma can be resolved through strong policies.
Aggrey Daniel Maina Thuo		2013	H	city area	cityization, land use planning, livehood, environment, economic activity	Cityization has an influence on land use change. city economy also encourages changes in land functions. A theoretical approach is needed to see patterns of interaction between variables that affect changes in city land.
Xiaowei Yao et al		2015	D	River area	land use, global climate, river area, land use change, type and function of land	Changes in the function of land around the river as a place of residence can have an impact on global climate conditions. Land change is strongly influenced by the type and function of the land.
Zhanqi Wang, et al	Yangzhou	2016	H	city area	city metabolism, regression analysis, sensitivity, energy, land use change, sustanability	city metabolism is a city activity that cannot be avoided. One of them is about energy consumption. If energy consumption increases, new land is needed to increase energy production. This can encourage changes in land functions followed by environmental changes.
Jie Feng	China	2018	H	city area	Population growth, distribution, population number, information, cell phone, city planning	The population increases rapidly and is distributed throughout the city. Population calculations can use various methods, one of which is using technology. The population can be known by using cell phone

AUTHOR	PLACE OF STUDY	YEAR	TYPE OF ANALYSIS	CITY FORM CONSIDERED	ISSUE OF RESEARCH	EMPIRICAL RESULT
						number data and telephone usage activities.
Minmin Li	China	2018	D	city area	Cityization process, city area, land area, population, GDP	Distribution of population is influenced by economic conditions and size of the city. Space distribution can spread the number of city residents. The balance in the economic development of the city will encourage the distribution of population distribution.
Sophie Mossoux	Ngazidja island	2018	H	city area	Population distribution, population growth, remote sensing, census data, comparission	Calculation of population distribution can be known by the data census. In addition, it can also be analyzed using remote sensing. Results can be analyzed using distribution maps with different colors and meanings.
Sisi Yu	7 regions in China	2018	D	city area	Population, distribution, growth, human activity, public facility	Distribution of population can be known by looking at the location of population activities and economic activities.
Hao Wu		2018	D	city area	city space, green space, quality of live, population growth, capacity	The quality of life of city residents can be affected by the availability of green open spaces. An increase in population can affect the capacity of open space. Spatial policy can affect population growth and the existence of green open spaces.

D=descriptive, H=Hypothetical, M=Multivariate analysis

Source: author

The figure below shows the methodological proportions of each study that were used as references in this study. This proportion shows that the research methodology in descriptive form is the most used methodology, which is then followed by the hypothesis methodology and multivariate. Meanwhile, for location objects that become the research, some research references that the authors make as references show that the majority of the locations that are the object of their research are cities, then followed by countries and rural areas. The location of the study can influence the approach chosen in each study. Therefore, the choice of the location of the object of research becomes a very important thing to think about before being decided to become an object in the research that we do in the future.

Thus the things that can be conveyed by the writer are related to the salary of some literature which will be a reference for the author to carry out this research. As for the differences between several previous studies with the research that will be conducted will be explained in another section. But the writer can simply say that the research that the author is doing covers several cities in Indonesia and the main issue that wants to be studied is the impact of population growth on several other issues, namely population density, population structure, the form of urban space and land use. The development of the city will always be interesting to note because there is a high population growth in the city and it has an effect on the overall shape change of the city. The conditions of change in each

city will be different because it is greatly influenced by various factors in it. Also influenced by the proportion of influence of each factor.

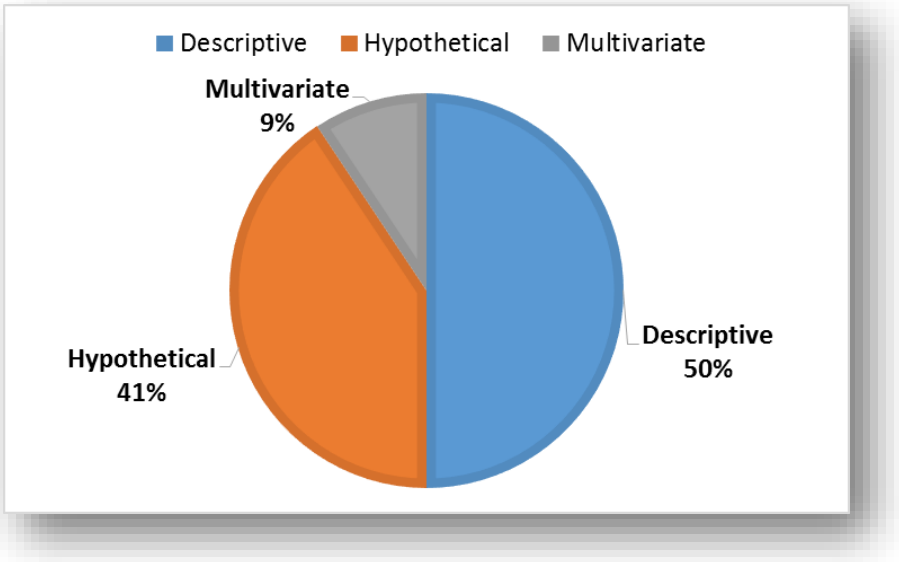


Fig 15 Proportion of research methodology from reference

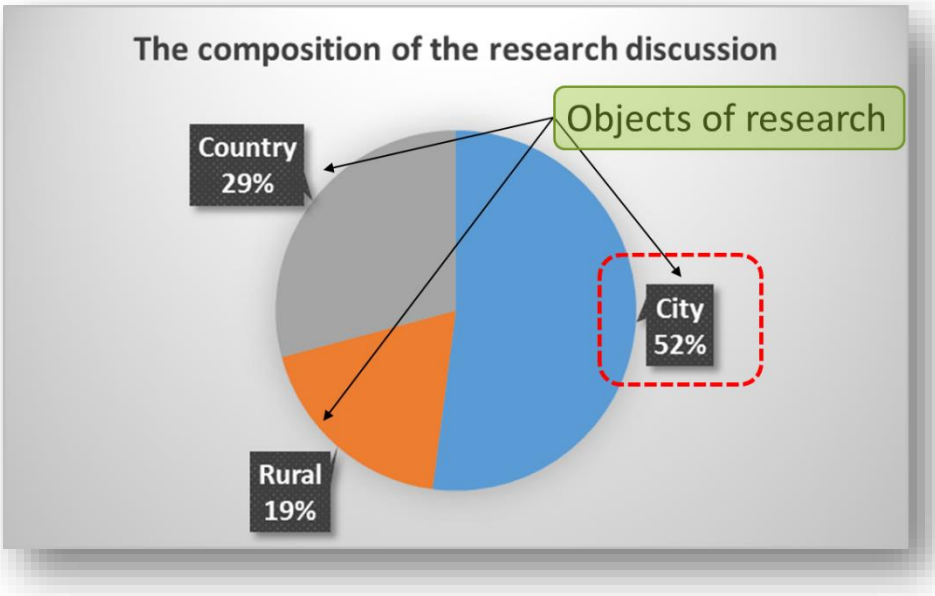


Fig 16 Proportion of research object

2.8 The Difference With This Study

This research was conducted in Indonesia. The authors conducted a study of 15 cities in Indonesia. The author conducts research on population growth. According to the authors, population growth can occur by two things, fertilization and migration. For population density, and then created a graph of population density based on the distance of the district to the city center. Population density here is the density of the population in each district. The author also analyzes the structure of population density. Other studies have suggested that the productive age population has an impact on the workplace, city economy, and socio-cultural change. In this study the authors see population growth in the productive age that can be used as an indication of the strength of this generation affect the development of the city in various. So, the author divides the population with three population groups namely the pre-productive group, the productive group, and the post-productive group. We will see changes in the proportion of population groups associated with changes in the population of the city. Associated with urban fabric, the authors see it from the urban fabric side based on the percentage of built-up area. There is a division of 0-20%, 20-40%, 40-60%, 60-80% and 80-100% built-up areas. This study was conducted on the physical condition of different cities according to the tendency of land use. Then the authors make a study of the effect of differences in built-up areas with population differences. This kind of study has never been done by other researchers. Meanwhile, about land use change, the author sees it from two things. And then the author sees the changes based on the built-up area changes in 1980-2010.

From the processed data and analysis, the authors will get the analysis of the effect of population on land use change. The author makes land use groups with five types, namely building, agriculture, pasture, forest and others. The research that the author will do is very different from what other researchers have done. Therefore this research will produce research products that can be used by other studies to be developed into a new understanding of the impact of population growth on several things that need to be mentioned before. The author makes hypotheses related to the influence of population growth on changes in the shape of city space, changes in the function of urban land, its influence on population density and population structure, and this is what the author will prove through this research. So this research was conducted to determine the effect of population growth on some of the things mentioned above. Each study does have a different background. This research is motivated by the existence of hypotheses related to the development of Indonesian cities which will be increasingly populated by the population. So, as a developing country, Indonesia will be faced with a proportion of the population living in urban areas eating more than the population living in rural areas. This condition will certainly have an effect on the physical and non-physical conditions of the city.

Changes in the shape of urban space and also changes in the function of land will be a very dominant element of change within the city. Moreover, each city has a different size of administration. The lion's condition finally gives a huge influence on changes in the shape of city space. If there is no analysis related to the influence of population growth on changes in the shape of urban space, it will be difficult for decision-makers and other researchers to carry out analyzes related to the influence of population growth that is taking place in their cities. Therefore this research is very important to be able to provide guidance and also to conduct a trend analysis of the effect of population growth on cities. As mentioned earlier, this study will look at changes in population growth towards population density,

city population structure, changes in the shape of space shown by urban fabric, and changes in the function of urban land.

An important element indeed lies in the matter which is the change in the function of urban land. Because protein land is an element that is as important as the population. So the city has two important elements in development, namely population, and land. When the population changes, of course, the land will also change. This is what researchers want to investigate to see changes for changes that occur on land as a result of changes in urban populations. This study will also identify patterns of change that occur in terms of the elements being the object of research in this study. This pattern will later become a reference for other studies conducted by researchers in the future. This pattern will later be used as a guideline in making policies and planning is also carried out to ensure population growth that occurs in each city Providing benefits to the progress of the city. Because urban land becomes more productive with increasing population entering or being in the city.

The author sincerely hopes that this research can provide benefits in the field of urban planning science. Moreover, research conducted by the author was carried out on cities in Indonesia as developing countries. So the results obtained from this study can be used to assess changes in the shape of urban space that occur in other countries that are also in the category of developing countries. Meanwhile for cities in developing countries can learn from developments that occur in cities in Indonesia. So, what is good can be used by other countries, while bad things can be left by other countries. So we can learn from developments in Indonesia as a reference for planning a better city in the future wherever.

CHAPTER 3 – METHOD OF RESEARCH

3.1 Introduction

The literature review conducted in the previous chapter opens an understanding of the influence of population growth on other sectors. Its influence varies greatly, depending on the conditions and objects that become the study. An understanding of population growth is interesting to do because population growth is caused by two main things, birth, and migration. High births can increase the population. Increasing population through this method is an old way to increase the population. But increasing population through fertilization takes a very long time. So, this raises a problem in the delay of changes and desired progress. Limited resources become a crucial thing. Therefore there needs to be population migration. Residents from outside the city are withdrawn to enter the city. This method is expected to accelerate changes in the city because there are a large number of workers available. There are indeed two types of migration, namely inward migration called immigration and outgoing migration called emigration.

Population growth has an impact on other things directly or indirectly. Impacts must be managed properly by city managers. The ability of city planners is very limited, the thing that can be done is to make guesses and hypotheses. The same thing was done by the author in this study. The author makes a guess, at an early stage, that the population has an impact on various things within the city area which is limited by imaginary administrative boundaries. The government makes landscapes and infrastructure administrative boundaries.

The methodology in this study was compiled to ensure the process of carrying out research can be measured in ways and results. Research on the impact of the population on several things in the city has not been done much before. Therefore, the authors really hope that some of the things that show the existence of improvisation can be understood because of the limited comprehensive study as will be read in this paper. But the author seeks to identify changes that occur in cities that are the object of research. Some data is not easy to obtain because as a developing country, cities in Indonesia are still weak in the latest data archives and data analysis. Because of that, the author conducted a search for every city and met with several agencies to obtain data. The results can be read well in this report. The author realizes that this method can be debated. But this is a research scheme that the author chose to get the research results that the author made as a target.

3.2 Investigation period

The author analyzes the changes in population and city conditions for a period of 30 years from 1980 to 2010. The author uses periodic population census data by the government, namely 1980-1981, 1990, 2000, and 2010. The ten-year census is a direct census or direct enumeration of populations in the field. The other year is the result of government analysis based on provisions that apply globally.

3.3 Research limitation

To clarify the implementation of research, there are definitions that need to be conveyed in this section. The definition is city, cities and sub-cities. city is an area which has been administratively designated as a city government area. Meanwhile cities is an area where the condition of the area is already dense and has economic activities in the business.

3.3.1 City criteria

Indonesia has provisions regarding city criteria. There are five (5) city criteria that have been determined by the government and this has been recognized through national legislation on spatial planning. city criteria determine the city status based on the population already in the city. From these five criteria, researchers will use the city as the object of research that is included in two criteria, namely the large city and metropolitan cities. Actually, all cities that are the object of research can be included in the criteria of a metropolitan city because they have a population of <1.5 million people. Thus, the city can be bigger in the future. And when they are now in the metropolitan ota category, it becomes an interesting issue to see the condition of these cities in the previous era. In this study the author decided to use data from 1980 to 2010.

Table 2 Criteria for cities in Indonesia

No	Criteria of city	Definition
1	small city area	is an city area determined by the criteria for a population of more than 50,000 (fifty thousand) to 100,000 (one hundred thousand) inhabitants
2	moderate city area;	An city area that is determined by the criteria of a population of more than 100,000 (one hundred thousand) up to 500,000 (five hundred thousand) inhabitants
3	large city area;	an city area determined by the criteria for a population of more than 500,000 (five hundred thousand) residents.
4	metropolitan area;	has a population of at least 1,500,000 (one million and five hundred thousand) people
5	megapolitan area;	an area formed from 2 (two) or more metropolitan areas that have functional relationships and form a system. (thus having a population of more than 1,500,000 (one million five hundred thousand) souls or more.

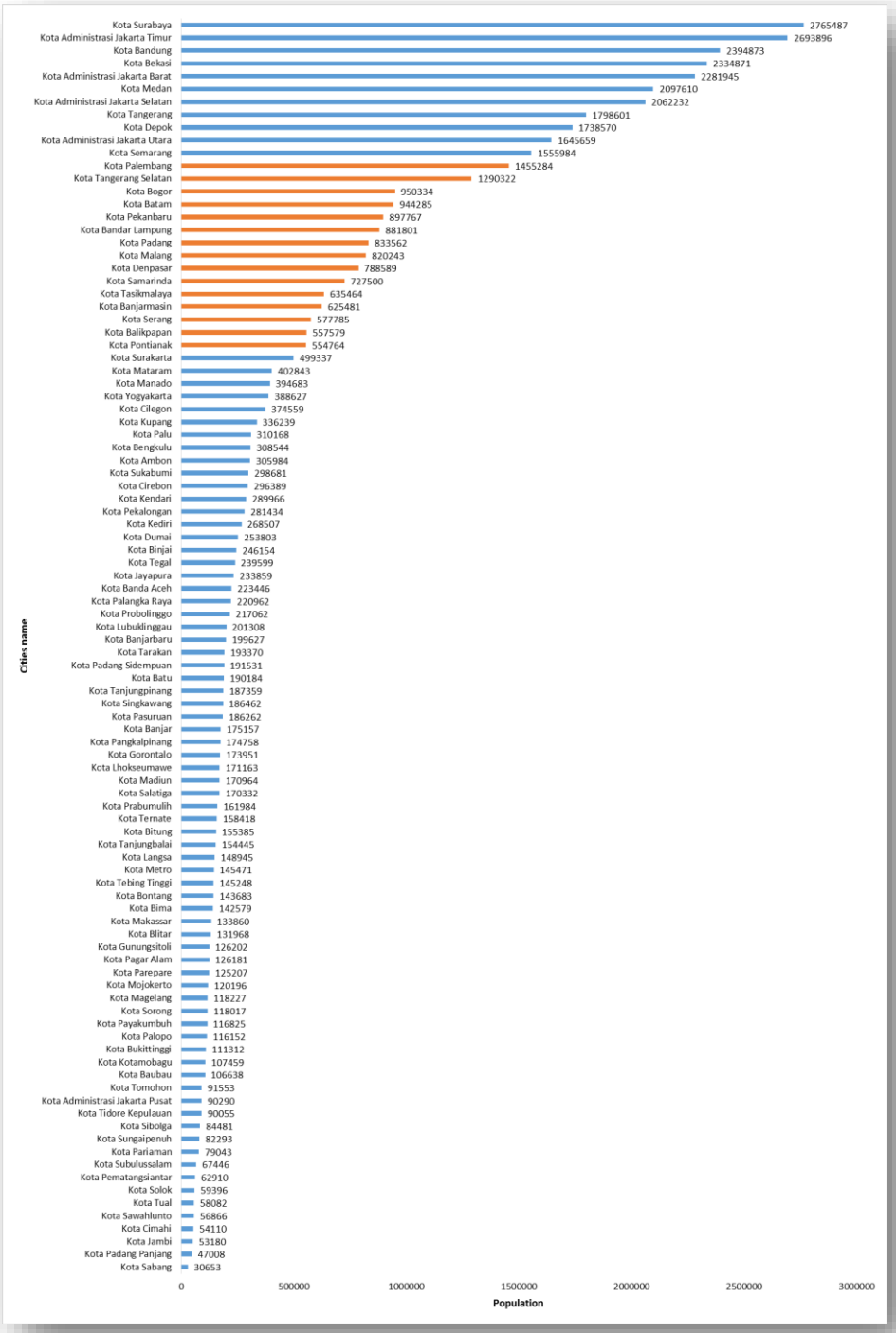
Source; KemenPUPR, author

3.3.2 List of cities in Indonesia

The research was conducted in the city in Indonesia. The authors present population analysis in 15 cities across Indonesia. The cities are Palembang, South Tangerang, Serang, Tasikmalaya, Pekanbaru, Batam, Bandar Lampung, Padang, Malang, Bogor, Pontianak, Banjarmasin, Samarinda, Manado and Denpasar. Furthermore, the authors will look at the influence of cities population in all city. Then the writer performs analysis on some of things: population growth, density, population structure, cities fabric, land use change, and influence variable to population growth and distribution (for the last topic, author will take one city as a sample, and it is a paper for journal). The author made a readjustment to get better results from this study.

Limitations of the study were conducted to limit the study of cities populations growth. This restriction is important because there are many issues that can be related to the cities population. The population has a huge impact on many things, not just on the issues that the authors make for their analysis of this research. but also on other issues. So the authors need limits in this study so as not to cause uncertainty and also raises the desire to do research outside the issues that the authors discussed in this dissertation. However, this raises a very strong desire to know the impact of other cities populations. Indonesia has 98 cities. Some are big cities, some are medium cities and small cities. The government divides the city class based on the population in the city. In this study, the authors will conduct research on cities that have a population of 0.5 million - 1.5 million. In many references, and also studies conducted by institutions that have attention to cities, cities with such a population that have dynamics of development in the period before and after. Therefore, the author decided to use

the population on a population scale of that size to see the dynamics of development in accordance with several topics of discussion that the author would do.



Red are the cities that are the object of research

Fig 17 City population in Indonesia 2010 (CBS 2010)

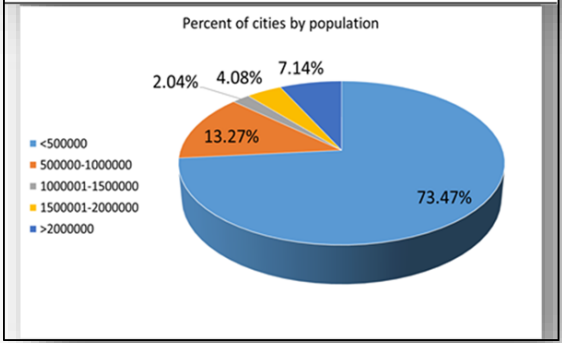
Source: BPS/Badan Pusat Statistik or Central Bureau of Statistics/CBS, author

3.3.3 How to choose several cities as research objects

The data shows that the majority of cities in Indonesia have a population of <500 thousand people. This indicates that many cities in Indonesia are included in the category of small cities. However, this will be a challenge for all parties because gradually this small city will gradually increase in population and this will make them as medium cities and big cities.

Table 3 Several cities were chosen as research objects and distribution of city locations

Population range	Number of cities	Percent
> 500,000	72	73.47%
500,001 - 1,000,000	13	13.27%
1,000,001 - 1,500,000	2	2.04%
1,500,001 - 2,000,000	4	4.08%
> 2,000,000	7	7.14%



No	Main islands	City
1	Sumatra	Batam
2		Padang
3		Pekanbaru
4		Palembang
5		Bandar Lampung
6	Jawa	Malang
7		Tangerang Selatan
8		Tasikmalaya
9		Serang
10		Bogor
11	Bali	Denpasar
12	Kalimantan	Samarinda
13		Pontianak
14		Banjarmasin
15	Sulawesi	Manado

Source: author

Moreover, as predicted by some that the majority of city residents will live in the city, this small city will become a city that will potentially develop. Although, of course, the development will depend on many things. The majority of cities in Indonesia are new cities so they have low populations. But they need population management in order to catch up with other cities.

3.3.4 Distribution of cities on several islands

Cities on the scale of the middle population are quite numerous nowadays. There are at least 15 cities in the medium category because the population is in the range of 0.5-1.5 million people. And this city will be the object of research in this study. Because they have a dynamic development. And this will be a lesson for other cities whose population is below them. So that it can be used as a reference in making policies and making city planning. Then, some of them are cities with> 1.5 million people. And for the size of Indonesia, the population in the population above 1.5 million has been included in the category of big cities and metropolitan cities.

3.3.5 Plotting a city location on the map of the Indonesian archipelago

Metropolis city has spread to almost all the main islands in Indonesia. As stated in the previous section, there are five main islands besides Papua and Nusa Tenggara, which already have metropolitan cities.

Java is an island that has a high population and high population density. The natural resources on this island will be small if a lot of lands has changed into a building. In fact, so that the population on the island can meet its own needs must have extensive land for agricultural activities. The need for food production will be high because the population increases high. Every country that survives is a country that has an awareness of the importance of maintaining agricultural resilience.

Distribution in the Indonesian archipelago can be seen in the picture. And this shows about the existence of equitable development in Indonesia. Because, the population began to be concentrated on each island and developed each other to advance Indonesia. The research will be conducted in 15 cities that have a population of 0.5 million - 1.5 million people. The consideration is aving a dynamic change in population which is considered more dynamic (a newly formed city and has a possibility of developing). All cities show dynamic developments. The ability to understand the development of the city and its developmental parameters will be able to help Indonesia in managing future development. Because, the population grows is a blessing for Indonesia if it can be managed optimally.

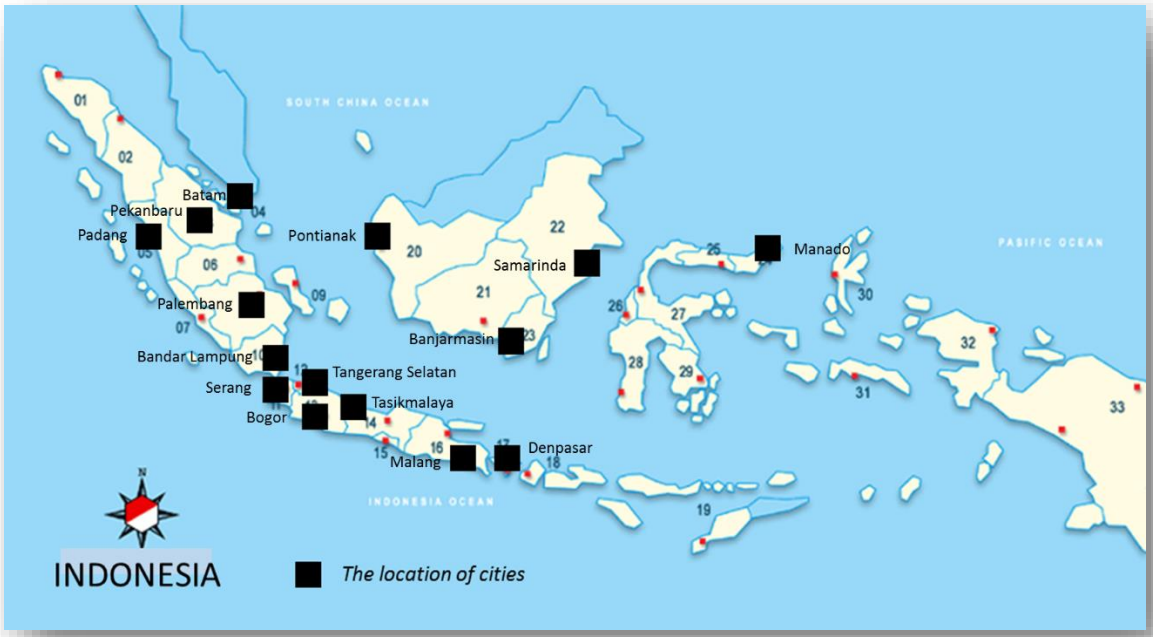


Fig 18 Distribution of cities as an object of research in the map of Indonesian archipelago

Source: big.go.id and author

However, a high population will be a problem if resources cannot be managed properly. Therefore, building an understanding of the city and its development dynamics are linked to various factors that will have an impact on development policies in the future. If we pay attention, the distribution of cities that are the object of this research is on the main islands in Indonesia. Java is an island that has been inhabited long enough by the community, this is evidenced by the very large population on the island of Java. More than 50% of Indonesia's population lives on the island of Java. In fact, if we look at the vast island of Java, its size is much smaller when compared to other islands such as Sumatra and Kalimantan. There are many cities on the island of Java. But there are five cities that have a population of 500,000-1.5 million. The rest are cities with smaller populations. Interestingly, there are also 5 cities in Sumatra that have populations in the scale of this research, which are included in the research scale. Next, are three cities on the island of Borneo. This city is indeed a city that has been formed for a long

time and at this time it is only known as a new city economically and there are many property developments in these cities on a large scale. There are even several cities in Kalimantan, such as Samarinda and Pontianak, building apartments. Even though other cities in Sumatra still don't get investors who are interested in building apartments. While in Kalimantan there are investors who are interested in building apartments.

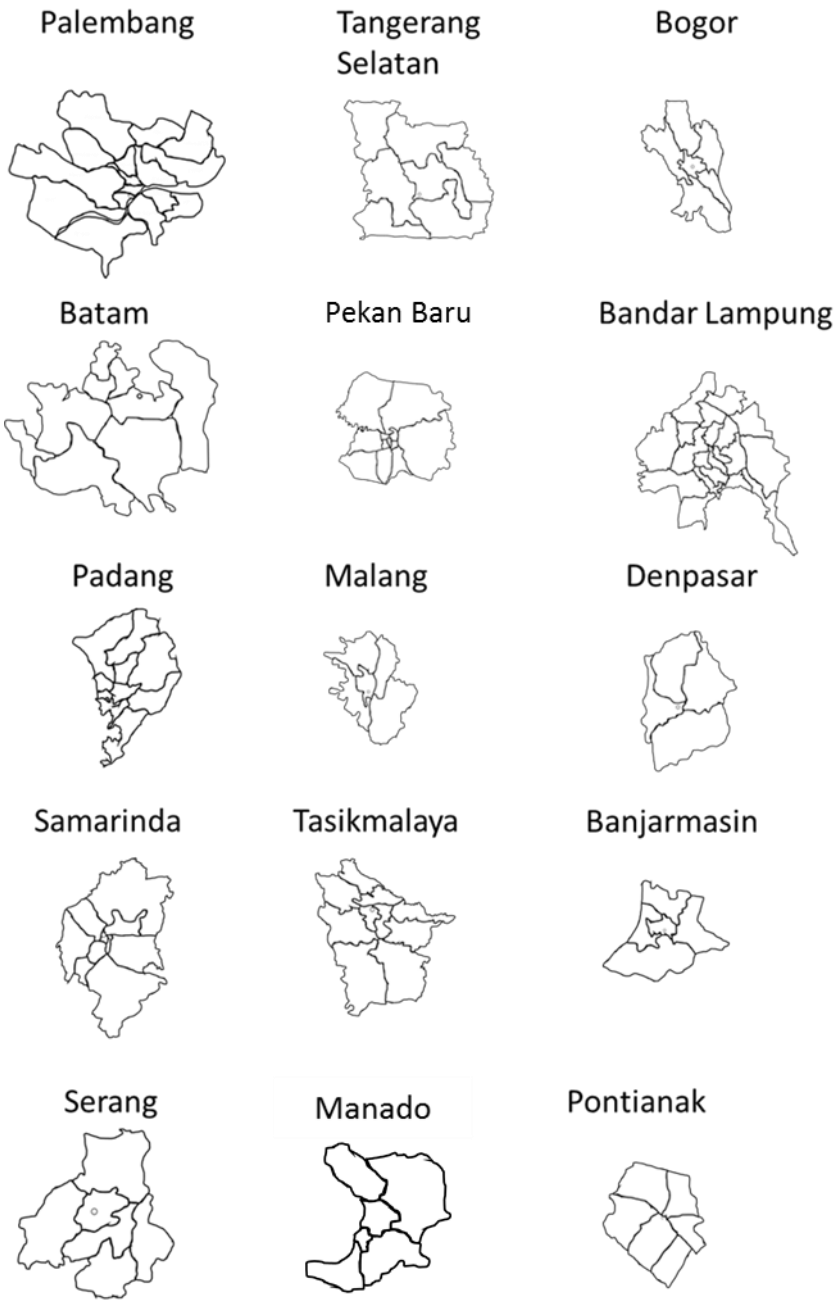


Fig 19 The shape of the city based on the city administration boundary

Source: Governance Bureau, Ministry of Internal Affairs; author

That is, the buyer market does exist and this is related to the increase in population in the city which gives hope to investors that the apartment they built will sell and have residents. Every city does expect its city population to be high because this will have an impact on the city's economic progress. But it must also be recognized that many cities in Indonesia, maybe even all cities in Indonesia, are

not designed to accommodate populations on a certain scale. So, how many populations should be in the city, unknown and unspecified? Of course, this will be a serious problem in the future. This research will contribute to addressing concerns related to the impact of population growth on cities in Indonesia.

3.3.6 The form of city

The picture shows the shape of the city that is the object of research. The shape of the city is presented without scale. This is done to understand the shape. The scale will be explained in another chapter which will compare the size of one city with another city.

The shape of the city is influenced by the landscape in the form of beaches, mountains or rivers. And another factor is the ability to control city space. If a government is considered to have the resources to manage city space in large sizes, the city will be larger than other cities. So, indeed there is an element of development policy in the management of the city. The size of the city has indeed been determined administratively by the government. The size of the city is adjusted to the proposals submitted by the community and the regional government, and adjusted to the conditions of the landscape. The landscape will be the limit of the imaginary line of the city limits. The size of the city is strongly influenced by proposals and agreements taken between the national government, local government, city government, and society.

3.4 Analytical method

Test kai squared (denoted by "χ2" from the Greek letter "Chi" pronounced "Kai") used to test two groups of data, in the form of independent or dependent variables, with categorical data. Or it can also be said as a proportion test for two or more events, so the data is discrete. The basis of the kai quadratic test itself is comparing the difference in the frequency of the observation (O) with the expected frequency (E). The difference is convincing if the price of Kai Square is equal to or greater than a price set at a certain significant level (from table χ2).

The Kai Squared Test can be used to test:

1. Test χ2 for the existence of a relationship between two variables (independency test).

2. Test χ2 for homogeneity between subgroups (Homogeneity test).

3. Test χ2 for Distribution Form (Goodness of Fit)

The analysis is done by looking at the effect of population growth on migration factors, density, population structure, urban fabric, and land functions. The analysis is done by looking at the value of Chi Square in the SPSS analysis. If the Chi Square value is> 0.05, the H1 hypothesis is correct.

The analysis is done by a hypothesis:

1) Population growth:

   Ho = Population growth is not influenced by population migration factors

   H1 = Population growth is influenced by population migration factors

2) Population density:

   Ho = Population growth does not affect population density

   H1 = Population growth influences population density

3) Population structure

   Ho = Population growth does not affect population structure

   H1 = Population growth influences population structure

4) Urban fabric

   Ho = Population growth does not affect the urban fabric

   H1 = Population growth influences the urban fabric

5) Land use

   Ho = Population growth does not affect land use

   H1 = Population growth influences land use

The method for calculation related to this can be seen in the formula below. This formula gives direction to the author to carry out an analysis related to the influence of population growth with several issues that are the object of research, namely the causes of population growth, population density, population structure, the form of urban space, and land use. The author analyzes the calculations using a statistical analysis program, namely the JMP 7 program. The results of the authors use it as a result of research from a study of several hypotheses that the author had previously made. The formula below shows how to do calculations manually. But in this study, the author did not do calculations manually but did calculations using a statistical program as stated earlier. Thus the authors hope the results obtained from the analysis using this statistical program will be more appropriate and can be more scientifically acceptable.

$$x^2 = \sum \frac{(O - E)^2}{E}$$

Information :

O = frequency of observations

E = expected frequency.

Value E = (Number of lines x Number of Columns) / Amount of data

df = (b-1) (k-1)

In doing the kai squared test, must meet the following conditions:

1) Samples are chosen randomly
2) All observations are carried out independently
3) Each cell contains at least one (1) expectation frequency. Cells with a frequency of expectations of less than 5 do not exceed 20% of the total cells

The limited use of the Kai Quadrate test is the Kai Kuadarat test technique using discrete data with a continuous distribution approach. The proximity of the resulting approach depends on the size of the

various cells from the contingency table. To guarantee an adequate approach, the basic rules for "frequency of expectations should not be too small" are used in general with the following provisions:

1) There must be no cell that has an expectation value smaller than 1 (one)
2) No more than 20% of cells have an expectation smaller than 5 (five)
3) If this is found in a contingency table, the way to overcome it is to combine values from small cells to other cells, meaning the categories of variables are reduced so that categories with small expectations can be combined into other categories.

3.5 Closing remark

Indonesia has 98 cities spread all over the islands in this country. Some cities have criteria as small cities and medium cities, but some other cities fall into the category of metropolitan cities and also big cities. The diversity of this city category shows that all cities in Indonesia are still in the process of developing. And the development of this city, one of which is influenced by the existence of the population that is in the city, also the population around the city. Research conducted at this time uses several cities that fall into the category of metropolitan cities, if we refer to the city category based on the number of city populations according to the OECD organization. In this study, from 98 cities in Indonesia, the authors chose 15 cities as objects of the study. The author will conduct research on these 15 cities with the aim to see the impact of population growth occurring in each city on population density, population structure, shape of urban space and land use.

The cities of the object of this study are spread throughout Indonesia. They are scattered on the main islands in this country, namely in Kalimantan, Sumatra, Java, Sulawesi, and Bali. The islands are the main islands in Indonesia, both in terms of island size and especially also based on the population of each island. So of the total population in Indonesia, the majority are in the islands mentioned earlier. Indonesia is an archipelagic country. The country has 17,000 islands spread across its various regions. Some of them are big islands, but also some of them are small islands. And not all islands have populations. Some of them still do not have a population because it is far from the nearest settlement. So that people do choose to gather on one island or several islands that have populations and they develop on that island. This is what then pushed the islands to have cities. As we can see that Indonesia currently has 98 cities and more than 400 districts. And the research that the author is doing at this time, this is against 15 cities in Indonesia, they are spread on the islands of this country.

In this study, we will use a quota measure that refers to city size based on city administration. So, indeed, each city has been determined administratively by a higher government, namely the central government. So for the size and shape of the city administratively it is fixed in this study. We will not change the size of the city and also will not change the shape of urban space because we will see several factors that occur in the city administratively when growth occurs in the city. Then we will see the impact of population growth on several things, namely population density, population structure, the shape of city size and also land use.

After all the data we can collect from 1980 to 2010, then coupled with some aerial photographs as well as data we can get from every city in Indonesia, especially the cities of this research object, namely 15 cities spread over 5 main islands in Indonesia. Indonesia, then the next step that we will do is to analyze the existing data. The author will also conduct an in-depth study related to the shape of urban space and land use in each city. We will see the effect of population growth on several things that are

the object of this research. Because population growth influences many factors that exist in the city. But it is still often difficult to find out academically about the effect of population growth on several factors that occur within the city. This is what encourages the authors to conduct deep research related to population growth and its impact on other factors that exist in the city. Especially Indonesian cities that are countries that have very high population growth reaching 300 million in the last 100 years. This high population growth has an impact on all regions in Indonesia. Because the population is spread throughout the island and there are also many of them gathered in one particular area which eventually made the area an administrative city.

In the next stage, the author will carry out statistical analysis to see the effect of population growth on other factors. This statistical analysis is very important to do to analyze the distribution of data obtained from the data and also the results of the analysis conducted by the authors themselves. This very large data distribution needs to be made a statistical analysis to help us understand the situation of each city that can be read from the data obtained through this research.

CHAPTER 4 – THE ANALYSIS OF POPULATION GROWTH

In chapter 4, the writer will discuss about population growth in the city which is the object of research. All cities have varied patterns of population growth. The author wants to know whether the size of a city has an influence on population growth, both growth in percent and population growth in the number of people. The author conducted population identification in 1980 and 2010 or for 30 years.

4.1 Population change

Population change is influenced by various factors. Several factors that influence the population are the size of the city, the economic activity of the city, and the economic growth of the city. In this section of the study, the author will explain the pattern of changes in population in each city. Because so many factors can influence population growth, research on population growth is a very interesting issue to do. Research conducted on cities in Indonesia, in 15 cities in Indonesia, is expected to be able to help all parties to understand the trend of population growth in Indonesia, in all cities in Indonesia represented by 15 cities that were the object of this research.

Table 4 City population in 1980 and 2010

CITY	1980	2010
Palembang	1,073,384	1,455,284
Malang	653,123	820,243
Denpasar	648,769	788,589
Samarinda	597,331	727,500
Tasikmalaya	500,389	635,464
Padang	484,253	833,562
Tangerang Selatan	428,818	1,290,322
Banjarmasin	394,667	625,481
Bogor	393,423	950,334
Pekanbaru	389,732	897,767
Manado	344,715	557,579
Pontianak	290,594	554,764
Serang	284,464	577,785
Bandar Lampung	284,275	881,801
Batam	55,241	944,285
Total	6,823,177	12,540,760
Population increase (1980-2010)		**5,717,583**

Source; CBS all cities compile 1980 and 2010, author

The population census carried out by the government was carried out in 1980, 1990, 2000, and 2010. Changes over 30 years in each city can have an influence on the formation of city spaces which will be investigated further. Population data in each city in 1980 and 2010 can be seen in the table. Figure shows population changes in 1980 to 2010. Some cities show very high population changes. The population in 1980 was still very low. But in 2010 it increased very high. Batam is a city that shows very high population changes. Furthermore, there are Bandar Lampung, South Tangerang and several other cities that have high population changes. Population changes can occur due to various factors. But in general there are two causes, namely fertilization and population migration. Both of these factors must be managed appropriately to prevent the occurrence of segregation problems in the living conditions of city communities. Because, this problem is a serious problem for the future of the city. Cities that are faced with an increase in high population must immediately prepare and conduct programs to deal with high population growth. They have to prepare to the house as a place for

residents to live, they also have to prepare a lot of work opportunities for their people so that there is no unemployment, and they also have to prepare various kinds of education and health facilities to ensure that their resources are productive.

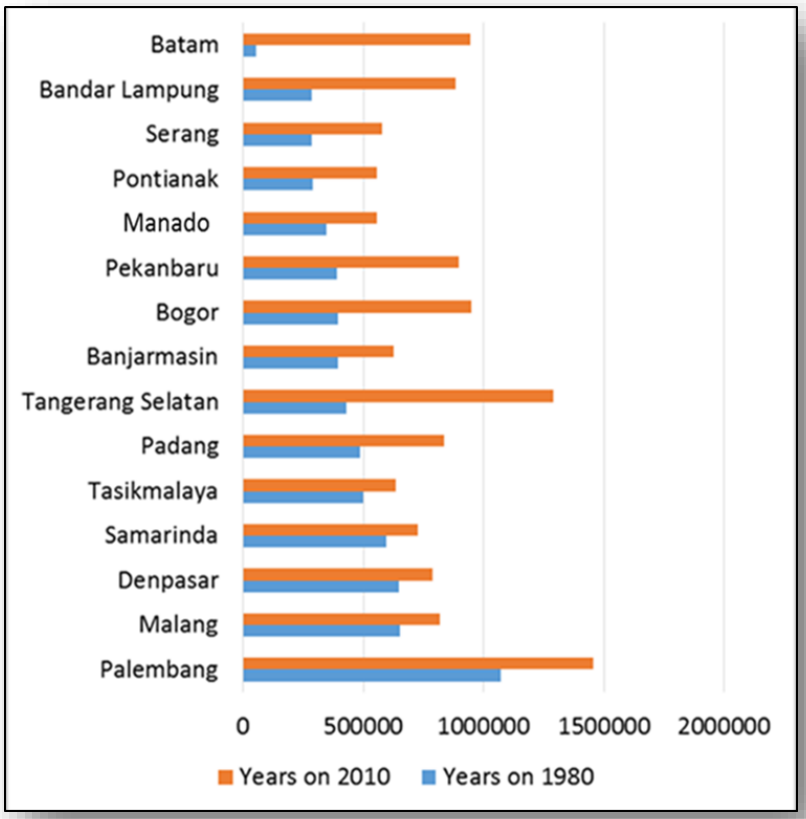


Fig 20 The cities population change in 1980 and 2010

Source; CBS all cities compile 1980 and 2010, author

The author found no particular pattern in population growth (in people) in this scheme. The form of growth is very diverse or random so that it cannot be easily estimated for its growth patterns. The author suspects that changes in population in all cities do not occur only because of internal growth due to birth and death, but are strongly influenced by other factors. That can vary. But the authors estimate that economic factors are a very strong reason. Because after all, every population will need a guarantee of a better life for themselves and for their families. Therefore, if they meet their needs economically and can guarantee that their economy will increase, there will be many populations coming to the city. They will strive to improve their lives economically and socially.

4.2 Population growth

4.2.1 Population growth in all cities

Figure shows population growth. The highest population growth is Batam. Its growth is very high when compared to population growth in other cities. In fact, when compared with Bandar Lampung as the city with the second highest growth, the difference in growth is very different. Denpasar became the city with the lowest population growth. Differences in population growth indicate very interesting conditions because they have very wide differences.

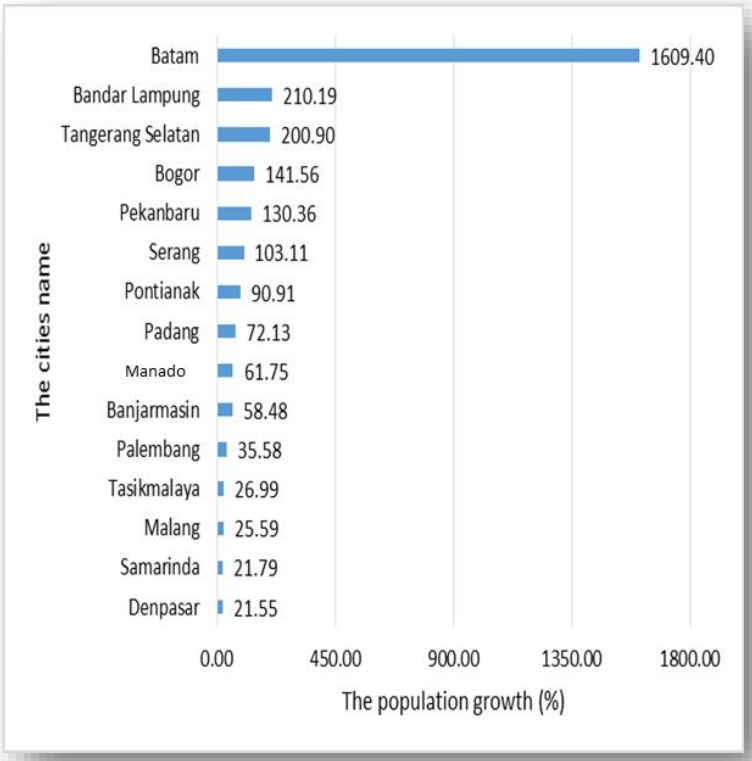


Fig 21 The population growth from 1980 to 2010

Source; BPS all cities compile 1980 and 2010, author

The author analyzes population growth for 30 years. Thus, this method opens up opportunities for very high growth. Logically, growth is above 100 percent. But not all cities show high growth. There are even 9 cities that show population growth below 100 percent. And then there was Batam which jumped dramatically in 2010 if it was filed in 1980. city development policies and economic policies had an effect on the increase in the population of the city. The city of Batam is known as a new industrial city in Indonesia. Batam is close to Singapore so that the Indonesian government makes Batam a city that is expected to grow just like the city of Singapore. Since the 70s, Indonesia has formed an authority body in the city of Batam as a representative of the central government. The hope is that any development policy in the city of Batam related to foreign investors can be taken quickly through the authority body, no longer necessary to the central government in Jakarta. Because this authority body is the representative of the central government in the city of Batam. That way, Indonesia really hopes Batam can become a developed and developing city as experienced by Singapore. Unfortunately, for decades the targets expected by the government to make Batam like Singapore have never materialized. Of course, there are many factors that influence this. But in terms of population, there is huge population growth in the city of Batam. This is the impact of urban development policies that lead to the development of industrial estates that are in dire need of large numbers of workers. Because Batam does not have a high population, many workers come from outside the city of Batam. And this is what makes the city of Batam has a very high pattern of population growth and is very different from other cities in Indonesia.From this issue, we can learn that urban development is strongly influenced by economic and political policies. When a city has been determined by the government as an industrial area and that means that it requires a very large workforce, then the people who will come to work are not only local residents but also residents from

outside the city. Meanwhile, other cities have a relatively stable population growth or tend to be the same size. Only Batam city has a very different growth pattern. And indeed, Batam is the only city in Indonesia that is expected to compete with cities in Singapore and even Kuala Lumpur in Malaysia. Even though, until now, economic and political competition has not been able to materialize but this has brought implications for a very large population increase.

4.2.2 Population 1980 and 2010 on the map

Pictures show changes in city populations in 1980 and 2010. Images show the shape of cities and population changes.

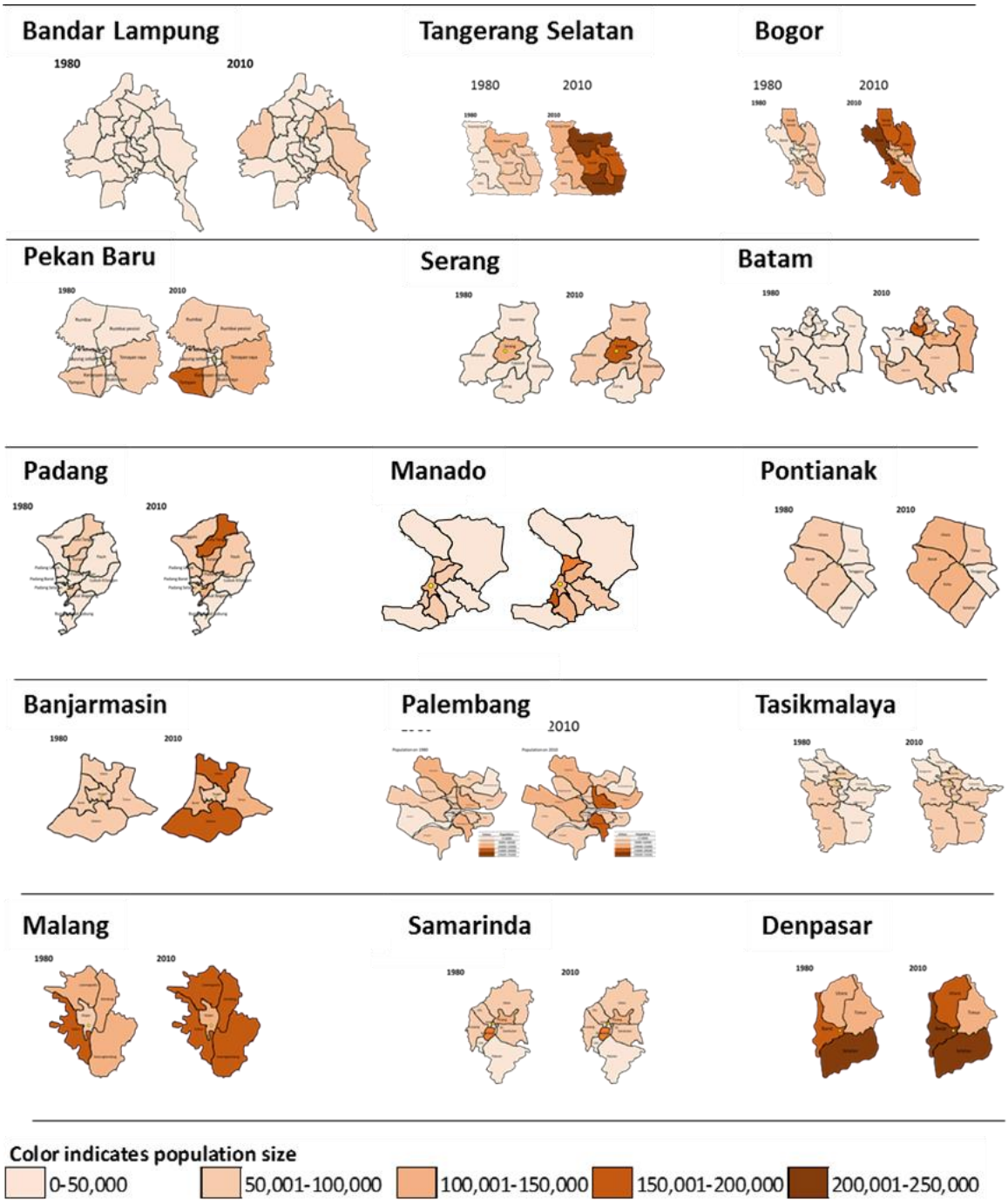


Fig 22 The population growth on map in 1980 and 2010

Source; Municipal, BPS, author

Some cities show significant changes such as South Tangerang, Bogor, Denpasar and Malang. However, other cities did not show significant changes. But this does not indicate the real conditions calculated by quantitative analysis.

The author suspects that there are city energy factors and industrial development which then have an influence on population growth in a city. Because, the population that grows with a very large number is caused by the flow of population cityization. Such a model occurs a lot in cities in developing countries in the 1980s which continued to grow into a country that approached developed countries. The city will absorb labor so that cityization becomes unstoppable. Batam will be a city that shows population changes caused by increased migration.

4.2.3 Population increase

Population increase is indicated by a table. Batam is the highest city in population changes in units of people. Followed by changes in the number of residents in South Tangerang. Batam being a city with high change is estimated because there is a special function assigned by the national government to Batam, namely as a new city to accommodate the abundance of economic activity in the city of Singapore. So that the population increases very high.

Table 5 Population change from 1980 to 2010

CITY	POPULATION INCREASE (1980 TO 2010)	POP INCREASE PER YEAR
Batam	889,044	29,635
Tangerang Selatan	861,504	28,717
Bandar Lampung	597,526	19,918
Bogor	556,911	18,564
Pekanbaru	508,035	16,935
Palembang	381,900	12,730
Padang	349,309	11,644
Serang	293,321	9,777
Pontianak	264,170	8,806
Banjarmasin	230,814	7,694
Manado	212,864	7,095
Malang	167,120	5,571
Denpasar	139,820	4,661
Tasikmalaya	135,075	4,503
Samarinda	130,169	4,339

Source; author

4.2.4 Population increase group

The processed data results in two groups increasing population. Population increase is done by looking at population growth per year. There are 7 cities with an increase in population of more than 10000 people. And there are 8 cities with population increases below 10000. High population increases are caused by many things. In this study, in the following section, we will see the effect of increasing

population from the size of the city. We will answer the question whether the size of a city has an effect on the increase in population? But beforehand, we will answer the allegations about the influence of the population in the initial year of the study, namely 1980. Because, population growth can be caused by high birth rates. If the initial population is high, the birth rate will be high. And this has an effect on the number of population increases. So, indeed there are some cities that have a population growth per year of more than 10,000 people. And there are several cities that have a population growth of less than 10,000.

The data shown from the study of 15 cities shows that there are 7 cities that have a population growth of more than 10,000 people and there are 8 cities that have a population growth of fewer than 10,000 people each year. If we consider that the city which has a population growth of more than 10,000 people per year is indeed cities that are currently known as industrial cities, large cities of trade and services, cities of tourism and education. Meanwhile, other cities that have a population growth of fewer than 10,000 people are known as cities that have long been established administratively but are not considered to have significant economic development in the past. But indeed at this time, they have gradually progressed to become a city with new economic strength as indicated by the ever-increasing population growth.

Table 6 Cities with additions of population during 1980-2010

Cities with an increasing population > 10,000 people during 1980-2010		
CITY	**POPULATION INCREASINGS 1980-2010**	**AVERAGE POPULATION INCREASINGS PER YEAR**
Batam	889,044	29,635
Tangerang Selatan	861,504	28,717
Bandar Lampung	597,526	19,918
Bogor	556,911	18,564
Pekanbaru	508,035	16,935
Palembang	381,900	12,730
Padang	349,309	11,644
Cities with an increase in population < 10,000 people, during 1980-2010		
CITY	**POPULATION INCREASINGS 1980-2010**	**AVERAGE POPULATION INCREASINGS PER YEAR**
Serang	293,321	9,777
Pontianak	264,170	8,806
Banjarmasin	230,814	7,694
Manado	212,864	7,095
Malang	167,120	5,571
Denpasar	139,820	4,661
Tasikmalaya	135,075	4,503
Samarinda	130,169	4,339

Source; author

Some cities also experience constraints in the development of population growth caused by the size of the city which may not be too large. It could be that high population growth does occur in the region, but they live around the city, outside the boundaries of the city administration. Thus, population growth in the city may be small, but overall it added to the population that is outside the limits of the city administration, growth can be very high. But this research indeed only limits itself to cities that are administratively limited. As for the development of the population outside the limits of the city administration, it does not become the scope of this study.

4.2.5 The influence of population on base year

But the comparison made shows that the population in the base year does not directly influence the increase in population in terms of population units. Batam as the city with the lowest population has the highest population increase. Palembang has the highest population but does not have a high population increase, Palembang's position is ranked sixth. These results indicate that city dwellers do originate from the flow of cityization. Indeed, the city will absorb labor. In addition to internal growth from birth, city residents will be dominated by new residents from outside the city.

They can come from anywhere, from rural areas close to the city, can also come from outside the province and outside the island. Because, Indonesia has a trasmigration program that is a program to move the population from a densely populated place but the condition of the economist is weak, to a new place that still has large land size, a small population and an undeveloped economy. This program shows great results. Even some cities outside Java developed into administrative cities as a result of planned transmigration or cityization.

Table 7 The Influence of the population in 1980 on the addition of the population (1980-2010)

City	Population on 1980	Population increase (1980-2010)	Average increase per year
Batam	55,241	889,044	29,635
Bandar Lampung	284,275	597,526	19,918
Serang	284,464	293,321	9,777
Pontianak	290,594	264,170	8,806
Manado	344,715	212,864	7,095
Pekanbaru	389,732	508,035	16,935
Bogor	393,423	556,911	18,564
Banjarmasin	394,667	230,814	7,694
Tangerang Selatan	428,818	861,504	28,717
Padang	484,253	349,309	11,644
Tasikmalaya	500,389	135,075	4,503
Samarinda	597,331	130,169	4,339
Denpasar	648,769	139,820	4,661
Malang	653,123	167,120	5,571
Palembang	1,073,384	381,900	12,730

Source; author

The results of the above data analysis show that the population in the initial year of the study does not have an effect on population growth within the city administrative boundaries. So the authors found that this very high annual population growth was not influenced by the population in 1980 which formed the basis or beginning of this study. This means that population growth per year does occur due to other factors that attract people to come to the city. Or there is a thrust from where they lived before which made them have to move and move into the city.

This growing urban population growth is an opportunity for the city to manage it because they will be a source of labor in the industrial and trade sectors. Because the city will indeed tend to have economic activities that lead to industry and trade that desperately need large labor with good quality. So, the authors found that this very high population growth per year was not influenced by the population in the basic research year, namely the 1980s. Population growth becomes high every year due to other factors that attract people outside the city to come and live in the city.

4.3 The city size

Cities have different sizes. In fact, Batam is the city with the largest size. Meanwhile, banjarmasin has the smallest size. city size can affect population growth. New residents will live in the city area and will be recorded as city residents because they are within the city administration area. However, if the city has a small size it will make new residents live near the city but not within the city administration area. This is in line with the pattern of over bounded city and under bounded city. The size of the city is determined based on conditions on the ground and also the direction of development policy and regional politics. Thus, Indonesia is unique in determining the size of the cities. Especially in the era of the 1970s which had implications for the formation of cities in Indonesia which were taken more based on regional political decisions. However, in the era of the 2000s, an understanding of the size policy of the city was seen from the population and geographical conditions. Thus, new cities in this era have the ideal city size compared to old cities. The size of the city is indeed a matter that greatly influences development policy and regional politics, so that many city governments like the size of the city.

So, if a city has a very large size, then they will have a tendency to increase population growth. We will try to see this hypothesis and the answer to this hypothesis in another section. But the authors see that conducting a comparison of the size of cities in each city can help to understand all parties to see the effect of the size of the city on population growth and other factors within the city. Because the size of the city is an asset to the city. If urban land is very large and can be utilized economically, it will greatly help the economic progress of the city and efforts to improve the welfare of the community. Especially if the local government can optimize the land they have for various kinds of activities that can spur economic growth and economic progress in their cities and regions as well as their communities. Different things if the city does not have large lands like Banjarmasin, Pontianak, and Malang, then the local government must be able to develop a development strategy that can trigger economic progress without depending on the area of urban land. And the government that manages a city with a small size must have far better human resources to be able to answer all challenges in the city properly. Because the city is not possible to rely on a small land in the city.

Because cities in Indonesia still do not rely on the business sector as an economic support. Certain cities still have dependence on the agricultural sector. Also, relying on the property tax sector. So, if the land is large, the population increases, there will be a building permit. Every building permit has a permit fee. And permit fees have an influence on city revenues. city revenue will be the government's

capital to build city infrastructure. So, if the population increases, it can be served because there are facilities already built by the government using taxes. The picture previousy shows the difference in the administrationsize of each cities. Batam city has a very large size. Its size is almost similar to the other 4 cities namely Manado, Pekanbaru, Padang and Samarinda. Meanwhile, there are several cities that have small sizes. Banjarmasin is the city with the smallest size. Its size is almost the same as some other cities but still a much smaller city. The size of the city is estimated to have an effect on the increase in the city's population. This is because the capacity of the city becomes larger if the city has a large size.

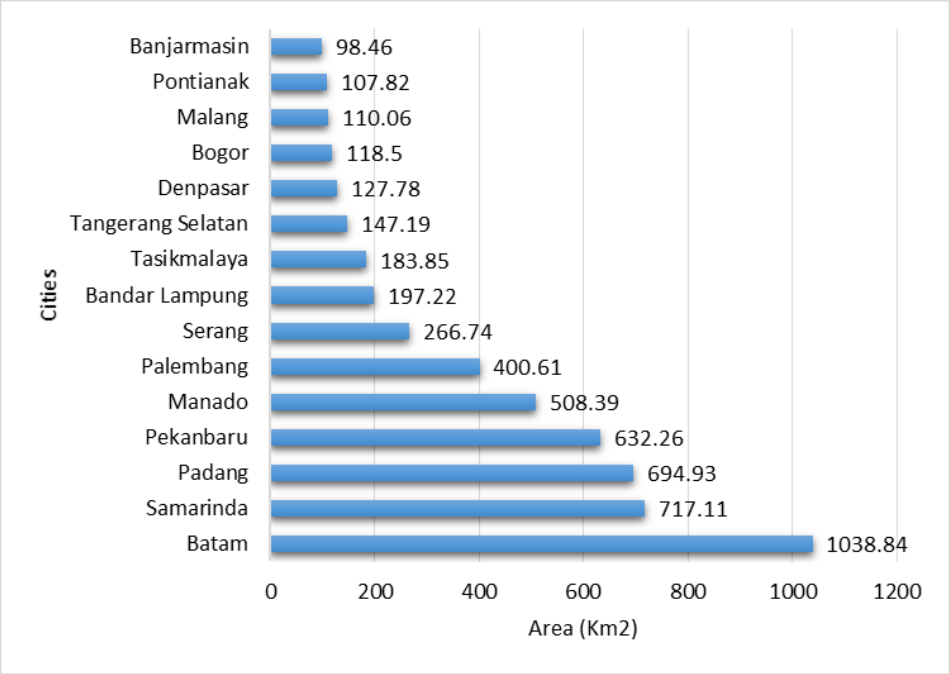


Fig 23 The administration city size

Source; Municipal, BPS, author

Therefore, for cities, large sizes can provide benefits for the city's economic progress. Because, there will be a large population that can be accommodated by the city area. Although, on the other hand, the size of large cities and scattered population settlements can lead to high costs in city infrastructure management. This image is another way of looking at the different sizes of each city. So, as explained earlier, determining the size of the city administratively has gone through several phases administratively in the government. So the problem of the size of the city will be as big as it is today because it relates to the limits of the city administration.

4.4 City size and population growth

This study shows that there is no strong correlation between population growth and city size. Of all cities, only Batam shows a link between city size and population growth in percent. Meanwhile, other cities show that there is no correlation between population growth and city size. They have a low population growth despite having a large city size. Size can affect population growth because the large size of the city means that it has a large capacity for the population.

4.4.1 Population growth in percent

In this section, the comparison that I make is a comparison between population growth (in percent) and city size. The results show that high population growth has a tendency related to the size of the city. Although, only Batam shows a very strong relationship between the size of the city and population growth. We need a method of analysis by using software to make a complete assessment. Because, population growth on a city scale shows a fairly high dynamic between the size of the city and population growth. Although there is a tendency for relations between these two issues with the value of the relationship that is not too high. The relationship between city size and population growth will lead us to an understanding of the capacity of the city.

Table 8 The correlation between population growth (%) and the city size

CITY	CITY AREA (KM2)	POPULATION GROWTH (%) FROM 1980 TO 2010
Batam	1,038.84	1609.40
Samarinda	717.11	21.79
Padang	694.93	72.13
Pekanbaru	632.26	130.36
Manado	508.39	61.75
Palembang	400.61	35.58
Serang	266.74	103.11
Bandar Lampung	197.22	210.19
Tasikmalaya	183.85	26.99
Tangerang Selatan	147.19	200.90
Denpasar	127.78	21.55
Bogor	118.50	141.56
Malang	110.06	25.59
Pontianak	107.82	90.91
Banjarmasin	98.46	58.48

Source; author

The ability of the city government to manage large areas and large populations will be able to bring the city into a city with high economic progress. Large cities can have the potential for natural resource management. Because, for certain cities, the availability of natural resources is very important in maintaining the consistency of the growth and progress of the city. The author has compiled a table based on the order of the size of the city from the size of the largest city to the size of the smallest city. Then the authors looked at population growth that occurred in each of 1980 to 2010. The results showed that there was a correlation between the size of the city and population growth even though the scale could be larger but could also be smaller compared to the correlation value and the value of no correlation.

Graph images provide clearer analysis material which shows that there is a correlation between the size of the city and the percentage of population growth. The results of the analysis show that the influence of this size is very large on population growth. Logic What can be built from the results of

this analysis is that there is so much that can be used to analyze the relationship between the size of the city and population growth.

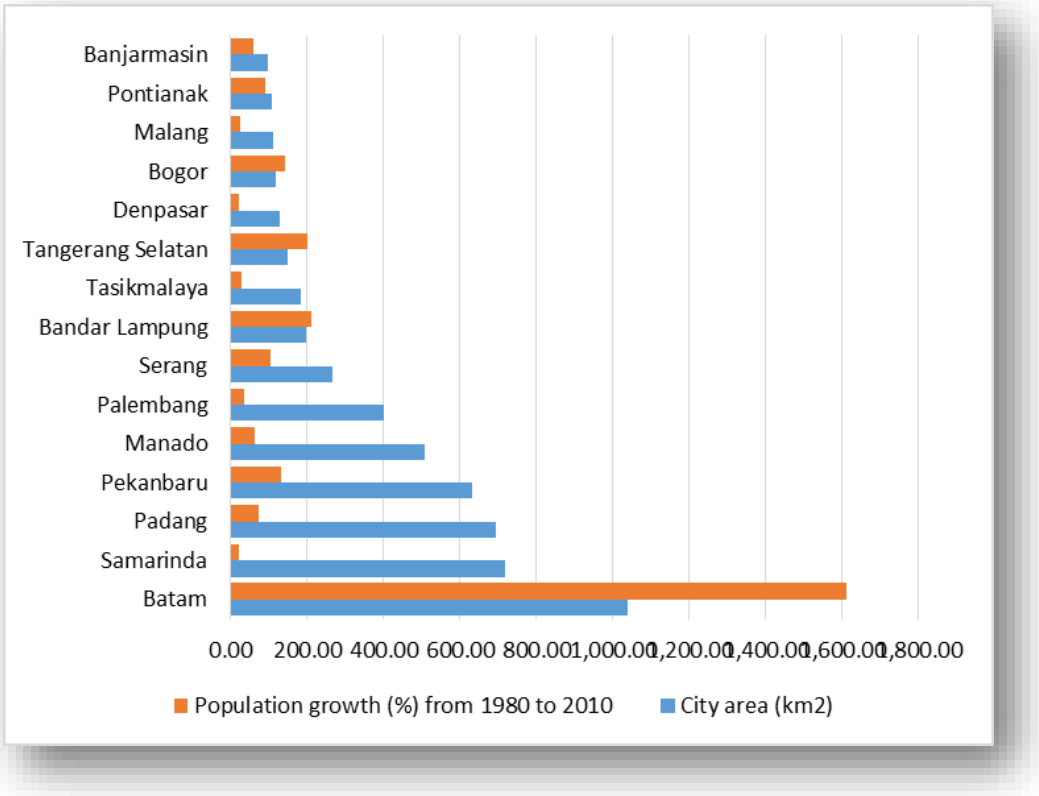


Fig 24 The graph of comparison between the city size and population growth

Source; author

4.4.2 Population growth in units of people

The same thing happened to the relationship between population increase in units of people and the size of the city. The size of the city does not have a direct link with the increase in population. However, in this section, the dynamics of population increase are higher because there is a diversity of patterns of population increase compared to the size of the city.

As the author mentioned earlier, the size of a city can affect the capacity of the city in terms of population. From the analysis of population increase, information is obtained that there are several cities whose population increase is very high. Like for example Batam and South Tangerang, whose population increases very high in annual size.

Population increase in all cities reaches 5.7 million people. This population increase is an implication of many things. It could be an increase in population caused by high birth rates. However, it can also be caused by the level of population migration. This study does not touch the birth and migration factors. Therefore, the authors see the population growth in each city compared to their potential. The potential that becomes the parameter of the study is the size of the city. Because, the main capital of the city is population and land. Both must be seen simultaneously to gain an understanding of the relationship between city size and population. The interaction between the two parameters must be well understood.

Table 9 Population growth (people) and city size

CITY	AREA (KM2)	AVERAGE POPULATION ADDITIONS PER YEAR (1980 TO 2010)
Banjarmasin	98.46	7,694
Pontianak	107.82	8,806
Malang	110.06	5,571
Bogor	118.50	18,564
Denpasar	127.78	4,661
Tangerang Selatan	147.19	28,717
Tasikmalaya	183.85	4,503
Bandar Lampung	197.22	19,918
Serang	266.74	9,777
Palembang	400.61	12,730
Manado	508.39	7,095
Pekanbaru	632.26	16,935
Padang	694.93	11,644
Samarinda	717.11	4,339
Batam	1038.84	29,635

Source; author

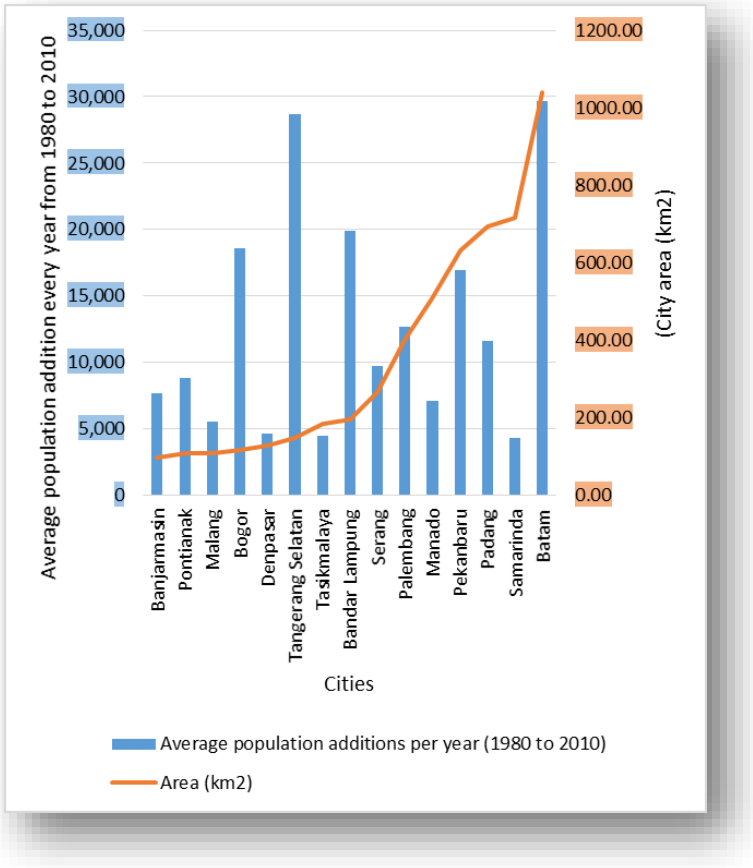


Fig 25 The graph of comparison between the city size and increasing of population

Source; author

Thus, we will gain an understanding of the interactions between the two cities in developing countries. This interaction will affect our perspective on the city. So, this study found that the size of the city has a slight influence on the average population growth or population increase every year from 1980 to 2010. Indeed, not all cities have a correlation between the size of the city and the increase in population per year. But some other cities show that there is a correlation between the size of the city and population growth per year. Previously the author had said that the size of the city had an effect on the addition of population per year or as a whole because, with the size of a large city, the capacity of the city to the population also became large. But for small cities in size but has a high population growth per year, it occurs because the city does not have a high population before. So that when the population increases, the increase is very drastic and this is reflected in the existing data, and ultimately can affect the analysis related to the size of the city and the increase in population per year.

4.4.3 City size group based on population increase (people)

Deeper searches carried out by looking at groups of population increases in the scale of <10000 people and> 10000 people showed that the effect of city size was not significant. If the two groups of population increases, the size of the city is combined and compared with each other, the city size for the group of population increases> 10000 people is 60.37% and for groups the population increase <10000 people has an area of 39.63% of the total size the city that became the object of research.

Table 10 The cities size by group of increasing population

The cities sized with population increase MORE then 10,000 people / year

City	Area (km2)
Bogor	118.50
Tangerang Selatan	147.19
Bandar Lampung	197.22
Palembang	400.61
Pekanbaru	632.26
Padang	694.93
Batam	1038.84
	3229.55

The cities size with population increase MORE then 10,000 people / year		
	Total area (km2)	3229.55
	% area from total	60.37%

The cities sized with population increase LESS then 10,000 people / year

City	Area (km2)
Banjarmasin	98.46
Pontianak	107.82
Malang	110.06
Denpasar	127.78
Tasikmalaya	183.85
Serang	266.74
Manado	508.39
Samarinda	717.11
	2120.21

The cities size with population increase LESS then 10,000 peoples / year		
	Total area (km2)	2120.21
	% area from total	39.63%

Source; author

The size of the city for population increase groups shows a larger size compared to the size of city groups with other population increases. Increased population influences the condition of the city in various ways. Because the population will increase the need for land to meet the needs of human life. Land will be very important because it can be a guarantee of meeting the needs of the community that can be fulfilled by the city itself. If a city has relied on production made by another city then it will cause dependency. Dependence has an impact on independence to be dropped and even lost. Therefore, land can become capital for the government to realize the independence of the city in

various ways. The ability of city managers to manage cities is very important and crucial. The size of the city affects the amount of resources in it.

The size of the city becomes the main capital for the city to manage it and use it. If it can be managed properly and will bring prosperity to the city. And the city has the funds to be advanced and modern. This section is a continuation of the analysis of population growth per year carried out previously, which the author explained in the previous section. This time we do see the size of the city, which we group based on the annual population growth. Counts performed indicate that a population that grows more than 10,000 people per year occurs in cities of varying sizes. But if we make the size of the city cumulatively, then the high population additions occur every year in cities that have a size of 60% of the total size of 15 cities that are the object of this study. Meanwhile, the population growth of fewer than 10,000 people occurred in cities that also varied in size but covered 40% of the total size of 15 cities that were the object of this research.

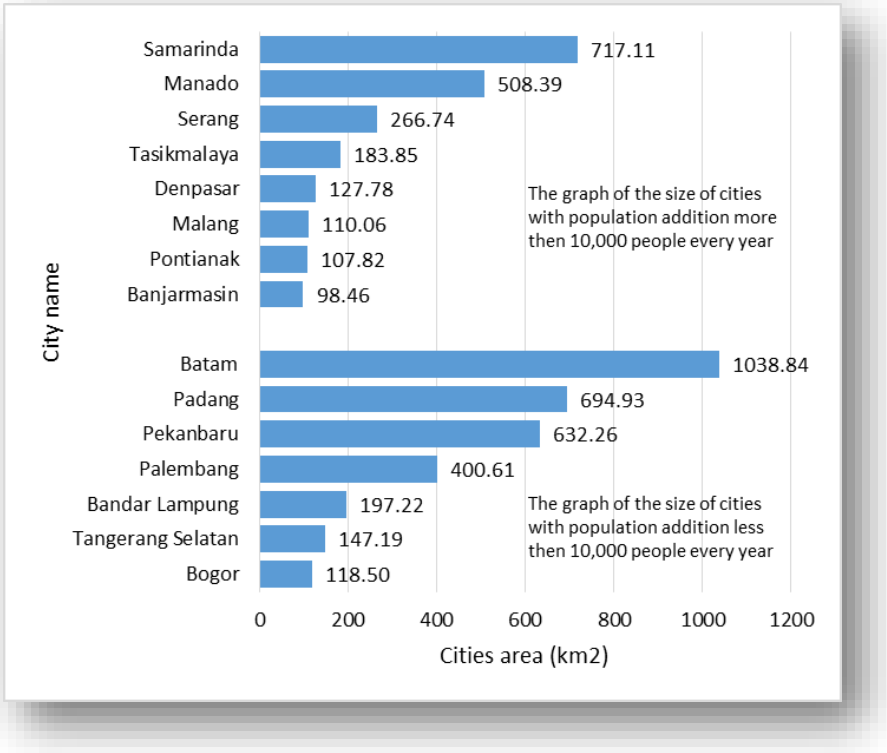


Fig 26 Cities size with population addition less and more then 10,000 people every year

Source; author

This condition indicates that the size of the city does have an influence on population growth. Because the analysis conducted shows that the size of a large city does have the ability to accommodate large numbers of populations and this has an effect on high population growth in cities that have large sizes. Because of that many megapolitan cities emerge today because population growth is getting higher and this happens in the main city and also the buffer cities around it. So they must collaborate with each other to prepare supporting infrastructure and other facilities in order to provide the best service to an increasingly high population and develop beyond the administrative boundaries of the city. This happened as a result of the small size of the city that could not possibly accommodate a growing

population while the concept of city development was not compact. As the size of the city widens, it will have implications for the vastness of the area built as a result of a population that is also increasingly multiplying.

4.4.4 Effect of city size on population growth

Population growth has an influence on the development of the city as a whole. Population growth can be caused by many factors and one of the factors that influence population growth between city sizes. The size of the city cannot be changed because the size of the note used in this study is the size of the city administratively. So, the government has indeed set the size and boundary of each city, so that the size of the city in km2 has been known from the beginning. This research still uses the size of the city administratively as a reference in conducting further analysis related to population growth. And the size of the city can influence population growth as stated in the previous section. And indeed, from the data and analysis carried out in this study, the authors found that high population growth occurs in cities that have a relatively small size and for relatively small city sizes that will have relatively high population growth.

This condition will influence the research that will be carried out in other parts. Because this is related to several factors that will be examined, namely population density and several other factors. But indeed the authors estimate that the size of the city and population growth influence population density. Population density factors will be discussed in another section of this document. Population growth also tends to be the same as the growth of population density because of the dividing factor, namely the size of the city is the same between one language and another language. Therefore, we do not need to do a deeper study related to the influence of the size of the city on population growth and population density, because the size of the city is fixed. The author uses the administrative limits of the city as a reference in this study.

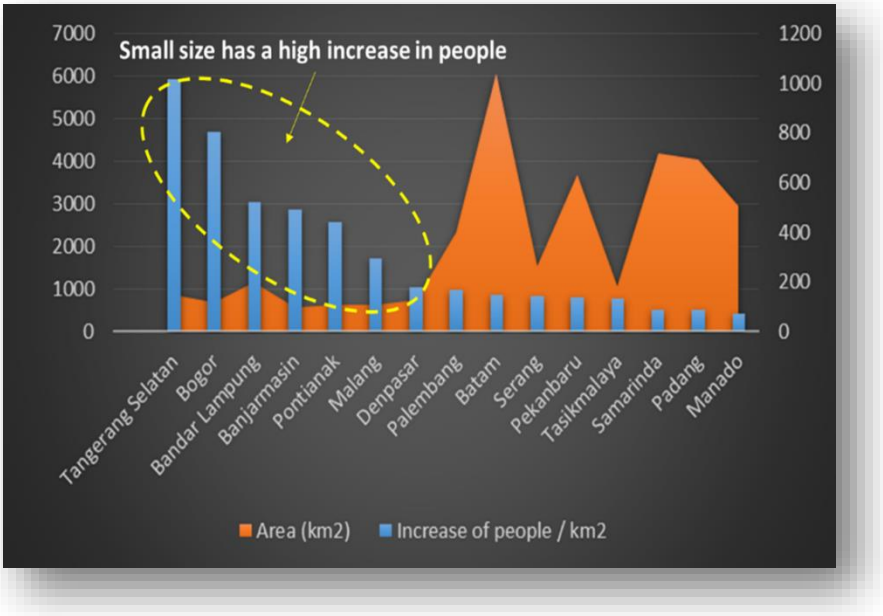


Fig 27 Interraction between area and population increasing (high increase)

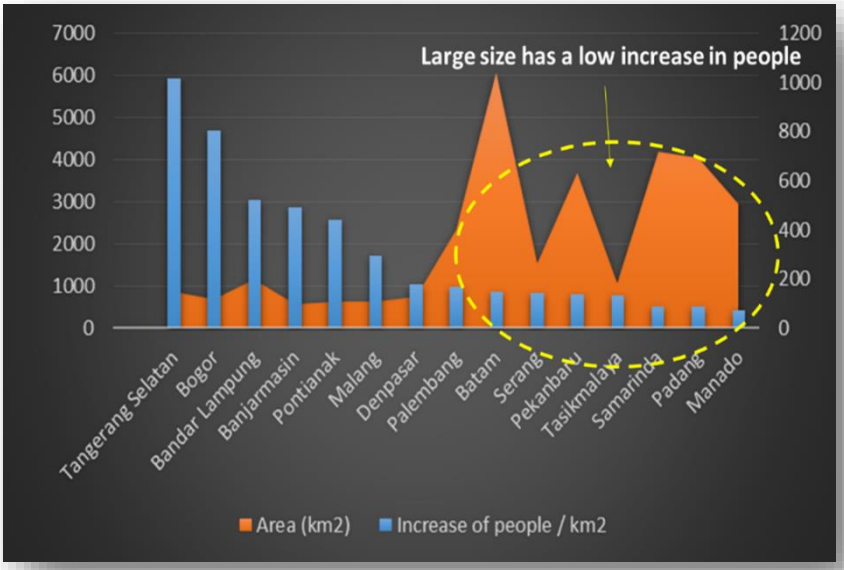


Fig 28 Interraction between area and population increasing (low increase)

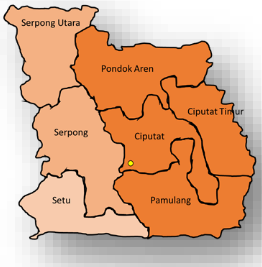
4.5 Overview of the district side

4.5.1 Understanding the district

Administratively, the city consists of several districts. Every population and district area has an influence on the city population. The researcher found that each city has a different number of districts.

Sample ;

Figure a



City with 7 districts

Figure b

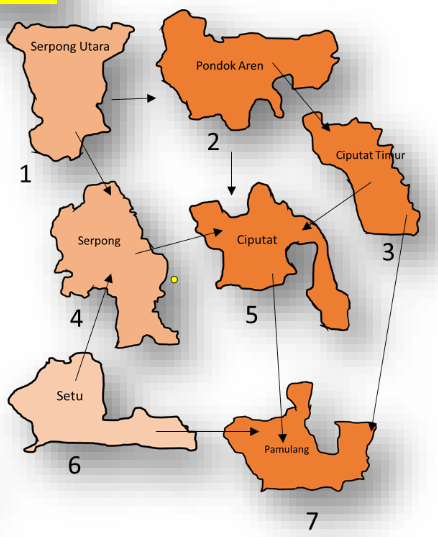


Figure a shows cities with several districts (7 districts). **Figure b** shows the seven districts that are part of one city. Numbers 1, 2 ... 7 indicate the district number. Other cities have several districts where the number of districts can be fewer or more than existing examples.

Fig 29 Understanding of city and district

Source; author

In government policy, the formation of districts in each city is influenced by the size of the land and the population. If the government can utilize the land they have, then each district will be able to meet the needs of its people by relying on land conditions and land size. Because in the land there are various sources of life for the community. If land can be managed properly, the needs of food, water, energy and housing can be met by relying on the land they have. The size of land becomes very important for a city and district. Moreover, if the population they have is high, the thing can increase revenue for the government. Because, the population will be subject to taxes and levies. Every land can be productive, it will also increase the welfare of the regional government in the city or district.

Back to the notion of the district, the district is a part of the city or part of the city administration that can influence the shape of the city and the development of the city. Districts become government tools to be able to control and serve the population. Therefore, the development of the population that occurs in the district will give effect to the city as a whole. Therefore, research on the district will be conducted to examine whether the phenomenon occurring on a city scale also occurs at the district scale. The assumption that the authors have is that there are similarities in results between research on a city scale and on a district scale.

4.5.2 A number of districts in each city

Every city has a district. Based on existing data, the author found that Palembang became the city with the most districts. Then followed by Bandar Lampung and Pekanbaru. Meanwhile Denpasar is the city with the lowest number. Previously there were Malang and Banjarmasin which had the least number of districts. Districts are formed by the government to provide the best service to its citizens.

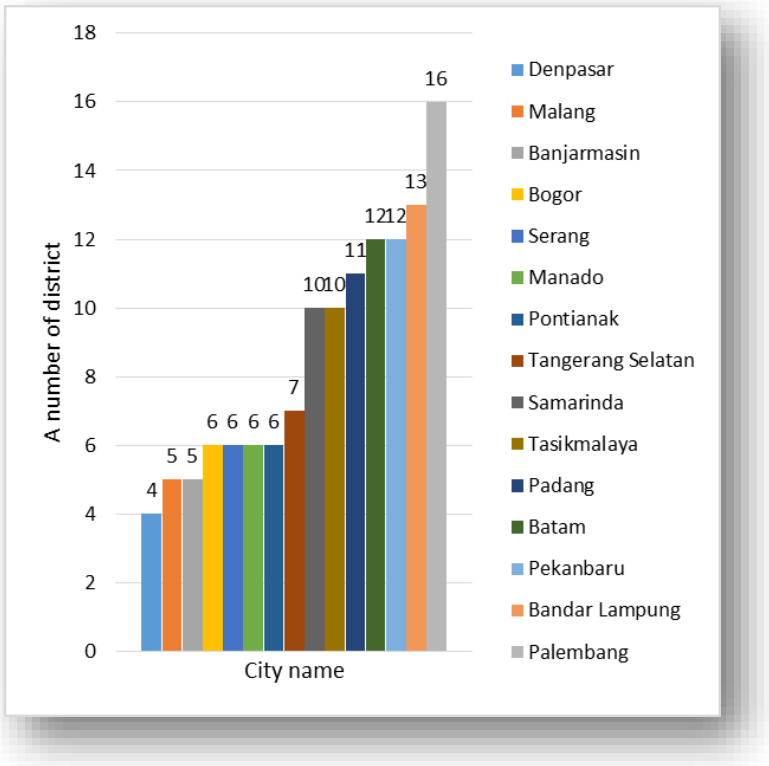


Fig 30 Number of districts in each city

Source; Municipal, BPS, author

Therefore, the formation of districts has special requirements, two of which are the number of population and size of districts. Therefore, logically, the city with the most districts means having the largest population. For the Palembang case this allegation is correct. And if we look at the condition of the city, the number of districts and the number of population shows that this is true. If we look at the size of the city, the proximity of the population number is closer to the number of districts compared to the size of the city and the number of districts. This indicates that the population is the main consideration, then it is followed by the size of the city. The number of districts is influenced by the number of population in the district. There are several districts that have high populations, but there are also districts that do not have high populations. But the existence of a district government can influence people's desire to live in that location. Because the existence of district government is indeed intended to provide services to the community. So, the community eventually tends to choose to live in an area close to the district government center which is equipped with markets and health services.

Thus, the greater the number of district governments, the greater the likelihood of high population growth in the district or in areas close to the center of the district. Therefore, giving attention to the development and development of the district, can affect the development of the city as a whole. Regarding the number of districts this is very much influenced by the availability of human resources in the city. However, the more districts and government districts, the better the development potential of the city will be.

4.5.3 Population in each district

The author finds populations in each district in all cities that are the object of research. The population is spread with high diversity. Far or near the distance of the district from the city center, the population in the district remains high and or low. As mentioned earlier, the population is an important basis in the formation of districts. And the total population varies greatly from one sub-district to another. Regarding the distance of the city center and district center associated with population and population density will be discussed in another chapter. However, the authors found data and conducted an analysis of the population in each district. The results show very high population variations. If each district manager can manage the population they have, each district will become an economic region.

The processed data shows that there is a diversity of populations in each district. This population diversity needs to be investigated more deeply to see the factors that affect the population in a city or all in general. The population has a big influence on city change as the author has said in the previous section. Therefore, understanding or knowing changes in population in cities, including on a district scale, can help us to understand the effect of population changes at the district level which has an effect on population changes at the city level. And this populationn change will have an influence on changes in the city as a whole. In the section below, we will look at population and population changes at the district scale that occur in all cities that were the objects of this study. Readers can read it in the section below.

Population development in each district has an impact on population growth in each district which becomes more varied. Each district does have an attraction for residents to live in the administrative area of the district. Coupled with the existence of various things that provide an attraction for residents of everything that is in the administrative area of the district. The attraction of each electricity can be created or planned so that there will be a lot of population that comes into the

district and then lives in the district. If every electricity has a high population, the district has human resources that can be managed to develop the economic and other sectors.

Table 11 The Population per districts

CITY	DISTRICTS	POPULATION (PEOPLE)			
		1980	1990	2000	2010
Palembang	Sukarami	102524	113960	126671	140800
	Alang-alang Lebar	63609	70704	78590	87356
	Kertapati	59449	65940	73141	81128
	Sematang Borang	23813	26469	29421	32703
	Gandus	42401	47031	52167	57864
	Sako	60874	67593	75053	83336
	Kalidoni	73673	81804	90833	100858
	Ilir Barat I	91720	101736	112845	125168
	Kemuning	61143	67749	75068	83178
	Plaju	58720	65064	72093	79881
	Ilir Timur I	51423	56918	63001	69734
	Ilir Timur II	117875	130610	144720	160354
	Seberang Ulu I	118862	132259	147166	163754
	Seberang Ulu II	67840	75249	83466	92580
	Ilir Barat II	47142	52235	57878	64131
	Bukit Kecil	32317	35808	39677	43963
Tangerang Selatan	Serpong utara	42096	63916	87383	127471
	Pondok aren	100747	152969	209132	305073
	Serpong	45632	69285	94722	138177
	Ciputat timur	59375	90151	123250	179792
	Setu	22016	33428	45701	66667
	Pamulang	95094	144386	197397	287955
	Ciputat	63858	96959	132557	193369
Bogor	Tanah Sareal	127468	131927	136542	190919
	Bogor Utara	78963	81046	132113	170443
	Bogor Barat	39829	40808	166427	211084
	Bogor Tengah	35014	35393	91230	101398
	Bogor Timur	61074	62403	77000	95098
	Bogor Selatan	51076	52601	147507	181392
Batam	Bulang	558	1430	4766	9531
	Galang	877	2247	7492	14983
	Belakang Padang	1083	2776	9254	18508
	Batu Aji	3437	8812	29373	58745
	Sekupang	2915	7474	24914	49828
	Sagulung	4726	12117	40390	80780
	Sei Beduk	4700	12052	40175	80349
	Batu Ampar	5856	15016	50054	100108
	Nongsa	8759	22459	74864	149727
	Lubuk Baja	9491	24336	81119	162238
	Bengkong	5384	13805	46017	92033
	Batam Kota	7456	19118	63728	127455
Pekanbaru	Rumbai	28054	36913	43944	64624
	Tampan	73649	96907	115365	169655
	Rumbai pesisir	28086	36955	43995	64698
	Tenayan Raya	53463	70346	83745	123155
	Payung Sekaki	37587	49457	58877	86584
	Marpoyan Damai	54567	71798	85474	125697

CITY	DISTRICTS	POPULATION (PEOPLE)			
		1980	1990	2000	2010
	Bukit Raya	39901	52501	62502	91914
	Sail	9306	12245	14578	21438
	Sukajadi	20479	26946	32078	47174
	Senapelan	15816	20811	24775	36434
	Limapuluh	17943	23609	28106	41333
	Pekanbaru kota	10880	14315	17042	25062
Bandar Lampung	Panjang	27311	48061	56675	68189
	Labuhan Ratu	11927	28986	33748	39883
	Rajabasa	13467	30894	36042	42715
	Tanjung Senang	12378	29545	34419	40712
	Kemiling	24914	45089	53102	63778
	Sukabumi	17965	36473	42747	50993
	Way Halim	19976	38966	45743	54692
	Langkapura	6659	22453	25896	30190
	Sukarame	17766	36225	42449	50626
	Teluk Betung Timur	10382	27069	31444	37039
	Kedaton	15866	33869	39617	47130
	Tanjung Karang Barat	16697	34900	40856	48659
	Kedamaian	15673	33631	39331	46775
	Bumi Waras	17679	36118	42320	50466
	Teluk Betung Barat	4656	19969	22910	26503
	Tanjung Karang Pusat	14965	32752	38274	45471
	Tangjung Karang Timur	8189	24350	28176	33004
	Teluk Betung Selatan	9274	25695	29793	35001
	Teluk Betung Utara	14707	32432	37890	44997
	Enggal	3827	18941	21675	24978
Padang	Koto Tangah	94159	123893	136146	162079
	Pauh	34401	45265	49741	59216
	Kuranji	73622	96872	106452	126729
	Lubuk Kilangan	28379	37341	41034	48850
	Bungus Teluk Kabung	13301	17502	19233	22896
	Lubuk Begalung	61831	81357	89403	106432
	Nanggalo	33274	43781	48111	57275
	Padang Selatan	33531	44120	48483	57718
	Padang Barat	26363	34688	38119	45380
	Padang Utara	40154	52835	58060	69119
	Padang Timur	45237	59522	65409	77868
Malang	Blimbing	144134	153334	170371	185907
	Lowokwaru	125128	133115	147905	161393
	Kedungkandang	145363	154641	171823	187492
	Sukun	150119	159701	177446	193627
	Klojen	88380	94021	104468	113994
Denpasar	Denpasar Selatan	205156	222995	232287	247114
	Denpasar Utara	143622	156111	162615	172995
	Denpasar Timur	111852	121578	126644	134728
	Denpasar Barat	188140	204500	213021	226618
Samarinda	Palaran	30370	37963	44662	49079
	Samarinda Utara	61113	76391	89872	98760
	Loa Janan Ilir	36373	45466	53490	58780
	Sungai Kunjang	70570	88213	103780	114044
	Samarinda kota	20523	25653	30180	33165
	Samarinda Ulu	78372	97965	115252	126651

CITY	DISTRICTS	POPULATION (PEOPLE)			
		1980	1990	2000	2010
	Sungai Pinang	125373	156717	184372	202607
	Sambutan	29146	36433	42862	47101
	Samarinda Seberang	70656	88321	103907	114183
	Samarinda Ilir	74835	93544	110052	120936
Tasikmalaya	Kawalu	66954	76519	83627	86214
	Bungursari	36099	41256	45089	46483
	Indihiang	37474	42827	46806	48253
	Tamansari	49930	57062	62363	64292
	Cibeureum	48078	54946	60050	61908
	Mangkubumi	67238	76843	83982	86579
	Purbaratu	29867	34134	37304	38458
	Tawang	49532	56608	61867	63780
	Cihideung	56269	64308	70282	72455
	Cipedes	58948	67369	73628	75905
Banjarmasin	Banjarmasin Selatan	92133	103520	124723	157678
	Banjarmasin utara	89527	100592	121195	153218
	Barjarmasin barat	87490	98304	118438	149732
	Banjarmasin timur	70154	78824	94969	120062
	Banjarmasin Tengah	55364	62206	74947	94750
Serang	Curug	23259	27689	35499	41278
	Walantaka	37314	44421	56950	66221
	Taktakan	38646	46007	58984	68586
	Kasemen	43286	51531	66065	76820
	Cipocok	39868	47462	60849	70754
	Serang	102091	121537	155816	181182
Manado	Malalayang	37371	48534	57098	61396
	Mapanget	69314	90019	105904	113876
	Singkil	61155	79423	93438	100471
	Tikala	75977	98671	116084	124821
	Wenang	51775	67240	79106	85060
	Tuminting	49123	63796	75054	80703
Pontianak	Pontianak Barat	64736	79921	103793	126577
	Pontianak tenggara	23636	29181	37897	46216
	pontianak timur	43126	53242	69145	84323
	Pontianak selatan	42734	52758	68517	83557
	Pontianak utara	58897	72713	94432	115161
	Pontianak kota	57465	70944	92135	112360

Source; Municipal, BPS, author

In the next section, we will look at population growth that occurs in each district. Population growth that occurs in each district influences the overall population growth of the city. Therefore what happens to the district is a reflection of what happened to the city.

4.5.4 Population growth in each district by size

Furthermore, the authors conduct research related to population growth. The author makes a comparison with the size of each district. So the authors can see the relationship between district size and population growth. Because, the logic used is, large districts will have large populations. And for districts with small sizes will have a small population. This assumption will be tested in this study.

Processed data shows the same results that population growth in units of people does not directly have an impact on population increases. However, in the logic of space and capacity it shows the possibility. Because the results are the same as reviews on a city scale, a search will be carried out using software to see the correlation between the size of the city / district size and population growth in percent and number of people. The increase in population can indeed be caused by various things. In this study, the authors want to see whether there is an influence of the size of the city or district on population changes or population increases.

Table 12 District size and population increase (people)

CITY	DISTRICTS	AREA (KM2)	POPULATION GROWTH (1980 TO 2010) ON PEOPLE
Palembang	Gandus	68.78	15463
	Sukarami	51.46	38276
	Kertapati	42.56	21680
	Sematang Borang	36.98	8890
	Alang-alang Lebar	34.58	23747
	Kalidoni	27.92	27185
	Ilir Timur II	25.58	42479
	Ilir Barat I	19.77	33448
	Sako	18.04	22462
	Seberang Ulu I	17.44	44892
	Plaju	15.17	21161
	Seberang Ulu II	10.69	24740
	Bukit Kecil	9.92	11646
	Kemuning	9.00	22034
	Ilir Timur I	6.50	18311
	Ilir Barat II	6.22	16989
Tangerang Selatan	Pondok aren	29.88	204326
	Pamulang	26.82	192861
	Serpong	24.04	92545
	Ciputat	18.38	129511
	Serpong utara	17.84	85375
	Ciputat timur	15.43	120417
	Setu	14.80	44651
Bogor	Bogor Barat	32.85	171255
	Bogor Selatan	30.81	130316
	Tanah Sareal	18.84	63451
	Bogor Utara	17.72	91480
	Bogor Timur	10.15	34024
	Bogor Tengah	8.13	66384
Batam	Galang	350.76	14106
	Bulang	158.75	8973
	Nongsa	114.55	140968
	Sei Beduk	106.45	75649
	Belakang Padang	69.12	17425
	Sekupang	68.30	46913
	Sagulung	54.78	76054
	Batu Aji	41.34	55308
	Batam Kota	38.96	119999
	Bengkong	13.21	86649
	Lubuk Baja	11.43	152747
	Batu Ampar	11.19	94252

CITY	DISTRICTS	AREA (KM2)	POPULATION GROWTH (1980 TO 2010) ON PEOPLE
Pekanbaru	Tenayan Raya	171.27	69692
	Rumbai pesisir	157.33	36612
	Rumbai	128.85	36570
	Tampan	59.81	96006
	Payung Sekaki	43.24	48997
	Marpoyan Damai	29.74	71130
	Bukit Raya	22.05	52013
	Senapelan	6.65	20618
	Limapuluh	4.04	23390
	Sukajadi	3.76	26695
	Sail	3.26	12132
	Pekanbaru kota	2.26	14182
Bandar Lampung	Kemiling	24.24	38864
	Sukabumi	23.6	33028
	Panjang	15.75	40878
	Tanjung Karang Barat	14.99	31962
	Teluk Betung Timur	14.83	26657
	Sukarame	14.75	32860
	Rajabasa	13.53	29249
	Teluk Betung Barat	11.02	21848
	Tanjung Senang	10.63	28334
	Kedamaian	8.21	31102
	Labuhan Ratu	7.97	27956
	Langkapura	6.12	23531
	Way Halim	5.35	34716
	Kedaton	4.79	31264
	Teluk Betung Utara	4.33	30291
	Tanjung Karang Pusat	4.05	30507
	Teluk Betung Selatan	3.79	25727
	Bumi Waras	3.75	32787
	Enggal	3.49	21151
	Tangjung Karang Timur	2.03	24815
Padang	Koto Tangah	232.25	67920
	Pauh	146.26	24815
	Bungus Teluk Kabung	100.78	9595
	Lubuk Kilangan	85.99	20471
	Kuranji	57.41	53107
	Lubuk Begalung	30.91	44601
	Padang Selatan	10.03	24187
	Padang Timur	8.15	32631
	Padang Utara	8.08	28965
	Nanggalo	8.07	24001
	Padang Barat	7	19017
Malang	Kedungkandang	39.89	42129
	Lowokwaru	22.6	36265
	Sukun	20.97	43508
	Blimbing	17.77	41773
	Klojen	8.83	25614
Denpasar	Denpasar Selatan	49.99	41958
	Denpasar Utara	31.42	29373
	Denpasar Barat	24.06	38478
	Denpasar Timur	22.31	22876

CITY	DISTRICTS	AREA (KM2)	POPULATION GROWTH (1980 TO 2010) ON PEOPLE
Samarinda	Samarinda Utara	229.52	37647
	Palaran	220.4	18709
	Sambutan	100.95	17955
	Sungai Kunjang	43.04	43474
	Sungai Pinang	34.16	77234
	Loa Janan Ilir	26.13	22407
	Samarinda Ulu	22.12	48279
	Samarinda Ilir	17.18	46101
	Samarinda Seberang	12.49	43527
	Samarinda kota	11.12	12642
Tasikmalaya	Kawalu	42.78	19260
	Tamansari	35.99	14362
	Mangkubumi	24.53	19341
	Cibeureum	19.04	13830
	Bungursari	16.91	10384
	Purbaratu	12.02	8591
	Indihiang	11.04	10779
	Cipedes	8.97	16957
	Tawang	7.08	14248
	Cihideung	5.49	16186
Banjarmasin	Banjarmasin Selatan	38.27	65545
	Banjarmasin timur	23.86	49908
	Banjarmasin utara	16.54	63691
	Barjarmasin barat	13.13	62242
	Banjarmasin Tengah	6.66	39386
Serang	Kasemen	63.36	33534
	Curug	49.6	18019
	Walantaka	48.48	28907
	Taktakan	47.88	29940
	Cipocok	31.54	30886
	Serang	25.88	79091
Manado	Malalayang	179.95	33285
	Mapanget	137.16	24025
	Singkil	132.16	48844
	Tikala	37.82	44561
	Wenang	11.08	39316
	Tuminting	10.22	31580
Pontianak	Pontianak utara	37.22	56264
	Pontianak Barat	16.47	61841
	Pontianak kota	15.98	54895
	Pontianak tenggara	14.83	22579
	Pontianak selatan	14.54	40823
	Pontianak timur	8.78	41197

Source; author

4.6 The correlation of population growth and city size

At the end of the discussion about population growth, the authors made a comparison between the size of the city and population growth. The analysis was carried out using JMP and SPSS software. The

results show that there is a correlation between city size and population growth. The correlation value is 0.6115. The correlation is quite strong.

Table 13 The influence of area to population growth

Correlations	Pop growth from 1980 to 2010	City administration area (km2)
Pop growth on 1980 to 2010	1.0000	0.6115
City administration area (km2)	0.6115	1.0000

Source ; author

So, the writer can say that a city will have a high population growth if the size of the city is wide. Because, the size of the city will make the capacity of the city to accommodate the population will also be high. Cities in Indonesia that are the object of this research show that the size of the city they have has contributed to population growth. Large populations will encourage and increase economic and social activities in a city. Thus, population growth is an opportunity for the city government to improve the welfare of citizens and cities.

4.7 Factors of fertility and migration in population growth

In addition to city size factors, the population can grow in two ways, namely fertilization (after being reduced by mortality) and migration. Fertilization is a process of increasing natural populations. Through fertilization, the population can increase sooner or later. However, increasing population through this method is a natural way of increasing the population of a city. UN states that in general the increase in population through the birth of a city or country can be estimated through fertilization rates. The UN said that global fertilization ranged between 1.7 and 2.1 per number of women there (source: unpopulation.org, 2017). At the same time, there is also an increase in population due to migration.

Table 14 Increased population due to fertilization and migration

NO	CITIES	POPULATION NUMBER IF COUNT BY FERTILITY FACTORS (ON PEOPLE)	POPULATION NUMBER BY CENSUS OF CBS (ON PEOPLE)	DIFFERENR NUMBER OF POPULATION	STATUS OF POPULATION
1	Palembang	1,688,601	1,455,284	-233,317	-
2	Tangerang Selatan	662,742	1,290,322	627,580	+
3	Bogor	605,175	950,334	345,159	+
4	Batam	84,846	944,286	859,439	+
5	Pekanbaru	585,153	897,768	312,615	+
6	Bandar Lampung	442,190	881,801	439,611	+
7	Padang	749,476	833,562	84,086	+
8	Malang	967,958	820,243	-147,715	-
9	Denpasar	987,464	788,589	-198,875	-
10	Samarinda	901,339	727,500	-173,839	-
11	Tasikmalaya	764,963	635,464	-129,499	-
12	Banjarmasin	594,526	625,481	30,955	+
13	Serang	418,335	577,785	159,450	+
14	Manado	520,036	557,579	37,543	+
15	Pontianak	453,622	554,764	101,142	+

(-) : the people out from city (out-migration/emmigration), (+) : the population addition (in migration / immigration).

Source; CBS/BPS 2010, author

There are two types of migration, namely city migration (immigration) and out-of-town migration (emigration). Two ways to increase population are choices for city managers to increase the

population. If the population is large and can be managed, the population will increase and contribute to the progress of the city.

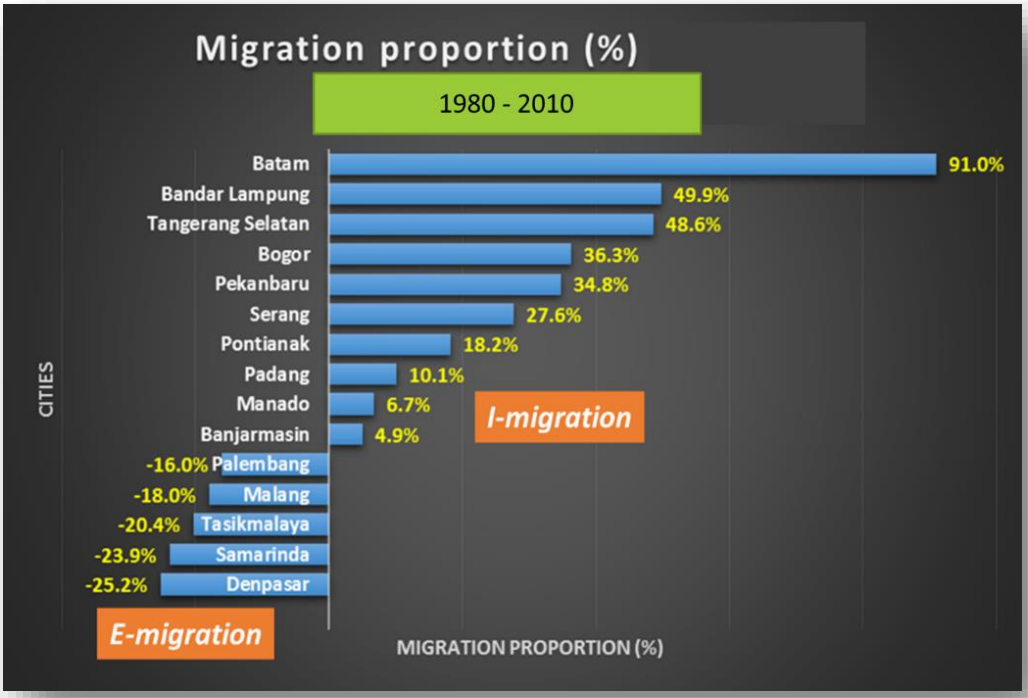


Fig 31 Migration proportion

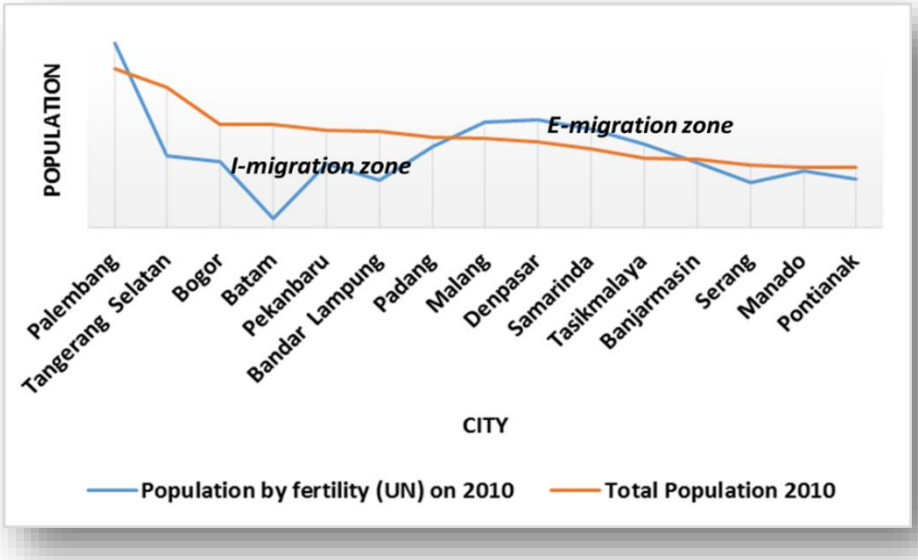


Fig 32 The influence of migration to population growth

The population increase for 30 years shows the contribution of fertilization and the contribution of migration in each city can be seen in the table. For migration numbers, negative indicates there is an

out-migration or emigration. If it is positive, it indicates that there is inward migration from the outside into the city. Because the population in 2010 is not possible just because of fertilization. The population due to fertilization does not show large numbers. In detail, we can be sure that most cities in Indonesia will show a tendency to increase the population by these two factors, fertilization, and migration. So there are cities that have a higher population than the population based on the multiplication of the population average birth rate in the base year. This indicates that there is a possibility that the population appears from outside the city. They enter the city because the city has something that can improve the welfare of people from outside the city. The entry of residents from outside the city is an advantage for the city government because the city has a large and productive workforce that can contribute to the economic progress of the city.

4.8 Compare the other cities to Bandar Lampung

In accordance with the question of the examiner some time ago, and also the request of the examiner to do a population comparison, then in this sub-section the author will present the results of the analysis of population density with Bandar Lampung. this city will be compared to other cities that are the object of research. This comparison is considered important because the development of one city alone cannot describe the situation of city development in Indonesia. Therefore, in this study, in line with previous research, population comparisons and population growth in Bandar Lampung will be conducted against other cities (14 cities). The comparison includes population comparison, comparison of population growth, comparison of population increase (unit of people), comparison of city size, and seeing factors that influence the position between one city and another city as found in this study.

4.8.1 Comparison of population

The author found a change in the population of Bandar Lampung in 1980 and 2010. In 1980, the population of Bandar Lampung was still far below the position of other cities. If we use position ratings with rankings, Bandar Lampung is in position 14 (1980).

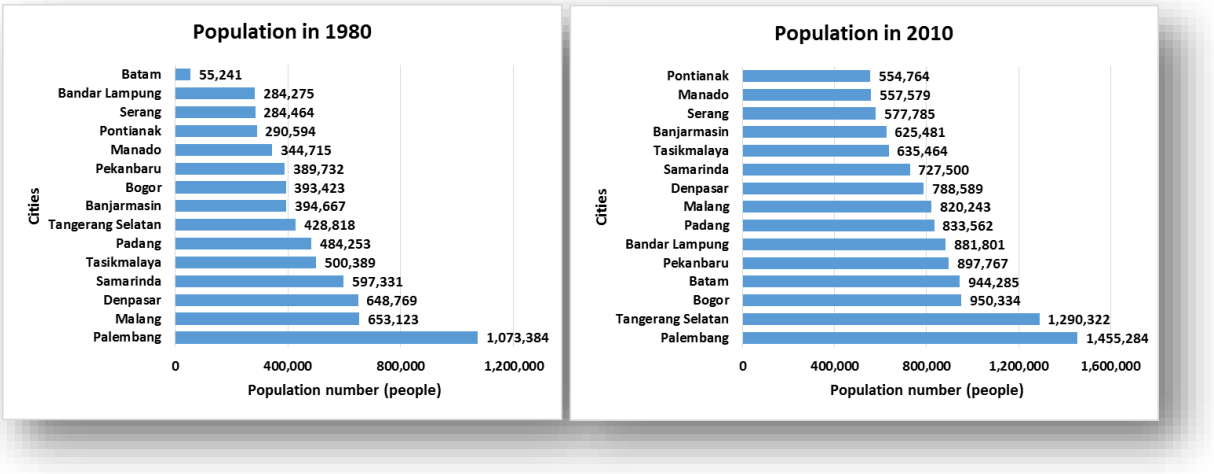


Fig 33 Population comparison for Bandar Lampung to others cities in 1980 and 2010

Source; author

However, in 2010, Bandar Lampung's position increased very rapidly. His position was ranked 6th in 2010. Bandar Lampung's population growth was defeated by Batam. Batam became the city with the

lowest population (1980), but became a city that could defeat the population of Bandar Lampung in 2010. The increase in population is estimated to be caused by migration of people from outside the region. Migration occurs in response to the city's economic development policies. Especially Batam, which was originally a city of island and lonely, was changed through a policy to make Batam as a buffer city of Singapore, has made Batam a city with a high population growth because the city's needs for workers are very high. and that can only be fulfilled by the availability of productive age populations from outside Batam. A similar case occurred in Bandar Lampung, which became a buffer for Cilegon as a national industrial estate. Thus, many industries developed in Bandar Lampung and made the city accept many population migrations, especially workers. Comparison of population changes from 1980 to 2010 can help us see patterns of population development in each city.

4.8.2 Comparison of population growth

If we look at changes in population position for 30 years, this indicates that Bandar Lampung has strong competitiveness in terms of absorbing a growing population. Population can come from birth and also migration / migration. The migration of people outside the area to Bandar Lampung was caused by many things. Among them is the transmigration program created by the government to suppress high population growth in Java.

So that some Javanese residents are directed or offered to move to other islands, one of which is Sumatra. Bandar Lampung is on the island of Sumatra. This makes Bandar Lampung a destination for population migration. The effect is that population growth rates are very high. Although Bandar Lampung's position is still low compared to Batam's population growth rate. But the Batam situation is indeed different. Batam was created as the second Singaporean or Singaporean competitor from the Indonesian side. As a result, because there are many special policies on Batam, Batam can develop into a large industrial area and indirectly change Batam's population. So that the growth becomes very high. This comparison gives us an understanding of the condition of each city that has differences between one city and another. We cannot give an assessment that every city has the same conditions.

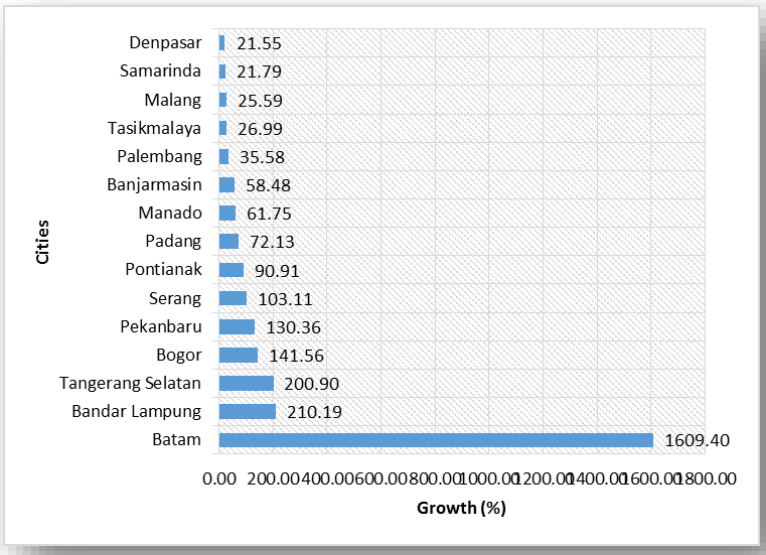


Fig 34 Comparison of population growth in 1980 to 2010

Source; author

4.8.3 Comparison of population increase (people)

If we see an increase in population in terms of numbers, we will get results or information that Bandar Lampung is one of the cities in the category of facing large population growth. Bandar Lampung's population growth was only defeated by Batam and South Tangerang.

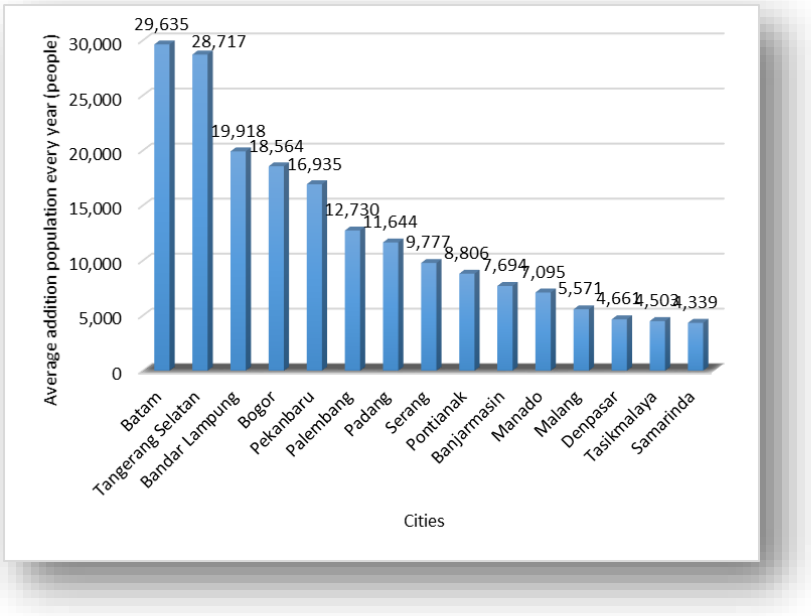


Fig 35 Comparison of addition of population every year from 1980 to 2010

Source; author

This growth places Bandar Lampung as the city with the third highest growth. Other cities are under Bandar Lampung in terms of population growth. The highest population growth per year is in Batam and South Tangerang. Batam is a new industrial area developed by the government to be the same as Singapore because between Batam and Singapore is very close. So that Indonesia designed the city of Batam as a city that would later have the same progress as Singapore. But indeed until now this matter still cannot be realized. Even though it still hasn't materialized, the population that appears and grows on Batam is very high. The same thing happened in the city of South Tangerang.

4.8.4 Comparison of city size

City size has an influence on population development. This is the hypothesis developed in this chapter. Penelis found the size of the city for Bandar Lampung to be in the middle size. Of the 15 cities that were the object of research, Bandar Lampung was ranked 8th for the widest population size. If we compare it with the population growth that places Bandar Lampung as the city with the third highest population growth, the size of the city shows that there is no strong influence between the two things in the context of Bandar Lampung. Some cities in Indonesia increase the size of the city because of the increasing trend of the city. An example is Bandar Lampung. In the 1970s, Bandar Lampung only had a size of 50.45 km2 and its name was not Bandar Lampung but Teluk Betung. However, because new areas emerged as residential areas such as Tanjung Karang and Kedaton, the new area was included in one area with Teluk Betung. The three regions then changed their name to Bandar Lampung. from this study, the authors did not find a change in the size of the city. All measures are always the same

and this gives the attraction to know the pattern of physical changes within the administrative area of the city after previously changes outside the administrative boundaries have an influence on changes in city size policies. The size of the largest city is Batam while for the city with the smallest size is Banjarmasin.

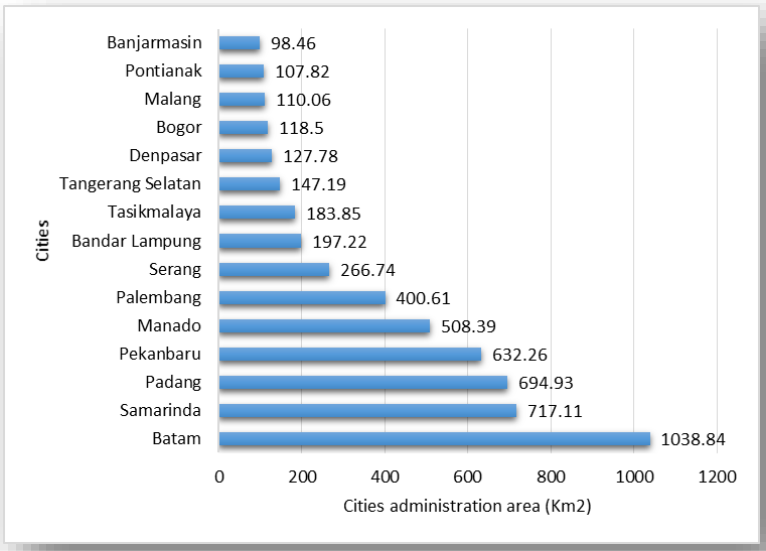


Fig 36 The city size comparison

Source; author

As the author said earlier that the size of the city will have an influence on population growth. Content and population growth have an influence on land use in the city and affect things related to everything in the city.Therefore, having an understanding of the size of the city can help us to do further analysis. The analysis that we will do in the next stage will always make the size of the city as one component of research that cannot be abandoned.

4.8.5 The influences of other factors

If so, then we need to do further or additional research to find out the factors that influence Bandar Lampung's high inflation growth. Because, the size of the city was not so strong as to show that the size of the city had a significant influence on population growth. From some of the readings the author did and some references indicate that the growth of the population can also be influenced by economic factors. Two economic parameters that influence the growth of the population are per capita income and the salary standard of workers. Residents from other places will move and settle in the city if the city has an interest in the economy.

The community needs a better life because if the city is able to meet the economic needs of the people they will cityize from outside the city into the city. The table shows the combined data and the comparison between population growth and work salary standard and income per capita. Every community who comes into the city and then chooses to live in the city does indeed have economic reasons to choose that option. They must stay in the city to improve the family's economic life, and they have the view that life outside the city or in rural areas will make their economic life tend to be

low and inferior, compared to the living conditions of people in the city. For this reason, economic issues related to salaries and income from other sectors will be the main consideration for the community to choose to live in the city.

Table 15 Compare of population growth work salary, and income

CITY	POPULATION GROWTH (%) FROM 1980 TO 2010	WORKER SALARY STANDARDS (RP) IN 2010	INCOME PER CAPITA (RP) IN 2010
Denpasar	21.55	1,111,000	33,200,000
Samarinda	21.79	1,900,000	125,000,000
Malang	25.59	1,006,263	14,044,625
Tasikmalaya	26.99	699,815	2,136,099
Palembang	35.58	927,825	10,168,303
Banjarmasin	58.48	2,600,000	14,900,000
Manado	61.75	1,000,000	549,000
Padang	72.13	940,000	15,000,000
Pontianak	90.91	710,000	6,262,491
Serang	103.11	955,000	5,070,000
Pekanbaru	130.36	1,055,000	10,010,000
Bogor	141.56	1,056,914	5,311,184
Tangerang Selatan	200.90	1,118,000	15,953,427
Bandar Lampung	210.19	776,500	6,128,093
Batam	1,609.40	1,201,000	36,820,000

Source; author

If this condition is considered as a condition that is not good, the government needs to create an equitable development policy between the city and outside the city. Although this policy will lead to urban sprawl in the physical condition of urban development.

4.8.5.1 Income per capita

If we look at the per capita income, it will place Bandar Lampung as the 5th city as the city with the lowest per capita income. But we must also understand that some cities such as Samarinda are cities with added land. So, the city gets money for the area from the mine side. So that Banjarmasin is included in the category of cities with the highest income. And this shows that per capita income for Bandra Lampung is not strong enough to affect population growth. This can be seen from the position of Bandar Lampung when compared with other cities in the parameters of per capita income.

4.8.5.2 Worker salary standard

The salary standard of workers owned by Bandar Lampung places the city as the third city as the city which provides the lowest salary standard. So from this data, the author can say that the standard salary of workers does not have an effect on population growth in Bandar Lampung. We can see this from the position of Bandar Lampung when compared to the position of other cities in the standard salary parameters of workers. He still lost very far compared to other cities.

If the conditions are like this, then Bandar Lampung has a high population growth caused by other factors. In this study, the authors only looked at the parameters of city size, per capita income and worker salary standards. There are no three parameters that affect the position of population growth for Bandar Lampung. but, in other parts, maybe we will get different results. Because data analysis is carried out on the entire city and overall information. Indeed, there will still be bias, but the measurement method used in the study gives results as we will see in the next section. But the value of work salary standards is actually very important for people's welfare. If the value of a work salary standard can rise high and be in line with other cities in developed countries, then this will have an effect on the overall welfare of the city. The ability of the government to organize the city economy will greatly influence the progress of the city, city order and the comfort of the city.

Per capita income and also the salary standard of workers should be an important parameter for populations from outside the city to enter into a city. Because they must have a reason to enter a city and that reason is an economic reason. But interestingly, for the case of Bandar Lampung city, the phenomenon of population growth does not always have a correlation with per capita income and salary standards. This proves that population movements from one place to another have so many variations of reasons.

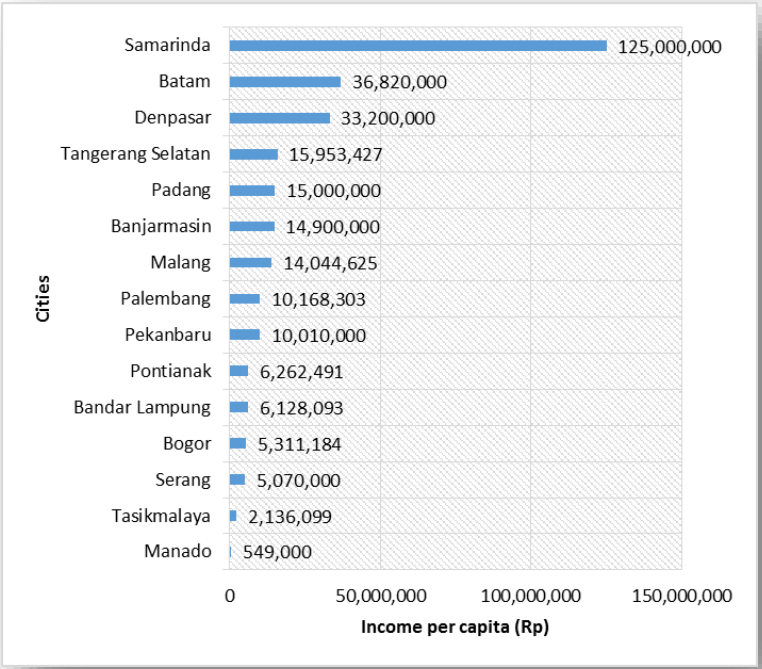


Fig 37 Comparison of income per capita in 2010 of all cities

Source; author

These reasons can vary in shape and depend on the situation at that time. But for the writer, there is still a reason for the population to enter the city of Bandar Lampung and that reason is economic reasons. Indeed, if we compare the per capita income and also the salary of workers between Bandar Lampung and other cities, it shows that the value for Bandar Lampung city is at the lower middle level. But this is for residents who are outside the administrative boundaries of the city which is quite high

when compared to the value they have and get outside the city. That is why people outside the city will still come and live in the city of Bandar Lampung because what they get in Bandar Lampung is far better than what they get outside the administrative limits of Bandar Lampung city.

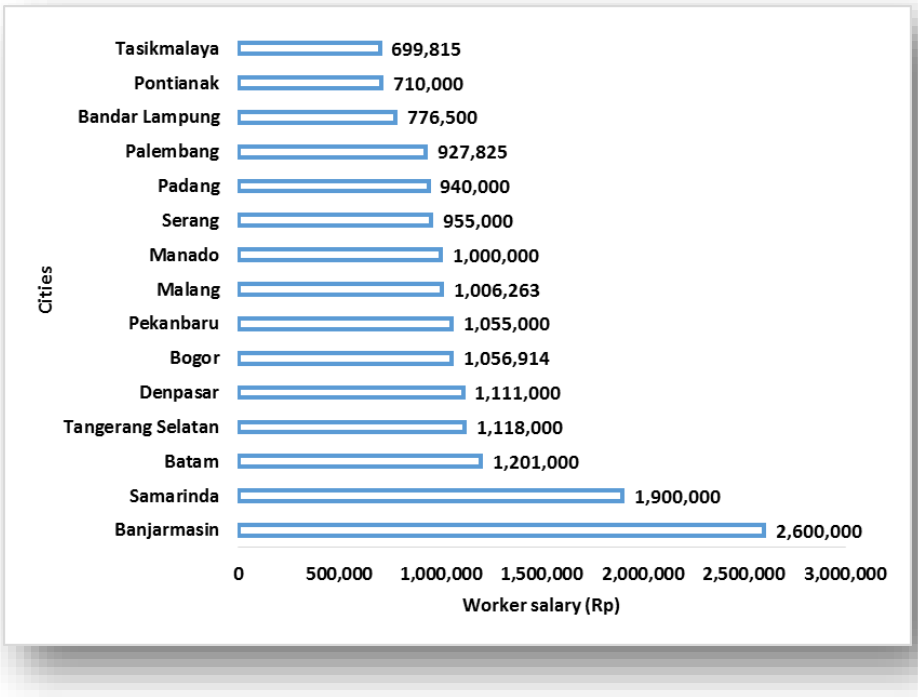


Fig 38 Comparison of work salary standard in 2010 of all cities

Source; author

The development of each city is indeed different, the condition is very dependent on economic development policies are chosen by the local government and also the choice of programs made by each mayor. This is the reason that this condition will have a difference between one city and another city. And every city government and mayor also needs to learn from the progress achieved by other cities. Because of the condition of each region and also the political and economic conditions in each city, it influences the development of the city. And every development of the city is a unique development. Although there are many challenges to make it happen, all city governments are required to be able to carry out city management reliably. Competition in the progress and welfare of the city has occurred since decades ago. And Indonesia must make another city a mirror to build a more reliable and steady city progress. Competition between citizens to obtain a more decent life must be managed by the government. The government must guarantee that all citizens of the City will get a decent life when they are in the city. Inequality of economic life among citizens must be reduced or even eliminated so that the comfort of the community and also the welfare of the community in various ways can truly be felt by the urban community. It is not only the city people who benefit from the right policies, but the people in other areas will also benefit.

4.9 Closing remarks

Population growth is influenced by many factors. One of the factors that is the parameter to be assessed is the size of the city. The size of the city shows the capacity of the city for various things, one of which is accommodating the population. The population will be large if there is an attraction built

or formed by the city government. They are required to advance the economy of the city and simultaneously it attracts people outside the city so that they migrate from outside the city to the city. Large migration will have an effect on many things within the city. Among them are influencing population uniformity, population structure, urban fabric and land use. In other parts after this we will discuss this matter. And in this chapter, the authors state that the size of the city has an influence on population growth.

At this stage, we have discussed population growth that occurred in various cities which are the object of this research in this case we examine 15 cities in Indonesia. The results show that population growth is very dynamic in each city. We cannot equate population growth in one city with another City because of each of the factors that influence population growth in each city. But we can try to identify what causes population growth to occur in a city. In this study, the authors used population growth factors related to birth, death, fertility, and also migration factors. When the authors make calculations related to the increase in population growth caused by migration, we will get an analysis regarding the out-migration and in-migration. This can occur because of the size of the city which affects the increase in population growth in a city. Of course, other factors can also influence each other including economic factors. These economic factors make many people come to a city to improve their economic and social life. When many migrations come to a city, the population growth in the city automatically occurs. When the writer calculates population growth by referring to the birth rate, the data obtained which when compared with the results of the population census carried out by the government show positive differences as well as negative differences. There are several cities that have real populations above population growth based on birth rates. This means that population growth is caused by inward migration because the population owned is no longer the pure population produced may be the city itself. But the population is intervened by the influx of out-of-town populations into the city. Things that the opposite also happens, write find a city population that is below the population growth due to birth. This happens as a result of the size of the city which is unable to accommodate the population that was at that time or that was growing at the time, which caused the population to move and stay outside the boundaries of the city administration. Physically they are still part of the main city, but administratively they are no longer part of the city's population itself. They have become part of the regional population outside the city.

There is also a population growth that grows high But there are also those that grow not too high. But the authors found that all cities faced positive population growth. The author did not find a decline in population in a city. This condition is indeed typical of the conditions of cities in developing countries. Because the phenomenon of the population in developing countries everywhere does experience an increase in population. And Indonesia as one of the developing countries are dealing with this phenomenon. High population growth is caused by many factors, ranging from city size factors and economic factors that make people come to the city. Not only did they come to the city but chose to stay in the box. The population that comes to the city is a population with a productive population structure. This then caused the city to have a productive population structure in large numbers because the city was supplied by productive residents from other cities. They came to the city to improve economic and social life. In another section, we will look at the effect of population growth on the growth of population structures as the authors mentioned earlier. In this section, the authors find the fact that population growth can have an influence on density and also social conditions.

CHAPTER 5 – THE ANALYSIS OF POPULATION GROWTH EFFECT TO DENSITY AND POPULATION STRUCTURE

5.1 Population density in Indonesia

Population density can be seen from three types of density, namely density based on agricultural conditions, based on arithmetic (general) and economically. The author conducts research on general population density. Density can affect city development, land use, spatial planning, transportation, economy, social and environment. Therefore, population density needs to be studied, especially those related to the size of the city and population growth. Previously, the population growth and size of the city were discussed in the initial chapter.

5.2 Density on each island

Indonesia as an archipelago has dozens of thousands of islands. Each island has a population with a density level as shown in the figure. High density islands are in Java, Bali, Nusa Tenggara, and followed by Sumatra, Sulawesi and Kalimantan. Java has a population of more than 150 million (2010). With a smaller island size compared to other large islands in Indonesia, this has an effect on population density per km2. Economic activities in Java have an influence on the flow of cityization. Residents from other islands chose to live in Java in an effort to improve their lives.

5.3 Population density in the cities area

Population density in each city varies greatly from year to year. But the data shows that the population density has increased. This condition is a typical condition with the condition of cities in developing countries.

Table 16 City population density

City	Population density			
	1980	**1990**	**2000**	**2010**
Tangerang Selatan	2913	4423	6048	8822
Bogor	3337	3428	6353	8037
Malang	5934	6313	7014	7654
Banjarmasin	4008	4504	5426	6860
Denpasar	5077	5519	5749	6116
Pontianak	2695	3327	4321	5270
Bandar Lampung	1441	3227	3768	4471
Palembang	2679	2973	3299	3661
Tasikmalaya	2722	3111	3399	3505
Serang	1066	1270	1628	1893
Pekanbaru	616	811	966	1420
Samarinda	833	1041	1225	1346
Padang	697	917	1008	1199
Manado	678	881	1036	1114
Batam	45	131	420	909

Source; BPS, author

The population increases every time and this creates many challenges in managing and serving the community. In the 1980s, Malang became a city with high density. Malang is an old city that has been formed for hundreds of years as a residential area. As an old city, Malang is a tourist and education place. Besides Malang, Denpasar is also a city with high density. Cities that are on the island of the gods, so the citizens of Indonesia call it, are becoming increasingly crowded even though in the end they will be controlled by geographical and cultural conditions. There is a lot of land that is not permitted to change into residential areas or wages on the grounds that there are cultural elements in the area. This can protect the existence of open space on the island. However, settlements in the city will become more congested because they are concentrated. Banjarmasin is also one of the densest cities because it is one of the old cities in Kalimantan. The city is close to water transportation. River is the main mode of transportation of people and goods in Kalimantan, this trend still exists today. Therefore, Banjarmasin is a city of settlements and business activities in Kalimantan. The existence of economic activities in the form of mines can further accelerate population density. On the other hand, city size factors can also have a large influence on the density of cities.

5.3.1 Pattern of population density

The pattern of population density in each city shows growth in density. Density growth can provide information about the existence of cities that are growing rapidly and some are stable. Increased density can be caused by the size of the city. But, besides the size of the city, the attractiveness factor of the city is one of the considerations of city density.

The population density in each city is affected by population and also the size of the city itself. If the city has a large size and has a low population, the population density will also be low. Because the dividing factor in calculating this population density is the size of the city. The opposite will happen if the size of the city is small but the population is very large. So if we compare the two, it will get a very high urban population density. Therefore, between population and city size influence each other when we do an analysis related to population density. And population density can also influence the use of urban space policies in each of these cities. But this population density does not reflect that all the space or all the land in the city has been met by the population. There will still be empty space or lose space from a very high population in the city. Because this population density reflects the overall population density within the city area. But again it does not reflect that all the space and all the land in the city has been fulfilled by the population. We need to emphasize this so that it does not give rise to the perception that there is no more open space in the city when we carry out analysis related to population density in a city or in several cities.

Open space still exists and loose space from population density is still very much. However, the analysis related to population density is done to help us understand that a city will be faced with a high population and that it is closely related to the carrying capacity and capacity of the city. So, in the balance factor of the urban environment in the analysis of population density is a very large influence and becomes an important background when we will analyze the condition of the city further. The carrying capacity and capacity of the city will affect many things in every government development program. Because there will be a housing development program there will be a program to improve the quality of settlements and there will be a comprehensive and integrated public transport development program when we already know how densely populated the cities are the object of this research. In this study, we will get analysis and information related to population density. There are several cities that already have very high population densities but simultaneously there are also cities

that have very low population densities. And interestingly, there was a growth in population density during 1980 to 2010 which gave us an idea that population density had occurred in every city and there were cities that experienced very high and very fast population density growth. This phenomenon must certainly be seen carefully and wisely because after all, once again, a high population in a city is a resource that can benefit the economic progress of the city.

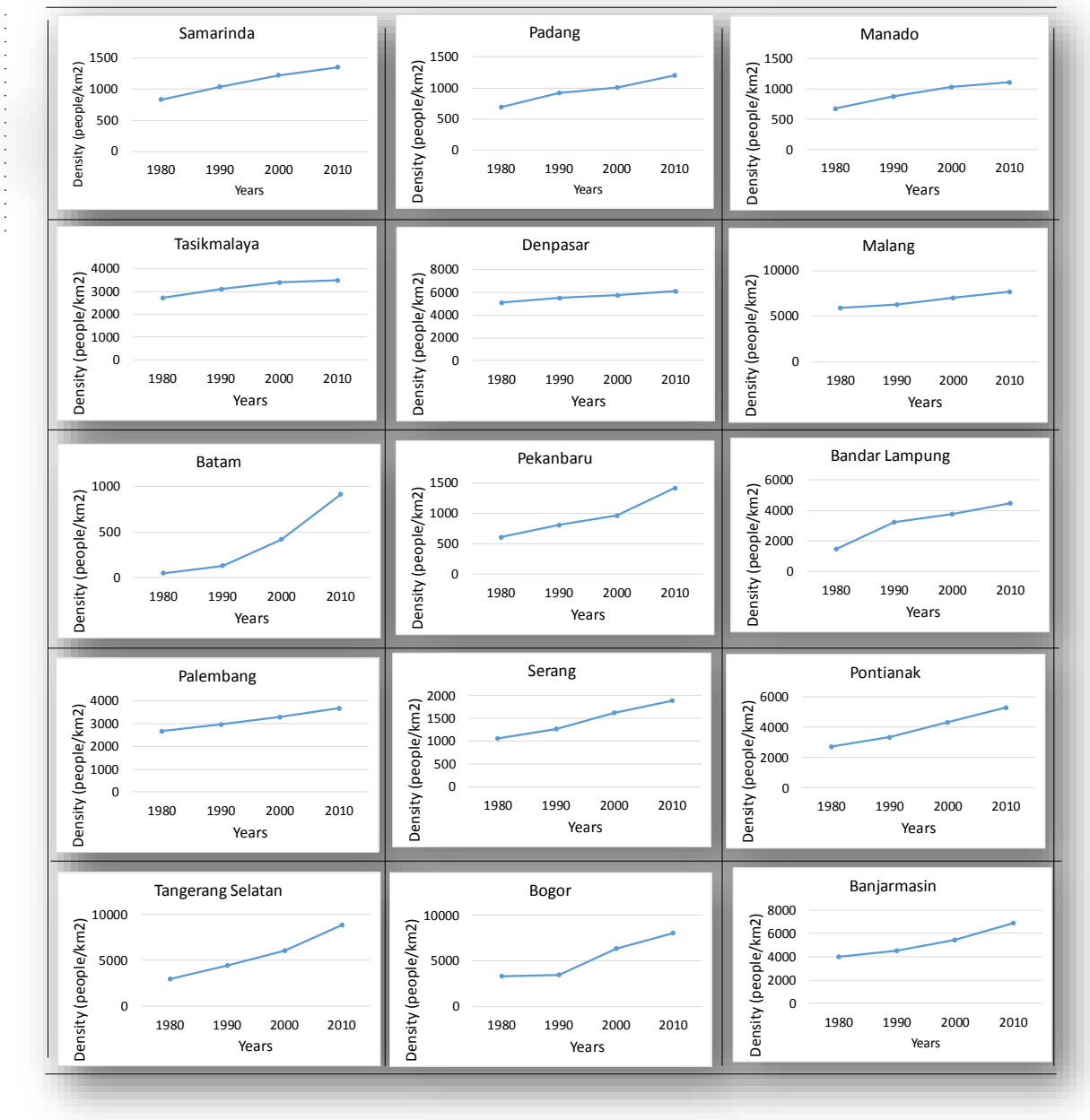


Fig 39 Graph of changes in population density (people/km2)

Source; author

Batam is a city that has a population density that is quite different compared to the pattern of population density in other cities. This happens because the population growth is very high and this affects the population density in the city. Then the city of Bogor is a city that has a very interesting population density surge. The surge occurred in 1990. This is an implication of the construction of the toll road that connects Jakarta and Bogor which then makes many people choose to live in Bogor even

though they work in Jakarta. Because at that time the city of Jakarta had developed quite rapidly and the population was quite high, so that the people then chose the satellite city of Jakarta namely Bogor as the location where they lived. This is the reason why the population density in Bogor surged in that year. Investigate population density in each city and find out what causes it to be a very interesting thing to do. The development of population and population density in each city differ from one another. And whatever happens to the city associated with the population, will have its own reasons and characteristics in each city.

5.3.2 Comparison of population density in 1980 and 2010

The authors also found a change in population density in 1080 to 2010. Population density shows changes dynamically. Some cities showed low changes, but other cities showed high changes. Some cities that show high change are Batam, Bandar Lampung, South Tangerang and Bogor. They are a city known as a national economy. This shows that there is an economic role that influences population density.

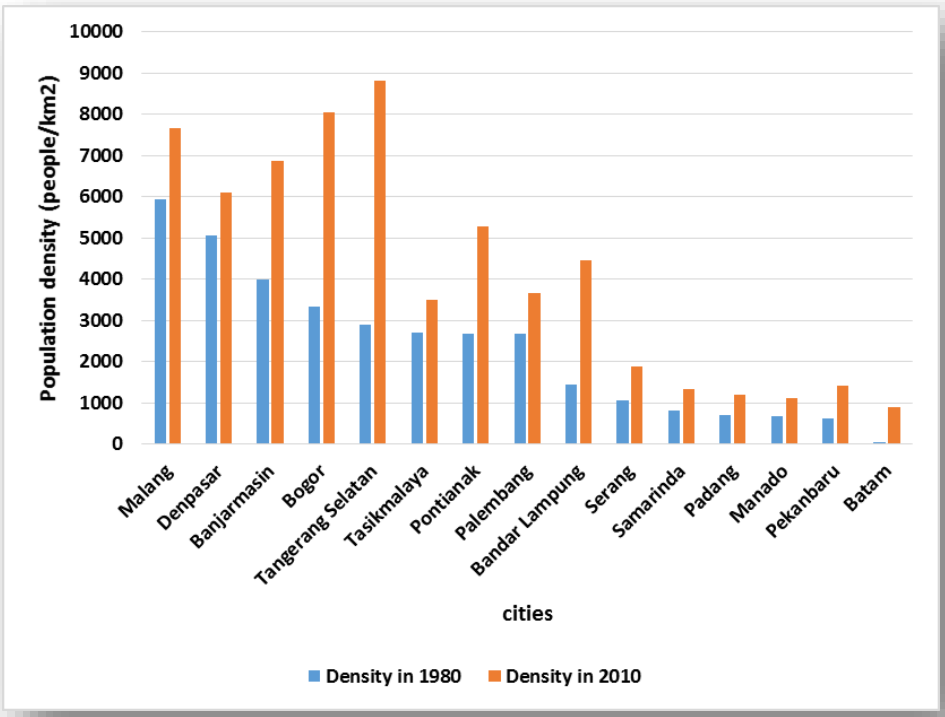


Fig 40 Graph of population density in 1980 and 2010

Source; author

Based on population, Palembang and Malang are the cities with the most population in 1980. However, Palembang does not have the highest density. The reason is the size of the city of Palembang is greater than in Denpasar and Malang. Thus, every increase in population will spread throughout the city and when divided by the size of the city will produce output that varies between one city and another city. Batam is an example of a city that has a high population growth but has a low population density. We see, the population density in Batam is very low. This happens because the size of the city is very large. Thus, the population rises high but has no effect on increasing population density when compared to other cities. Other cities have higher population densities.

5.3.3 Chart pattern of population density 1980 and 2010

The shape of the graph becomes increasingly clear because it uses two years of research. Some cities show flat growth but there are cities that show very significant growth. But the growth of population density is the same as the growth of the city population. Because the divider value remains the same, namely the size of the city. So that the growth of population density and growth has the same value. The difference is just the population dividing factor, which is the size of the city. If the city has a large city size, the density will tend to be low. Likewise, if the city has the size of a small city, it will potentially have a high density.

Table 17 Population density in 1980 and 2010 (people/km2)

City	Year 1980	Year 2010
Tangerang Selatan	2913	8822
Bogor	3337	8037
Malang	5934	7654
Banjarmasin	4008	6860
Denpasar	5077	6116
Pontianak	2695	5270
Bandar Lampung	1441	4471
Palembang	2679	3661
Tasikmalaya	2722	3505
Serang	1066	1893
Pekanbaru	616	1420
Samarinda	833	1346
Padang	697	1199
Manado	678	1114
Batam	45	909

Source; author

If we look at there are some cities that have very high population density growth. These cities are South Tangerang, Bogor, Banjarmasin, Pontianak, and Bandar Lampung. While some other cities have high growth but not drastically as happened in the city that the author mentioned earlier. This condition becomes interesting to be able to explore more deeply to find out whether the size of the city has an effect on increasing this very high population density growth. Because as mentioned earlier, the size of the city has a huge influence on the density of urban populations. Nevertheless, population growth can occur with a variety of reasons and causes. And with regard to this, specifically for population density, more is influenced by the size of the city and the number of population at that time.

This population density is spread across all districts within each city. In this regard, we will see in the next section. But the authors can say that the size of electricity and the phenomenon of economic activity in each district could have an influence on the density of the city as a whole. Because what happens to each electricity will have an influence on the district around it and this will have an influence on the condition of the city as a whole. Therefore, every government must pay more attention to every district in the city. Because distik in the city will have an influence on the

development of the city as a whole. And the development of each district must refer to the direction of city development.

5.3.4 Map of population density in 1980 and 2010

Changing population density maps show South Tangerang, Bogor, Palembang, Malang, Banjarmasin and Bandar Lampung as cities that have changes in density. While other cities have changes, although not significant.

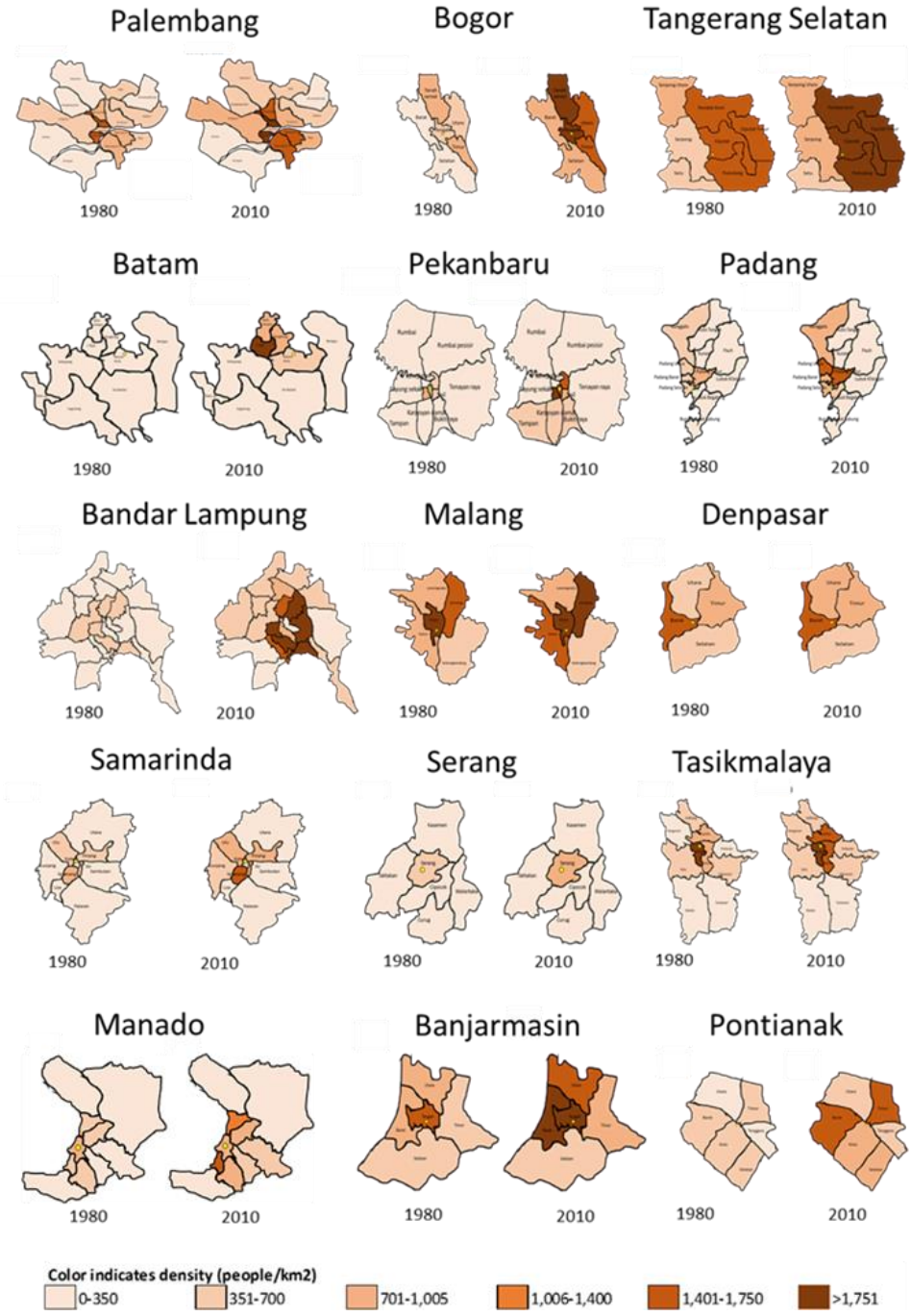


Fig 41 Maps of population density in 1980 and 2010 (people/km2)

Source; author

This condition confirms the results of previous analysis of changes in population density in each city. There are big changes and there are small changes. There is even a flat change. These results indicate that there is a need for further investigation to find out the models and causes of changes in population density. But it is important that population density can be influenced by the shape of the city, not just the size of the city. However, this is not part of this study. Research on the shape of the city and its influence on density can be the object of other research.

Changes in population density in each city can be seen in the picture below. Every city has different developments between one city and another city. There is a tendency that population density will increase in sub-districts close to the city center. Because the city center is also the center of government and also the business center so there is a considerable circulation of money in the area and this has an effect on the tendency of the people to live close to the city center as the center of government and business center. This condition is a very smooth condition and many occur everywhere because after all, people will tend to choose to stay close to the center of government and business centers with a variety of considerations. Therefore, when we want to widen and flatten the level of population density, we have to multiply new business centers that are scattered in various places. But if we want to make just one point or one location as the center of the central business center so that all populations tend to settle in one place then we do not need to spread new centers of economic activity.

5.4 Population density growth

Graphs further clarify changes in population density from 1980 to 2010. Batam is a city with the highest population density changes.

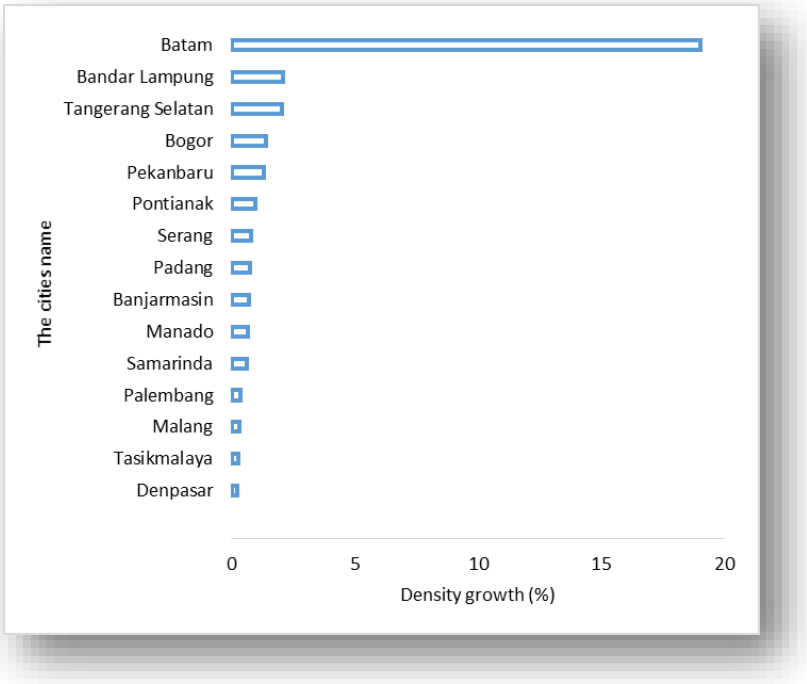


Fig 42 Growth in population density from 1980 to 2010

Source; author

Followed by other cities namely Bandar Lampung and Tangerang and so on. The difference between Batam which has the highest density, and Bandar Lampung as the city with the second highest density growth, is very different. Meanwhile, Denpasar is the city with the lowest density growth. As the authors have stated earlier that population density growth has similarities with population growth. Because the difference between these two things is that there is only a dividing factor in the population density factor. So, from the factor side which is divided into the population, it will have the same growth value. So, this is what causes population growth and population density growth will always be the same. As mentioned earlier, the population growth in Batam City is very high. This is very different from other cities that are the object of research. And this very high population growth will affect population density in each city.

Moreover, besides the size factor of the city, the population is a factor that greatly affects the density of the city population. Therefore, to understand population density we must understand these two factors, namely the size of the city and also the factor of population. Unlike the population density factor, population growth can be caused by many things. Economic and social factors have a very large influence on increasing urban population growth. Therefore, the government must pay enormous attention to factors that can affect population growth if the government wants to have a high population. Because a high population means having many workers or having many sources of labor that can be directed to fill in jobs in the industrial and trade sectors, which are a source of urban economic activity. Denpasar is a city with a low population density growth because the area in this city is a tourist area so there are many hotel and villa buildings as well as tourist objects that maintain the availability of green open space as an attraction for tourists.

5.4.1 Increased population density per km2

South Tangerang is the city with the highest population density increase of 5909 people per km2. Followed by other cities namely Batam and Bandar Lampung.

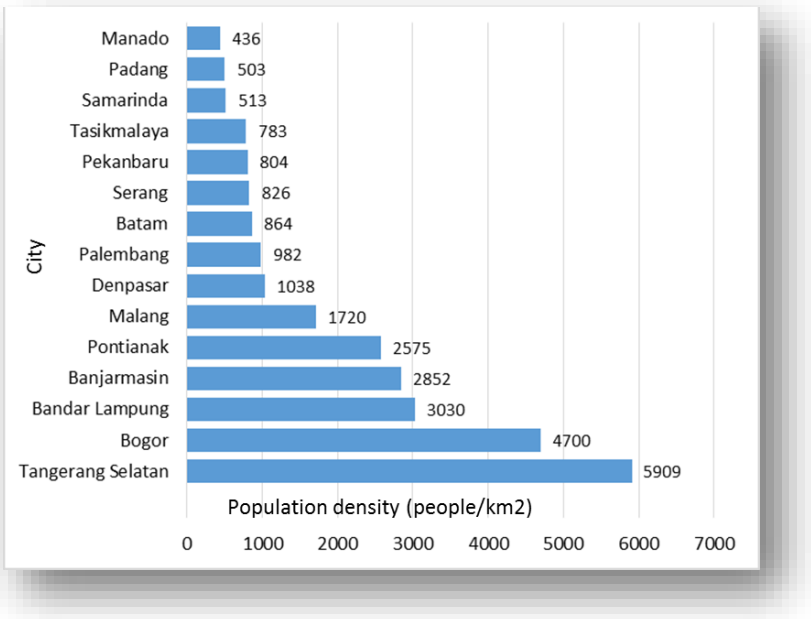


Fig 43 Increase population density from 1980 to 2010 (people/km2)

Source; author

If we look at this increase in population density we can get information that there are some cities that have almost the same population density increases. They can be included in the same growth group. Like Manado, Padang and Samarinda, the cities are almost the same as the general population increase. Changes in density are influenced by the size of cities, births, and also cityization. It can be assumed that cities with large populations should have high density. Change in density is high. However, in some cities which are the object of research, they indicate anomalies. But this was allegedly due to the high flow of cityization. Cityization itself can occur as a result of economic growth, improved services, availability of jobs, schools and health facilities, and others. Finally, residents outside the city area gather within the city as an effort to improve the quality of human life. Every increase in population will have consequences for increasing housing needs and infrastructure to meet people's needs.

Growth in population density per km2 in some cities is very high. As happened in the city of South Tangerang which has a population density increasing to 6,000 people per km2 is a very high increase in density in the last 30 years from 1980 to 2010. In addition to southern Tangerang, Bogor is a city that has a population density increase of 4,700 people per km2. And this is related to the construction of a toll road that connects Jakarta and Bogor, which then encourages people to choose to live in Bogor city rather than in Jakarta because Bogor City is a satellite city and its environmental conditions are still good. Moreover, Bogor is close to the peak area which is one of the tourist destinations in Indonesia. So, making Bogor as a place to live and make Jakarta a place to work, is a life choice that happens in Bogor city. And this is what gives an influence on increasing population density in Bogor city. Meanwhile, other cities have diverse population density growth. And this is very much influenced by the situation and conditions that occur in the city. Manado, Padang, and Samarinda are 3 cities with the lowest population density growth compared to all cities that were the object of this research. Each city has a background in growth in population density as much as they currently have.

5.4.2 Relationship between population growth and population increase per km2

This section aims to answer questions; Does increasing population density have a relationship with the percentage increase in population? This study shows that tabulation can be said that there is no strong relationship between increasing density and population growth. In fact, population needs will affect population density. This section proves that there is no connection, or almost no connection between increasing population density and population growth. Batam became a city with high growth but did not have the highest increase in population density. In other parts, Denpasar is a city with the lowest population growth but has a high increase in population density per km2, the figure is above Palembang and Batam. Three cities with the lowest population increase have population growth in intermediate positions. This confirms that population growth does not have a direct correlation with increasing population density per km2. Although, the three cities with the highest density increase were South Tangerang, Bogor and Bandar Lampung, the population growth rate was above 100%.

Increasing population density every year from 1980 to 2010 is an implication of development policies taken by each city and decided by the central government. The author then conducted an investigation related to the increase in population density growth compared to population growth from 1980 to 2010. The authors found that increasing population density did not correlate directly with increasing population growth. This is indicated by the phenomenon that occurs in Batam and Pekan Baru which has a very high population growth but the increase in population density is not too high or small. But if these two cities are considered non-existent or neglected, then we can see a tendency for an

increase in population density related to the increase in overall population growth. The two cities that the authors mentioned earlier, namely Batam and Pekan Baru are two geographically adjacent cities. It could be, the thing that happened in one city affected another city, in these two cities.

Table 18 The correlation of increase of population density and growth (1980 – 2010)

CITY	INCREASE OF POPULATION DENSITY FROM 1980 TO 2010 (PEOPLE / KM2)	POPULATION GROWTH (%) IN 1980 TO 2010
Tangerang Selatan	5909	202.8%
Bogor	4700	140.9%
Bandar Lampung	3030	210.2%
Banjarmasin	2852	71.1%
Pontianak	2575	95.5%
Malang	1720	29.0%
Denpasar	1038	20.5%
Palembang	982	36.7%
Batam	864	1904.4%
Serang	826	77.5%
Pekanbaru	804	130.4%
Tasikmalaya	783	28.8%
Samarinda	513	61.6%
Padang	503	72.1%
Manado	436	64.3%

Source; author

And as the author has said, Batam was indeed built by the government to become a new industrial city and a new trading city on a large scale as happened in Singapore, which is very close to Batam. And what happens to the stem turns out to have an effect on the new week which is geographically close to the location.

5.4.3 Relationship between city size and population increase per km2

The authors also find the fact that there is a tendency for correlation between city size and increase in population density per km2. The image shows that cities with small sizes tend to increase in density per km2 higher than cities with large sizes. Indeed, not all cities show this, but the majority of cities prove the influence of city size by increasing population density per km2. Small cities will have a major impact when there is a population growth flow. Small land will be filled with city residents. Because the land is small, residents will live close together and even have to build vertical settlements. Population density will always be indirect and directly to the size of the city. The smaller the city, the higher the population density. The opposite will happen with a city with a large size. The picture above shows that there is a correlation between the size of the city and an increase in urban population density. We can see from this data that the small size of the city will have a high population density. And for cities with large sizes will have a low population density. South Tangerang and Bogor are two cities that are small in size and have high population densities. Population density in southern Tangerang almost reaches 6,000 people per km2 while the size of the city is below 150 km2. For Bogor

city, the population density reaches 4,700 people per km2 with a city size of less than 119 sq. Km. This is very different from the conditions experienced by 8 other cities that have very large city sizes which then have an impact on the low population density in the city.

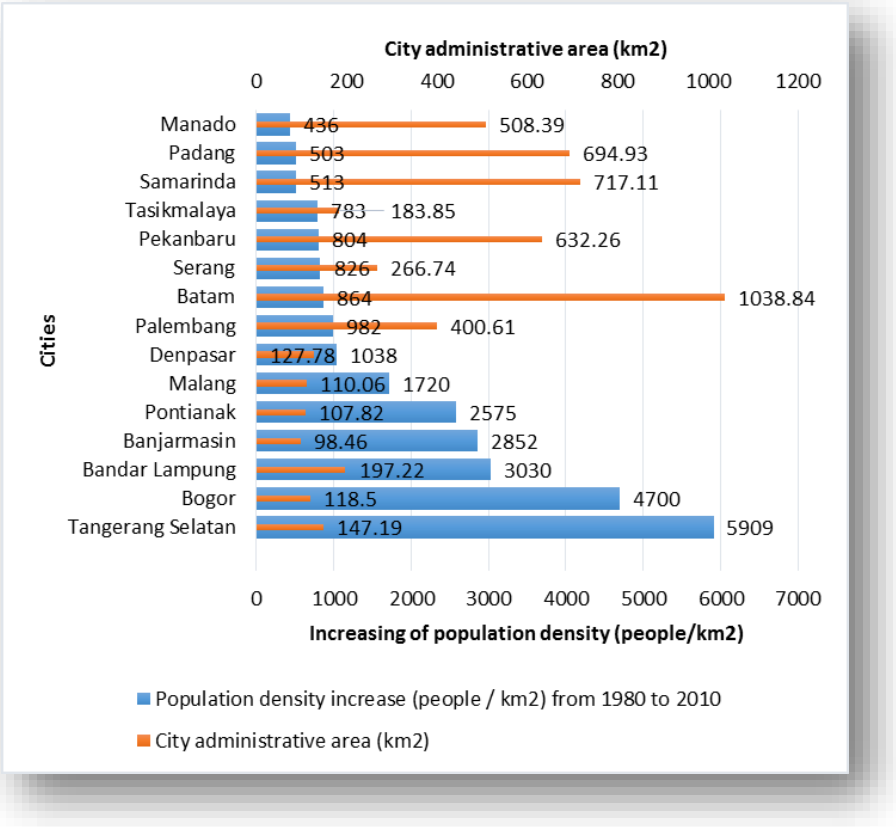


Fig 44 City size and population density increase in 1980 to 2010

Source; author

Increasing population growth and increasing population density can provide an indication to all parties related to the attractiveness of the city. The city promises a better life for the entire population that is in the city as well as those who are still outside the city. This condition eventually causes population density and increases in population density to be high in the city. The author estimates that increasing population density will continue to occur over the next several decades. Because at this time the cities have not been included in the saturated category, but still fall into the category of proceeding to become a city that is habitable and worthy of living. And to achieve city conditions like that is still needed decades.

5.5 Population density in the district

In this section, the authors conducted a grouping of data related to changes in density in each sub-district to see the effect of district size on city density. This data is material for further analysis using analysis software, namely JMP or SPSS. The population found a density pattern that also varied. Density patterns remain the same as before, they are influenced by district size. If the district has a large size, the density will be low. Data analysis shows these conditions as we will read in the table below. With this phenomenon, we can take it as material to do further analysis. So the results will get better. Population density in each district has an influence on the overall population density of the

city. Therefore, to find out the density conditions in each district, readers can see the data below. We can see changes in population density in all cities.

Table 19 Population density in each district of all cities

DISTRICTS	AREA (KM2)	DENSITY (PEOPLE/KM2)			
		1980	1990	2000	2010
Palembang					
Sukarami	51.46	1992	2215	2462	2736
Alang-alang Lebar	34.58	1839	2045	2273	2526
Kertapati	42.56	1397	1549	1719	1906
Sematang Borang	36.98	644	716	796	884
Gandus	68.78	616	684	758	841
Sako	18.04	3374	3747	4160	4620
Kalidoni	27.92	2639	2930	3253	3612
Ilir Barat I	19.77	4639	5146	5708	6331
Kemuning	9.00	6794	7528	8341	9242
Plaju	15.17	3871	4289	4752	5266
Ilir Timur I	6.50	7911	8757	9692	10728
Ilir Timur II	25.58	4608	5106	5658	6269
Seberang Ulu I	17.44	6815	7584	8438	9390
Seberang Ulu II	10.69	6346	7039	7808	8660
Ilir Barat II	6.22	7579	8398	9305	10310
Bukit Kecil	9.92	3258	3610	4000	4432
Tangerang Selatan					
Serpong utara	17.84	5440	5440	6036	7145
Pondok aren	29.88	7773	7773	8624	10210
Serpong	24.04	4376	4376	4855	5748
Ciputat timur	15.43	8871	8871	9843	11652
Setu	14.80	3429	3429	3805	4505
Pamulang	26.82	8174	8174	9069	10737
Ciputat	18.38	8010	8010	8887	10521
Bogor					
Tanah Sareal	18.84	6766	7002	7247	10134
Bogor Utara	17.72	4456	4574	7456	9619
Bogor Barat	32.85	1212	1242	5066	6426
Bogor Tengah	8.13	4307	4353	11221	12472
Bogor Timur	10.15	6017	6148	7586	9369
Bogor Selatan	30.81	1658	1707	4788	5887
Batam					
Bulang	158.75	4	9	30	60
Galang	350.76	2	6	21	43
Belakang Padang	69.12	16	40	134	268
Batu Aji	41.34	83	213	711	1421
Sekupang	68.30	43	109	365	730
Sagulung	54.78	86	221	737	1475
Sei Beduk	106.45	44	113	377	755
Batu Ampar	11.19	523	1342	4474	8949
Nongsa	114.55	76	196	654	1307
Lubuk Baja	11.43	831	2130	7100	14199
Bengkong	13.21	407	1045	3482	6965
Batam Kota	38.96	191	491	1636	3271
Pekan Baru					
Rumbai	128.85	218	286	341	502
Tampan	59.81	1231	1620	1929	2837
Rumbai pesisir	157.33	179	235	280	411
Tenayan Raya	171.27	312	411	489	719
Payung Sekaki	43.24	869	1144	1362	2002
Marpoyan Damai	29.74	1835	2414	2874	4227

DISTRICTS	AREA (KM2)	DENSITY (PEOPLE/KM2)			
		1980	1990	2000	2010
Bukit Raya	22.05	1810	2381	2835	4168
Sail	3.26	2855	3756	4472	6576
Sukajadi	3.76	5446	7166	8531	12546
Senapelan	6.65	2378	3129	3726	5479
Limapuluh	4.04	4441	5844	6957	10231
Pekanbaru kota	2.26	4814	6334	7541	11089
Bandar Lampung					
Panjang	15.75	1734	3052	3598	4329
Rajabasa	13.53	995	2283	2664	3157
Kemiling	24.24	1028	1860	2191	2631
Sukabumi	23.60	761	1545	1811	2161
Sukarame	14.75	1204	2456	2878	3432
Teluk Betung Timur	14.83	700	1825	2120	2498
Kedaton	4.79	3312	7071	8271	9839
Tanjung Karang Barat	14.99	1114	2328	2726	3246
Teluk Betung Barat	11.02	422	1812	2079	2405
Tanjung Karang Pusat	4.05	3695	8087	9450	11228
Tangjung Karang Timur	2.03	4034	11995	13880	16258
Teluk Betung Selatan	3.79	2447	6780	7861	9235
Teluk Betung Utara	4.33	3397	7490	8751	10392
Padang					
Koto Tangah	232.25	405	533	586	698
Pauh	146.26	235	309	340	405
Kuranji	57.41	1282	1687	1854	2207
Lubuk Kilangan	85.99	330	434	477	568
Bungus Teluk Kabung	100.78	132	174	191	227
Lubuk Begalung	30.91	2000	2632	2892	3443
Nanggalo	8.07	4123	5425	5962	7097
Padang Selatan	10.03	3343	4399	4834	5755
Padang Barat	7.00	3766	4955	5446	6483
Padang Utara	8.08	4970	6539	7186	8554
Padang Timur	8.15	5551	7303	8026	9554
Malang					
Blimbing	17.77	8111	8629	9588	10462
Lowokwaru	22.60	5537	5890	6544	7141
Kedungkandang	39.89	3644	3877	4307	4700
Sukun	20.97	7159	7616	8462	9234
Klojen	8.83	10009	10648	11831	12910
Denpasar					
Denpasar Selatan	49.99	4104	4461	4647	4943
Denpasar Utara	31.42	4571	4969	5176	5506
Denpasar Timur	22.31	5014	5449	5677	6039
Denpasar Barat	24.06	7820	8500	8854	9419
Samarinda					
Palaran	220.40	138	172	203	223
Samarinda Utara	229.52	266	333	392	430
Loa Janan Ilir	26.13	1392	1740	2047	2250
Sungai Kunjang	43.04	1640	2050	2411	2650
Samarinda kota	11.12	1846	2307	2714	2982
Samarinda Ulu	22.12	3543	4429	5210	5726
Sungai Pinang	34.16	3670	4588	5397	5931
Sambutan	100.95	289	361	425	467
Samarinda Seberang	12.49	5657	7071	8319	9142
Samarinda Ilir	17.18	4356	5445	6406	7039
Tasikmalaya					
Kawalu	42.78	1565	1789	1955	2015
Bungursari	16.91	2135	2440	2666	2749

DISTRICTS	AREA (KM2)	DENSITY (PEOPLE/KM2)			
		1980	1990	2000	2010
Indihiang	11.04	3394	3879	4240	4371
Tamansari	35.99	1387	1586	1733	1786
Cibeureum	19.04	2525	2886	3154	3251
Mangkubumi	24.53	2741	3133	3424	3530
Purbaratu	12.02	2485	2840	3104	3200
Tawang	7.08	6996	7996	8738	9009
Cihideung	5.49	10249	11714	12802	13198
Cipedes	8.97	6572	7511	8208	8462
Banjarmasin					
Banjarmasin Selatan	38.27	2407	2705	3259	4120
Banjarmasin utara	16.54	5413	6082	7327	9263
Barjarmasin barat	13.13	6663	7487	9020	11404
Banjarmasin timur	23.86	2940	3304	3980	5032
Banjarmasin Tengah	6.66	8313	9340	11253	14227
Serang					
Curug	49.60	469	558	716	832
Walantaka	48.48	770	916	1175	1366
Taktakan	47.88	807	961	1232	1432
Kasemen	63.36	683	813	1043	1212
Cipocok	31.54	1264	1505	1929	2243
Serang	25.88	3945	4696	6021	7001
Manado					
Malalayang	137.16	272	354	416	448
Mapanget	37.82	1833	2380	2800	3011
Singkil	11.08	5519	7168	8433	9068
Tikala	132.16	575	747	878	944
Wenang	179.95	288	374	440	473
Tuminting	10.22	4807	6242	7344	7897
Pontianak					
Pontianak Barat	16.47	3931	4853	6302	7685
Pontianak tenggara	14.83	1594	1968	2555	3116
pontianak timur	8.78	4912	6064	7875	9604
Pontianak selatan	14.54	2939	3628	4712	5747
Pontianak utara	37.22	1582	1954	2537	3094
Pontianak kota	15.98	3596	4440	5766	7031

Source; BPS, municipal, and author

A collection of processed data shows that there are variations between cities related to the size of cities and districts with population density. With almost the same composition, the analysis shows results about the effect of the size of the city on population density. Because the data is very diverse, the authors will use this data as a basic material to be analyzed using a computer program. The author analyzes this data by using JMP and SPSS. The authors want to find the relationship or influence of city size on increasing population density. The author hypothesizes that size determines density. However, the real conditions in each city are the spread of residential areas. The city is wider than the city administration boundary. Thus, this causes the city to form a sprawl. The city of sprawl will have a negative influence on the environment and social conditions. Therefore, if population density occurs in areas of small size, this indicates that there is potential for city development with vertical settlement. Because so far residents in Indonesia have a tendency to live in flat houses even though they are far from the city center and increase transportation costs. The government is also finally required to spread trade and service activities to be easily reached by residents living on the outskirts of the city center. So far, suburban areas are often not seen as areas that will develop rapidly.

Suburban areas are always regarded as underdeveloped areas, and there are not many trade and commercial activities. So the suburbs are often referred to or suspected of being underdeveloped areas. But in reality, the development of population density occurs a lot in suburban areas. This indicates that there are differences of opinion between the government and the assumptions held by the public regarding the feasibility of the location of residence.

5.6 District density and the size of district

The results of the initial analysis indicate that there is a diversity of data related to district size and density in each district. An in-depth study of districts in each city was conducted to see the effect of administrative size of land on population density. The minimum and maximum parameters are the size of the district's maximum and minimum land in each city. Population and population density also see the maximum and minimum values. This table is a summary of data to make it easy to read the data contained in the previous table.

Table 20 Value parameters, population (people) and density (people/km2) in 1980 and 2010

CITY	PARAMETERS	AREA	POPULATION	DENSITY	POPULATION	DENSITY
		KM2	1980	1980	2010	2010
Palembang	Minimum	6.22	23813	616	32703	841
	Maximum	68.78	118862	7911	163754	10728
	Total	400.61	1073384	64324	1466787	87754
	Mean	25.04	67087	4020	91674	5485
	-					
Tangerang Selatan	Minimum	14.80	50755	3429	66667	4505
	Maximum	29.88	232261	8871	305073	11652
	Total	147.00	988588	46073	1298504	60517
	Mean	21.00	141227	6582	185501	8645
	-					
Bogor	Minimum	8.13	35014	1212	95098	5887
	Maximum	32.85	127468	6766	211084	12472
	Total	118.50	393423	24416	950334	53907
	Mean	19.75	65571	4069	158389	8984
	-					
Batam	Minimum	11.19	558	2	9531	43
	Maximum	350.76	9491	831	162238	14199
	Total	1038.84	55241	2307	944285	39441
	Mean	86.57	4603	192	78690	3287
	-					
Pekanbaru	Minimum	2.26	9306	179	21438	411
	Maximum	171.27	73649	5446	169655	12546
	Total	632.26	389732	26388	897768	60787
	Mean	52.69	32478	2199	74814	5066
	-					
Bandar Lampung	Minimum	3.75	3827	422	24978	2161
	Maximum	24.24	27311	4714	68189	16258
	Total	197.22	284275	40046	881801	131113
	Mean	15.17	21867	3080	67831	10086
	-					
Padang	Minimum	7.00	13301	132	22896	227
	Maximum	232.25	94159	5551	162079	9554
	Total	694.93	484253	26138	833562	44992
	Mean	63.18	44023	2376	75778	4090
	-					
Malang	Minimum	8.83	88380	3644	113994	4700
	Maximum	39.89	150119	10009	193627	12910
	Total	110.06	653123	34460	842413	44447

CITY	PARAMETERS	AREA KM2	POPULATION 1980	DENSITY 1980	POPULATION 2010	DENSITY 2010
	Mean	22.01	130625	6892	168483	8889
	-					
Denpasar	Minimum	22.31	111852	4104	4104	4943
	Maximum	49.99	205156	7820	7820	9419
	Total	127.78	648769	21508	781454	25907
	Mean	31.95	162192	5377	195363	6477
	-					
Samarinda	Minimum	11.12	20523	138	33165	223
	Maximum	229.52	125373	5657	202607	7039
	Total	717.11	597331	22796	965306	36839
	Mean	71.71	59733	2280	96531	3684
	-					
Tasikmalaya	Minimum	5.49	29867	1387	38458	1786
	Maximum	42.78	67238	10249	86579	13198
	Total	183.85	500389	40050	644327	51570
	Mean	18.39	50039	4005	64433	5157
	-					
Banjarmasin	Minimum	6.66	55364	2407	94750	4120
	Maximum	38.27	92133	8313	157678	14227
	Total	98.46	394667	25737	675440	44046
	Mean	19.69	78933	5147	135088	8809
	-					
Serang	Minimum	25.88	23259	469	41278	832
	Maximum	63.36	102091	3945	181182	7001
	Total	266.74	284464	7938	504841	14087
	Mean	44.46	47411	1323	84140	2348
	-					
Manado	Minimum	10.22	37371	272	61396	448
	Maximum	179.95	75977	5519	124821	9068
	Total	508.39	344715	13294	566328	21840
	Mean	84.73	57453	2216	94388	3640
	-					
Pontianak	Minimum	8.78	23636	1582	46216	3094
	Maximum	37.22	64736	4912	126577	9604
	Total	107.82	290594	18554	568194	36278
	Mean	17.97	48432	3092	94699	6046

Source; author

If a city has a high density then it shows that there is a high capacity capacity of an area against the population. The population will indeed increase every year. All regions in the city must be able to meet the needs of the city. In the guidelines for environmental development in Indonesia it is stated about "capacity" and "carrying capacity". They become a reference in determining the capacity of a land. And the population will always be in the city and will increase every year. High populations will have an influence on the city's economic activities and socio-cultural activities. Thus, a high population and high population density per km2 is an advantage for the city government. Because they have many workers, lots of production and lots of consumption.

There are many city governments that are not aware of these advantages and opportunities. So, they often forget to design a population that must and can be within the limits of city administration. Because the expected poluuasion is unknown, it has an impact on development planning that does not adapt to the needs and development of cities and populations. The infrastructure of the city that is not dampat is provided because it does not know what to build. The government builds anything but is not oriented to strategic needs. The implication is that the infrastructure built is not ideal with

the needs that arise and continue to grow. This model of planning and development must be stopped by the government by changing the pattern of planning and development. For this reason, the availability of capable human resources must be provided by the government. But is this problem a concern of the government and other parties? Apparently, the answer is not like that. This is evidenced by the development of physical and non-physical imbalances. Changes in the city do not show a change towards a more equitable condition in the use of urban land. But what happened instead shows the opposite condition. Land changes will increasingly show inequality between community groups in various ways.

5.7 Relationship of population density and growth

The next stage, the researcher will explain the relationship between population density and population growth. Data and initial analysis have been made in the section before this discussion, and the results are analyzed using a software analysis program to get the correlation value. This correlation will show the perfect number = 1. The closer the value is obtained with the value 1, the more perfect their correlation will be. If a negative value is obtained then the meaning has a correlation but reduces each other. The results of the analysis carried out on all existing data indicate that the 1980 density with population growth has a value of -0.415. That is, the correlation value is low and tends to have conflicting correlations. The higher one thing will decrease the other thing. If growth is high, the density will slow down. The same thing happened the opposite. The same thing happened to population growth and population density in 2010. The value obtained was -0.3093. This correlation value is lower than the 1980 density. But it has a negative value, the same as the previous density. And this indicates that density has a low correlation with population growth. And the relationship also turns around. Because the factor that determines population density is the size of the city not on population growth. If the size is large, the density will be low, if the size is small then the density will be high.

5.8 Analysis of the relationship between population increase per km2 and city size

The results of the analysis of the relationship between increasing population density and city size are -0.5551. These results indicate that if the size of the city gets smaller then the population increase will be high. This indicates that the size of the city does have an influence on increasing population density. If the city has vertical settlements, the results of this analysis will be stronger and justify the phenomenon. But interestingly, the results of this analysis show strong and mutually different correlations between increasing city density and size. This result clearly states that relationships are different from each other. These results will strengthen the notion of the effect of city size or district size on density factors. Size always has a big influence.

5.9 Effect of distance on population density

In this section, the author wants to answer the question of the effect of distance on population density. In this section, the author takes an understanding of distance. If the reader is not observant, then he can draw the wrong conclusion. Therefore, read carefully about the definition of distance intended in this study.

5.9.1 Definition of distance in this study

The city consists of several districts. The city center has been established by the government, a central government and business. Meanwhile, the district is part of the city. Districts have different forms. Population density related to the way from the city center to the outskirts of the city shows that densities close to the city center will be higher compared to the population density in the suburbs.

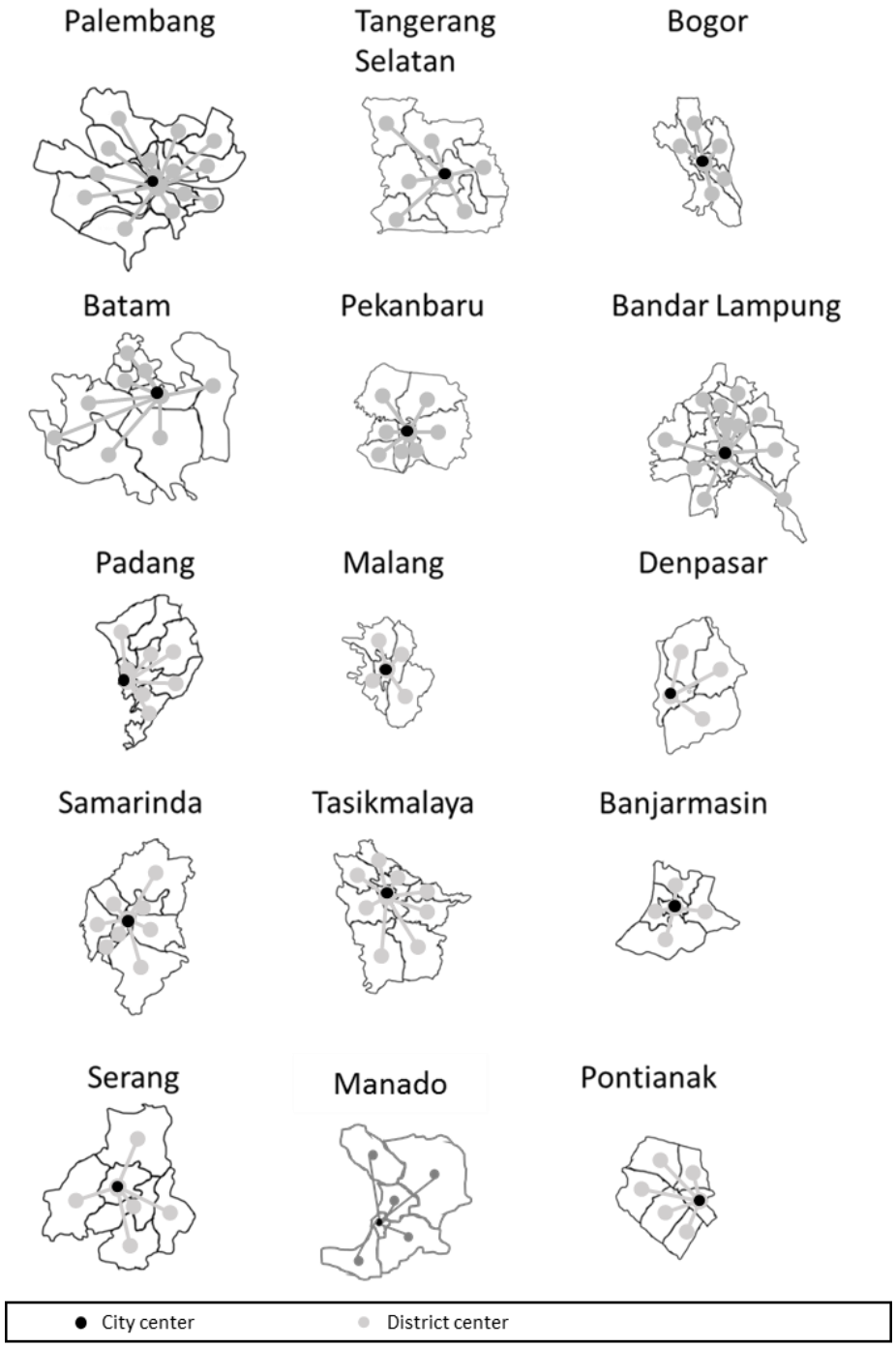


Fig 45 Distance, center of district and city center

Source; author

This is greatly influenced by the functions of the city center which tend to lead to the functions of economic and government activities. If the participant has a function as the location of the center of

economic activity and governance, there will be many people living in that location and this will ultimately have an impact on the high level of population density in that location. This condition is a condition that tends to have a meaningful phenomenon that occurs in many cities everywhere. This condition can also give us a new understanding that the center of government and the economy will tend to attract the population to be close to that location. From this study, we can say that the distance from the city center has a large influence on the level of urban population density. So the size of the city and also the distance between the city center and the residential area have an influence on each other.

5.9.2 Population density for each city based on distance

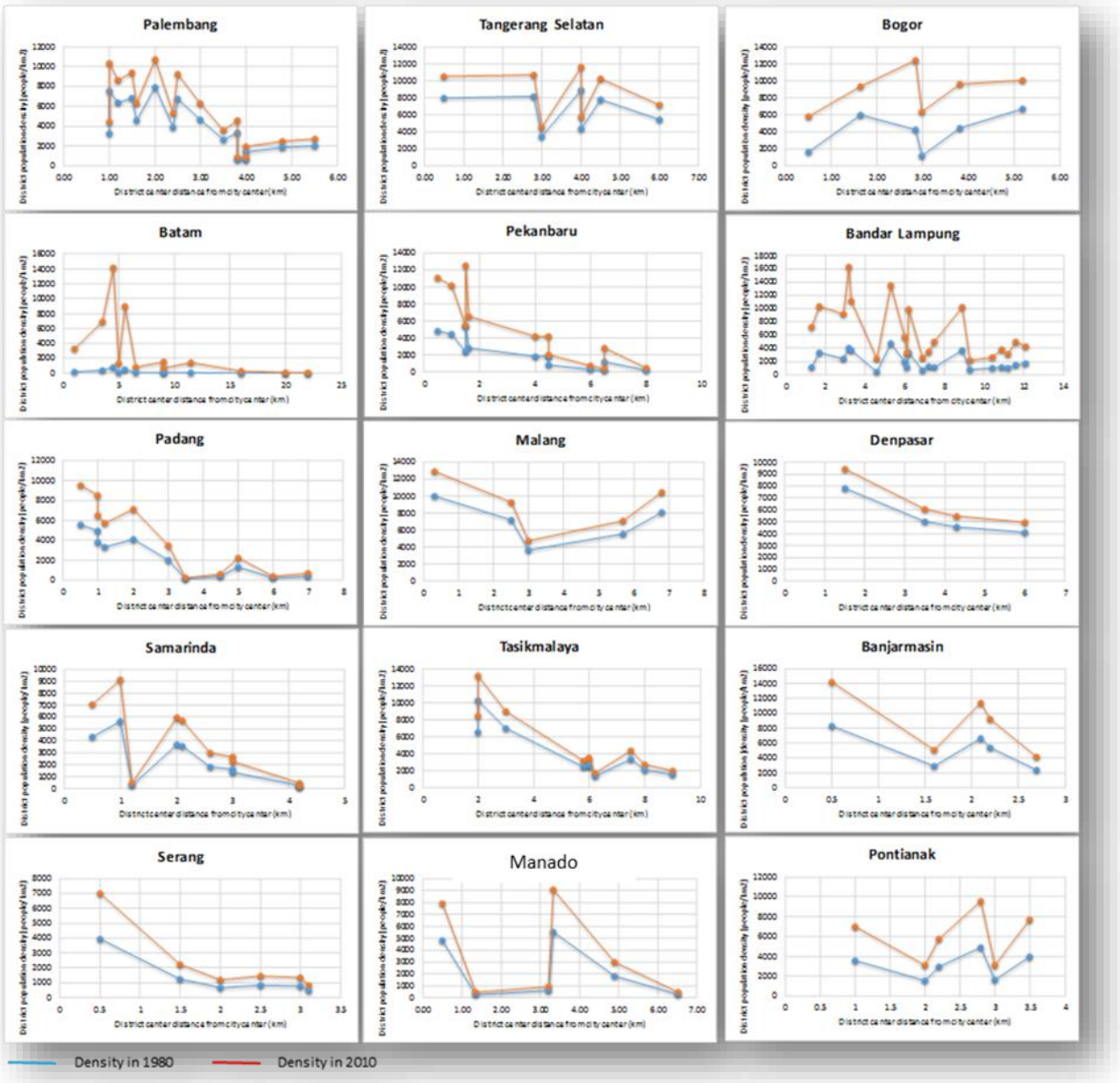


Fig 46 District population density based on distance of districts center to city center

Source; author

The figure shows the distribution of district population density based on the distance of the district from the city center. In general, it can be said that the district will have a high density if it gets closer to the city center. Density will decrease if the district is further away from the city center. The city center has the power to attract the population to get closer to the city center. Population density can show the attractiveness of the area where many inhabitants live in it. There are several forms of regional attraction, some of which are the availability of adequate water resources, the security, and comfort of the area, as well as the price of land that can still be reached by the economic capacity of the community.

5.9.3 Combined analysis of population density based on distance

The author finds a graph that is quite clear, the result of a combination of distance and density. The authors conducted an analysis of two density data, namely density 1980 and 2010. The results showed that there was a tendency that the density of districts close to the city center would be high and the density would decrease if it was further from the city center.

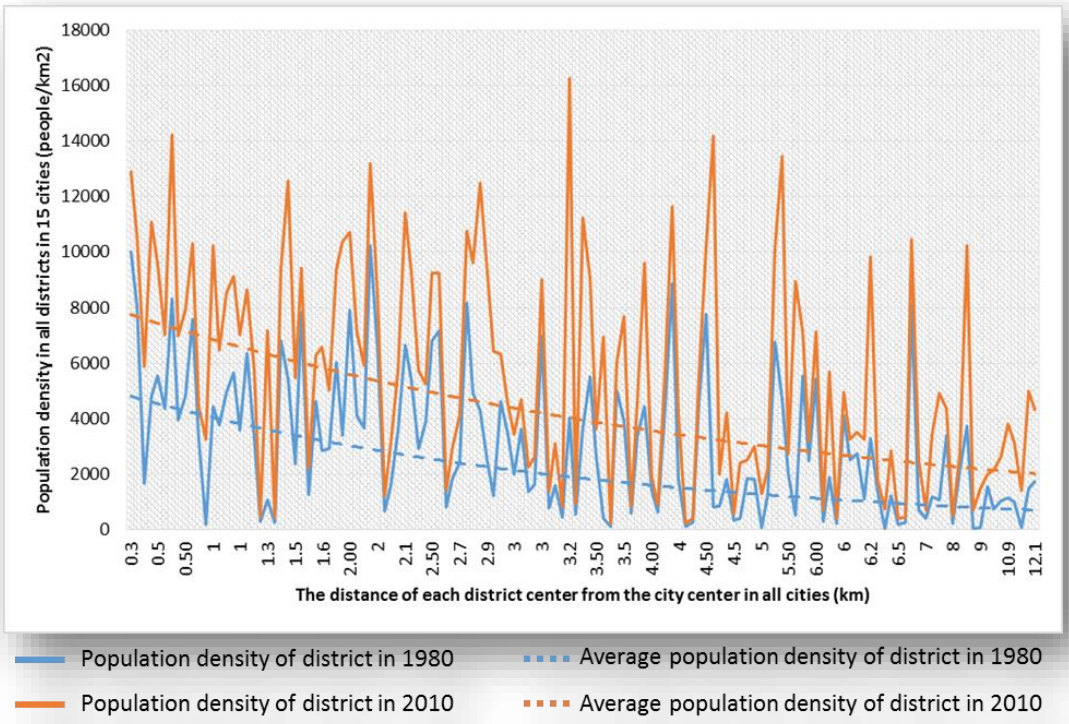


Fig 47 Population density in all districts of all cities

Source; author

The city center is still the location of residence targeted by many residents. Especially for city residents who have economic capabilities. Because, settlements close to the city center will tend to be more expensive when compared to the price of land in the suburbs. The reason is that there are many city residents who are looking for and buying land that is close to the city center. Meanwhile, land that is close to the city center is getting smaller and there is even no unproductive land. District density is strongly influenced by the size of the city as discussed in the previous section. If the size of the sub-district is small while the population is high, it will cause the density to be high. And that is relevant

and does not conflict with the high density analysis if it is close to the city center because citizens have the desire to be close to the city center.

Because, the city center is a business center. Getting closer to settlements with the city center will further strengthen the possibility to improve the status and economy of citizens. The assumptions that exist in the minds of some city residents have made residential areas near the center of the city become crowded and even tend to be slum. The government must make a policy of handling dense and slum settlements for several years to ensure that residents living in these settlements can have an environment that is both physical and non-physical. If we look at the pattern of population density in each district shows that no development or interesting changes to our attention. The population density in each district in 1980 in several districts showed a quite different pattern in 2010. Some districts at 80 showed a low density but in 2010 showed very high density.

5.10 Distribution of population density in 1980 and 2010

The density distribution is plotted in a table that places distance as one of the guidelines in forming a graph of district population density. Graphs were made separately between population densities in 1980 and 2010. Graphically there were no significant changes between densities in 1980 and 2010.

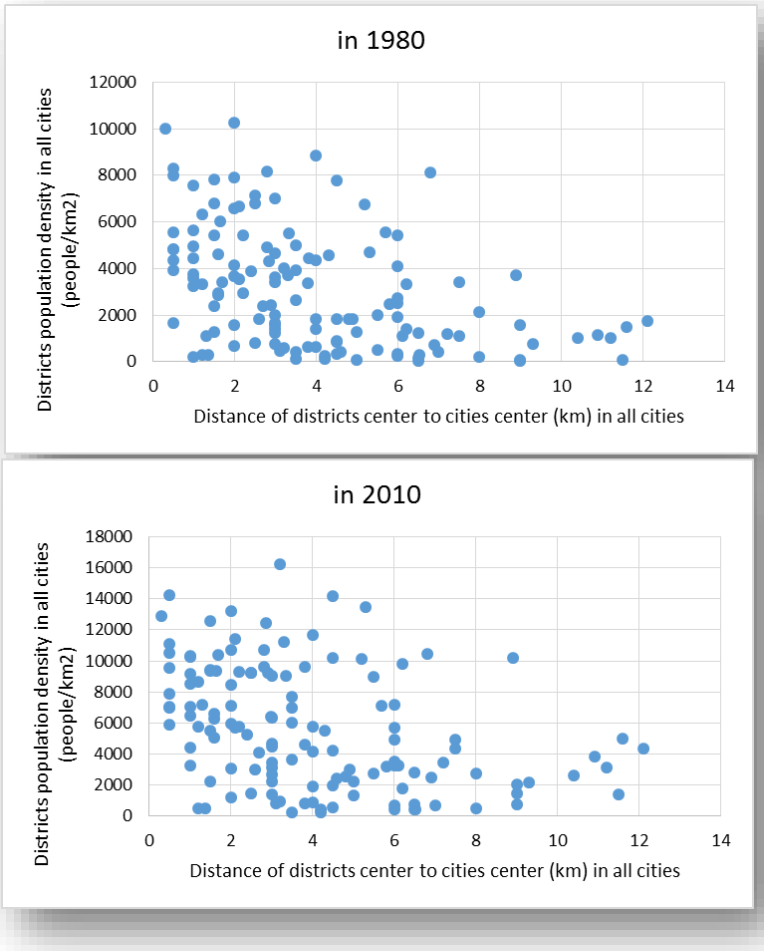


Fig 48 Distribution of district population density in all cities (1980 and 2010)

Source; author

However, there were only a few districts that had an increased population density, as indicated by changes in the position of density points. Some districts show a position that increases on a scale of displacement that is quite far, but there are also those that shift in close proximity. District distribution and district density will influence each other.

5.10.1 Grouping population density

The author groups population density in three groups based on distance, which is 0-4 km, 4-8 km and 8-12 km. The author wants to see the level of density in the districts included in each group. Grouping was carried out at population densities in 1980 and 2010. The authors found that the population density for districts <4km was greater compared to districts farther from the city center. Please note that one of the conditions for establishing a new district is the population. The more population close to the city center the more districts will be. The reason is to facilitate service to the community. Infrastructure inequality and access to community services always occur in cities in Indonesia. Various efforts have been made by the government and various parties, including the community, to reduce the imbalance.

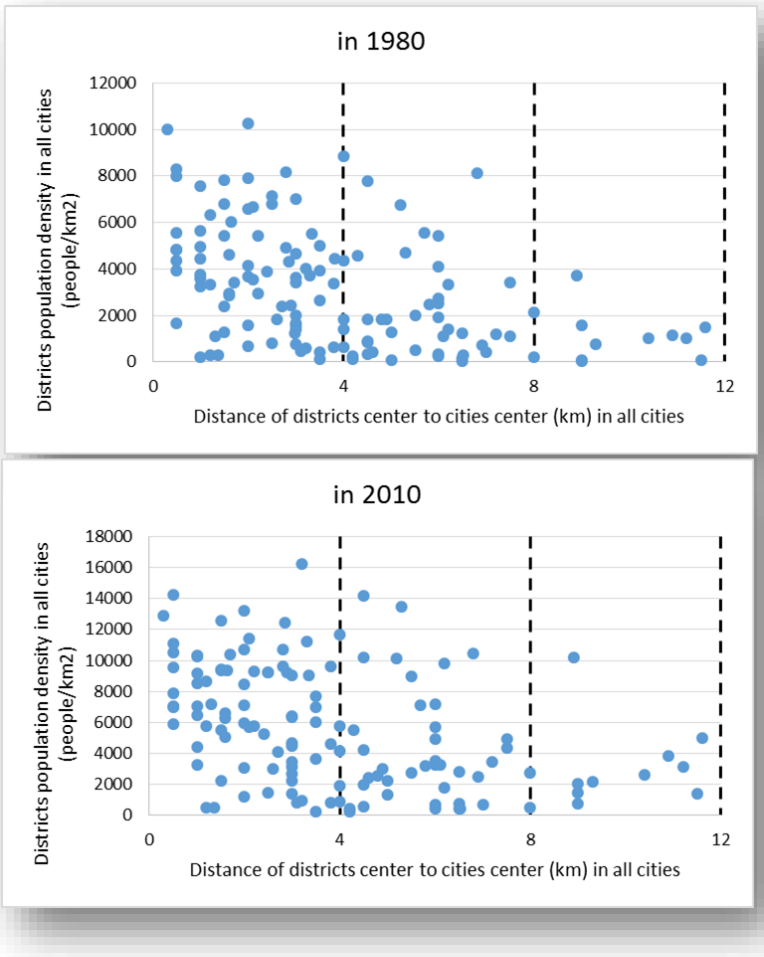


Fig 49 Grouping population density per 4 km distance

Source; author

But changes to be better are not always easy. It takes a heavy process and takes a long time to make it happen. But the changes for the better can still continue to occur, and even should have happened.

Therefore, this condition requires the issuer to improve everything. This grouping will be able to help all parties to better understand the changes that have occurred to take lessons and policies related to it. Through this grouping, we can also find out the distribution of population density based on the distribution of districts in each city. Districts close to the city center will have different characteristics of population density than the population densities of districts far from the city center. If we look at the distribution pattern of population density in each district in all cities that are the object of this study, it shows that the distribution pattern is very large and this indicates that there is a change in population density in each city. The population density in each city can be influenced by population growth factors and also the size of the city. Which factors have the greatest influence between population growth or city size is strongly influenced by conditions in each district. Because each district has a different size and has a different population growth and this condition will eventually become a factor that is interrelated to each other which then has an influence on population growth in each electricity and also the population density in each district varies. Distribution based on rare groups also shows a tendency for high population density to occur close to the city center. The city center is indeed an attraction that cannot be denied by other factors because economic factors and also government are an attraction for the people who are left behind in these locations.

5.10.2 Analysis of population density based on groups

The grouping results show that the average density in 1980 for each distance group was 2261, 950 and 595. Meanwhile in 2010 the population density was 3997, 1863, and 1647. There was an increase in density in each district distance from the city center. The increase was 0.768 for the first group, then 0.962 and 1.768.

Table 21 The average density in each distance group

DISTANCE GROUPS	0-3.999 KM	4.-7.999 KM	8.-12 KM
Density 1980	2261	950	595
Density 2010	3997	1863	1647
Density changein 1980 to 2010	*1736*	*913*	*1052*
Density change in %	0.768	0.962	1.768

Source; author

5.11 Chart pattern of population density

The chart pattern will show the density pattern for each district distance group from the city center. This graph will further clarify the pattern of density of cities that are the object of research when viewed from the district distance group as previously explained.

There are quite interesting results to discuss, namely the highest increase in density is in the group the furthest distance from the city center. The second highest increase was the second furthest district group and for the closest district to the city center only increased under the other district distance groups. This indicates that the population is growing and gathering in subcity and central cities. Settlements are growing rapidly in this region. The reason is the price of expensive land for areas near the city center. And the price of land becomes as low as it is far from the city center. People choose to live in areas that are away from the city center because property prices are still affordable. This phenomenon is very interesting because simultaneously the city does not yet have a public transport system. People must use motorbikes and cars to serve their mobility if they are further away from the

economic center of the city. But the community chose to increase transportation costs rather than choosing to live close to the city center.

The figure shows that there is a growth in density per group of district distances from the city center with varying values. In the research year of 1980 and 2010 the authors found that density increased in all cities with a large difference in density increase. Each city has its own increase in value depending on socio-economic conditions and other factors. Many things cause the population and density of a city to increase rapidly. The cause of the population increase is not only because there is a new birth factor. But more cityization occurs in all cities that are the object of research. Cityization is a consequence of the development model chosen by Indonesia, namely implementing the iceberg development model. Development is carried out at one point so that all residents gather at that point and then expand to follow the social economic developments that occur at each point of development. The results of the analysis that can be seen in other sections show that population density in the city center is indeed higher than the population density on the edge of the city. This condition is an implication of the existence of economic activities and government activities in the downtown area. This function does have an influence on the attractiveness of the community to live in that location. And this can be a reference for the development of other new cities. If a city wants to have a high population immediately, an attraction must be provided for the arrival of urbanization or the arrival of the community to that location.

5.11.1 Analyze population density per km2 in 1980 and 2010

The image shows changes in density based on the distance from the city center in the entire city. Density will be high in the city center and will drop if far from the city. This phenomenon is a common phenomenon in the city.

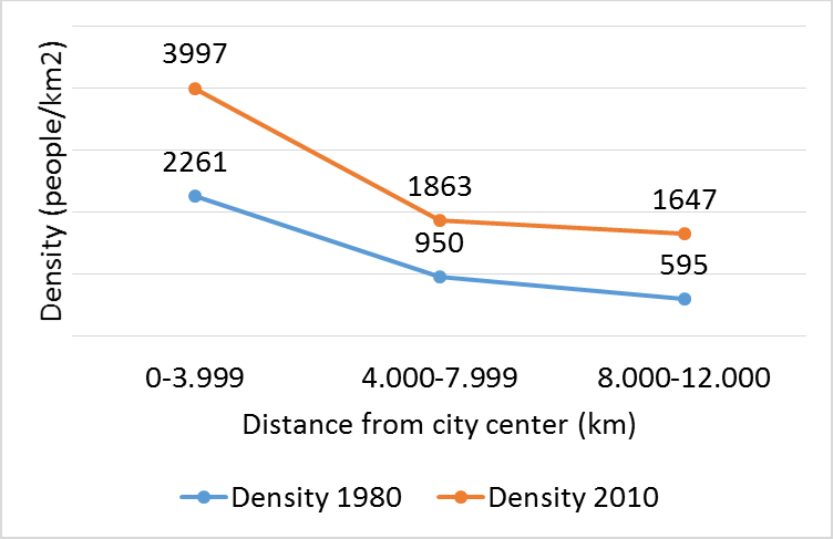


Fig 50 Population density per km2 in each district distance group

Source; author

Especially cities in developing countries because the population will try to settle in a place close to the city center to be close to the location of economic activities. Especially for cities that do not yet have a reliable public transportation system. So, in order to reduce transportation costs, people will live in areas close to the city center. However, this classic phenomenon can change if people have cars and

motorbikes. This has an influence on the availability of transportation infrastructure. Because, if the city has a city transportation system that facilitates the mobility of people and goods from any direction and direction, the city will be sprawl because residents can be free to have the location where they are. This creates a dilemma in building compact cities as stated in city planning theory. However, city planners must find ways to solve the challenges faced by the city. The challenge must be answered by the approach to the concept of city development and population management that is relevant to the conditions. At this time the distance from the settlement to the place of work or to school is no longer a problem. Communities in Indonesia, especially, in 15 cities that are the object of research, have relied on private vehicles as their main means of transportation, namely cars and motorbikes. Especially motorbike use, which greatly dominates community mobility. This is the reason why people no longer choose to live near the city center. They are free to choose the location of their residence because their mobility is guaranteed by their own motorbikes and cars.

5.11.2 Analysis of density changes

The highest change in population density occurs at a distance of less than 4 km from the city center to the center of each district. Then changes in density will decrease at the distance of the city center to the electricity center between 4 to 8 km. But interestingly, changes in population density will again rise in locations that are 8 to 12 km from the city center. This raises the suspicion that the suburbs or districts far from the city center will be places chosen by the people as the location of their new residence because it is far from the busy city, house prices are still affordable because land prices are still cheap, environmental conditions are still green and beautiful and various other factors that influence the community choose to live on the outskirts of the city but are still within the limits of city administration.

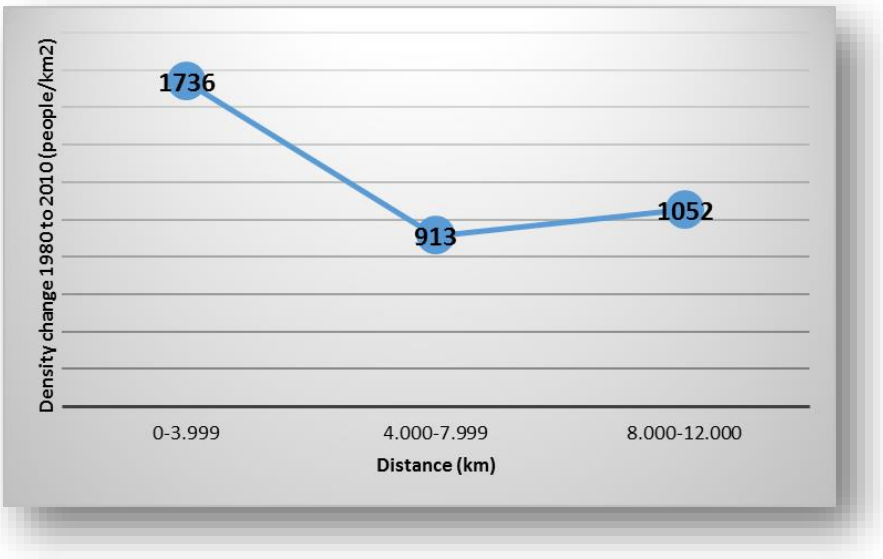


Fig 51 Changes in density per group distance from the city center

Source; author

5.11.3 Analyze population density growth per km2

The Figure 43 shows a higher population growth in the suburbs than in the city center. This is caused by the availability of land on the edge of the city is still a lot when compared with land in the city

center. However, this also shows that the housing development policy is not yet vertical. The residential development model is flat. Thus, land is a major factor in building housing. This phenomenon strengthens the assumption that the city development model tends to sprawl. In fact, many studies show that development with a sprawl model will have a negative impact on the environment and the city's economy.

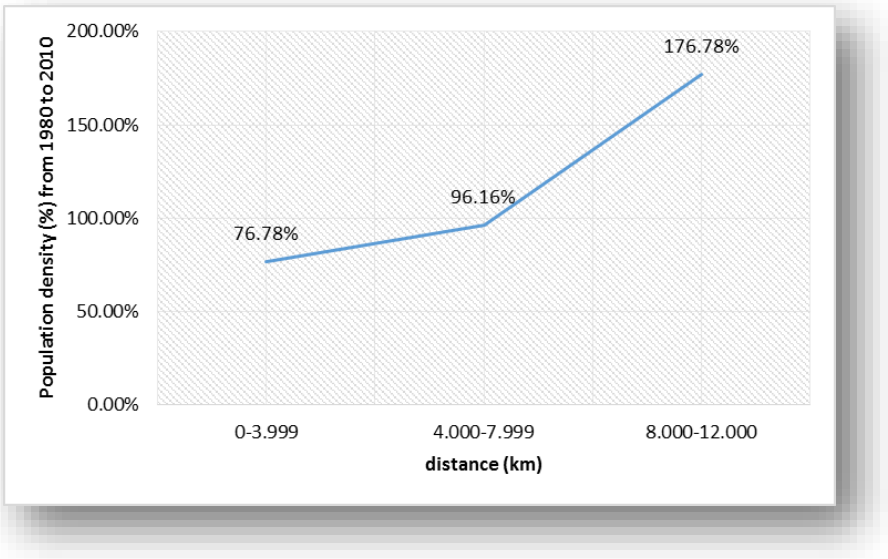


Fig 52 Growth in population density based on group distance from the city center

Source; author

This condition does not only occur in density growth in percent. But increasing density indicates that there is an increase in high density on the edge of the city. This indicates that the city that is the object of research included in the category of metropolitan cities is growing rapidly and requires extensive land to develop themselves. As long as it is within the limits of city administration, city, environmental and infrastructure development policies can still be implemented by using city resources that are relatively adaptable to challenges. However, problems will arise if the city physically exceeds the limits of city administration.

5.12 Proportion of population

Population structure is one of the factors that can affect the development of the city. If we look at the population structure in terms of age groups, we will get an understanding of the population situation in the future. Especially if we discuss the workforce side which is the generation of workers. Generation of workers can contribute to the economic future of the city. If the workforce has a large number, it indicates that the city has the potential to become an investment place for many entrepreneurs. Because there are many workers who are ready to work. And if the workforce is abundant, it will have an effect on the low cost of labor wages. And this is an attraction for entrepreneurs to invest in a city. This will also have an influence on the development of city areas. Cities will increasingly have city infrastructure and residents that will have an impact on the shape of the city, city land use, and so on. Researchers found a very dynamic proportion of the population structure in each city. This population structure starts from the age group 0-4 years to> 75 years. Life expectancy in Indonesia has indeed increased.

Table 22 Population composition (%) based on age groups in 1980 and 2010

AGE	PALEMBANG		TANG. SELATAN		BOGOR		BATAM		PEKANBARU	
	1980	2010	1980	2010	1980	2010	1980	2010	1980	2010
0-4	11.41%	9.20%	11.05%	9.35%	7.52%	7.95%	4.39%	12.56%	8.72%	10.76%
5.-9	10.33%	8.71%	10.07%	8.49%	7.62%	8.64%	8.93%	10.15%	7.54%	9.81%
10.-14	9.41%	8.32%	10.27%	8.10%	8.05%	8.75%	7.20%	7.66%	6.08%	8.75%
15-19	8.18%	9.42%	11.22%	8.73%	7.52%	8.26%	5.44%	6.19%	4.73%	9.64%
20-24	9.41%	9.91%	11.05%	9.42%	7.62%	8.47%	4.49%	9.56%	6.28%	12.04%
25-29	8.18%	9.05%	10.07%	10.29%	8.05%	8.58%	6.79%	12.29%	7.54%	10.74%
30-34	7.17%	8.11%	8.61%	10.13%	6.78%	9.07%	5.44%	11.84%	7.97%	9.20%
35-39	5.58%	7.34%	6.86%	9.23%	5.80%	8.31%	8.92%	9.46%	8.99%	7.96%
40-44	7.17%	6.69%	6.86%	7.89%	4.65%	7.64%	7.20%	6.67%	6.08%	6.41%
45-49	5.58%	5.81%	5.09%	6.29%	7.06%	6.53%	5.44%	4.56%	4.73%	4.99%
50-54	3.34%	5.09%	3.41%	4.67%	6.79%	5.24%	6.52%	3.20%	6.31%	3.63%
55-59	5.58%	3.97%	1.90%	3.13%	6.72%	4.27%	6.79%	2.28%	7.23%	2.41%
60-64	3.34%	2.37%	1.24%	1.74%	6.78%	3.07%	8.73%	1.49%	7.54%	1.37%
65-69	2.28%	1.62%	0.75%	1.14%	4.91%	1.89%	6.98%	0.96%	6.08%	1.03%
70-74	1.56%	2.71%	0.79%	0.69%	2.87%	1.40%	4.59%	0.60%	3.20%	0.64%
75+	1.51%	1.69%	0.75%	0.72%	1.25%	1.92%	2.25%	0.51%	0.97%	0.62%
Age	Bdr Lampung		Padang		Malang		Denpasar		Samarinda	
	1980	2010	1980	2010	1980	2010	1980	2010	1980	2010
0-4	8.52%	9.05%	10.08%	9.61%	7.97%	7.92%	10.42%	8.91%	7.70%	10.45%
5.-9	7.93%	9.04%	8.21%	8.92%	7.82%	7.22%	10.75%	10.87%	6.86%	9.55%
10.-14	6.98%	8.82%	7.96%	8.65%	7.34%	7.09%	10.01%	11.21%	6.03%	8.42%
15-19	7.49%	9.57%	10.08%	10.95%	6.54%	6.66%	8.82%	10.44%	6.62%	8.71%
20-24	6.98%	10.29%	12.51%	9.99%	8.82%	5.93%	8.14%	9.19%	7.38%	10.39%
25-29	6.07%	9.58%	8.18%	8.89%	6.99%	7.99%	7.25%	8.48%	7.41%	10.85%
30-34	5.49%	8.43%	6.87%	7.46%	8.13%	6.34%	6.43%	7.56%	6.78%	9.66%
35-39	7.48%	7.34%	6.63%	7.20%	7.09%	7.37%	5.51%	6.71%	5.97%	8.49%
40-44	7.30%	6.64%	6.18%	6.71%	6.83%	6.43%	4.61%	5.75%	6.18%	7.33%
45-49	7.93%	5.54%	5.34%	5.80%	5.43%	6.19%	3.89%	4.81%	7.38%	5.68%
50-54	6.98%	4.49%	4.65%	5.05%	6.79%	5.29%	4.53%	4.06%	7.70%	4.02%
55-59	5.49%	2.97%	3.72%	4.04%	6.54%	4.72%	5.84%	3.69%	6.86%	2.67%
60-64	4.59%	1.94%	2.23%	2.42%	4.92%	5.62%	4.61%	2.63%	6.03%	1.60%
65-69	3.72%	3.32%	3.72%	1.53%	2.90%	7.87%	3.89%	2.10%	5.20%	0.96%
70-74	2.45%	2.16%	2.23%	1.07%	3.97%	4.72%	3.89%	1.45%	4.03%	0.61%
75+	4.59%	0.82%	1.41%	1.71%	1.93%	2.62%	1.39%	2.16%	1.89%	0.60%
Age	Tasikmalaya		Banjarmasin		Serang		Manado		Pontianak	
	1980	2010	1980	2010	1980	2010	1980	2010	1980	2010
0-4	9.97%	9.35%	7.44%	9.27%	7.22%	11.50%	8.15%	10.41%	6.72%	9.40%
5.-9	9.44%	9.15%	6.34%	7.90%	7.13%	10.71%	7.47%	9.54%	7.91%	8.52%
10.-14	7.90%	9.26%	7.44%	7.27%	7.13%	10.58%	7.11%	9.07%	8.62%	8.19%
15-19	7.54%	9.60%	6.34%	8.64%	7.75%	11.15%	5.80%	8.74%	7.47%	9.65%
20-24	7.81%	8.71%	5.43%	9.73%	7.22%	6.83%	6.69%	9.14%	6.42%	10.39%
25-29	7.09%	8.13%	6.13%	9.87%	7.13%	7.64%	7.11%	9.46%	7.91%	8.90%
30-34	7.90%	7.98%	5.83%	9.62%	7.75%	7.40%	8.15%	9.27%	6.98%	8.15%
35-39	6.62%	7.68%	6.93%	8.08%	7.22%	8.73%	7.47%	8.49%	6.72%	7.82%
40-44	6.50%	7.15%	8.94%	7.37%	7.13%	6.71%	7.11%	7.44%	7.91%	6.95%
45-49	6.25%	6.34%	7.92%	5.15%	7.52%	4.36%	6.06%	6.07%	8.82%	5.96%
50-54	5.82%	5.21%	8.12%	5.03%	4.61%	4.08%	6.38%	4.56%	7.59%	4.88%
55-59	5.16%	4.27%	6.48%	3.21%	5.15%	3.13%	7.41%	3.19%	6.68%	3.96%
60-64	4.24%	3.08%	5.91%	2.03%	4.99%	2.10%	6.47%	2.00%	6.42%	2.82%
65-69	3.48%	2.22%	4.13%	3.50%	5.88%	2.50%	4.30%	1.19%	1.79%	1.94%
70-74	2.51%	1.40%	4.03%	2.56%	4.52%	1.66%	2.69%	0.72%	1.06%	1.29%
75+	1.81%	0.49%	2.58%	0.77%	1.64%	0.92%	1.62%	0.70%	0.98%	1.20%

Source: Author

The proportion of the population will have an influence on the development of the city, as has been stated by the author in the previous section. If the proportion of the young population, which we then call the pre-productive group, grows bigger, then it will indicate that the number of workforce in the city will be even greater. If the working age is a fact, the greater it will have an impact on the development of the city in the future. If the pre-productive group is getting bigger, which is followed by the increasing size of the productive group, then it provides good news for the progress of the city's economy. Because the city has human resources that are very much needed to work in the industrial and trade sectors. Indonesia is currently dealing with the phenomenon of high productive groups. It is estimated, Indonesia will reach the highest point or phase in the availability of labor in 2030. This condition, of course, provides a description of the condition of the population structure in each city in Indonesia. Because the majority of the Indonesian population lives in urban areas. This will further encourage the progress of the national economy because there are many human resources living in the city. And they will become human resources who work in the industrial and trade sectors who are the locomotives of the city's progress and help improve the welfare of the people in the city. The old age group that we call the post-productive name shows a declining number. But some analysts say that post-productive groups will rise again in the future. This is due to the longevity of the Indonesian human life expectancy. Thus, this has an impact on increasing the number of productive populations in Indonesia. In the next section, the author will divide the population structure into three large groups. They are called pre-productive groups, productive groups, and post-productive groups. Pre-productive groups are the age group of 0 to 14 years.

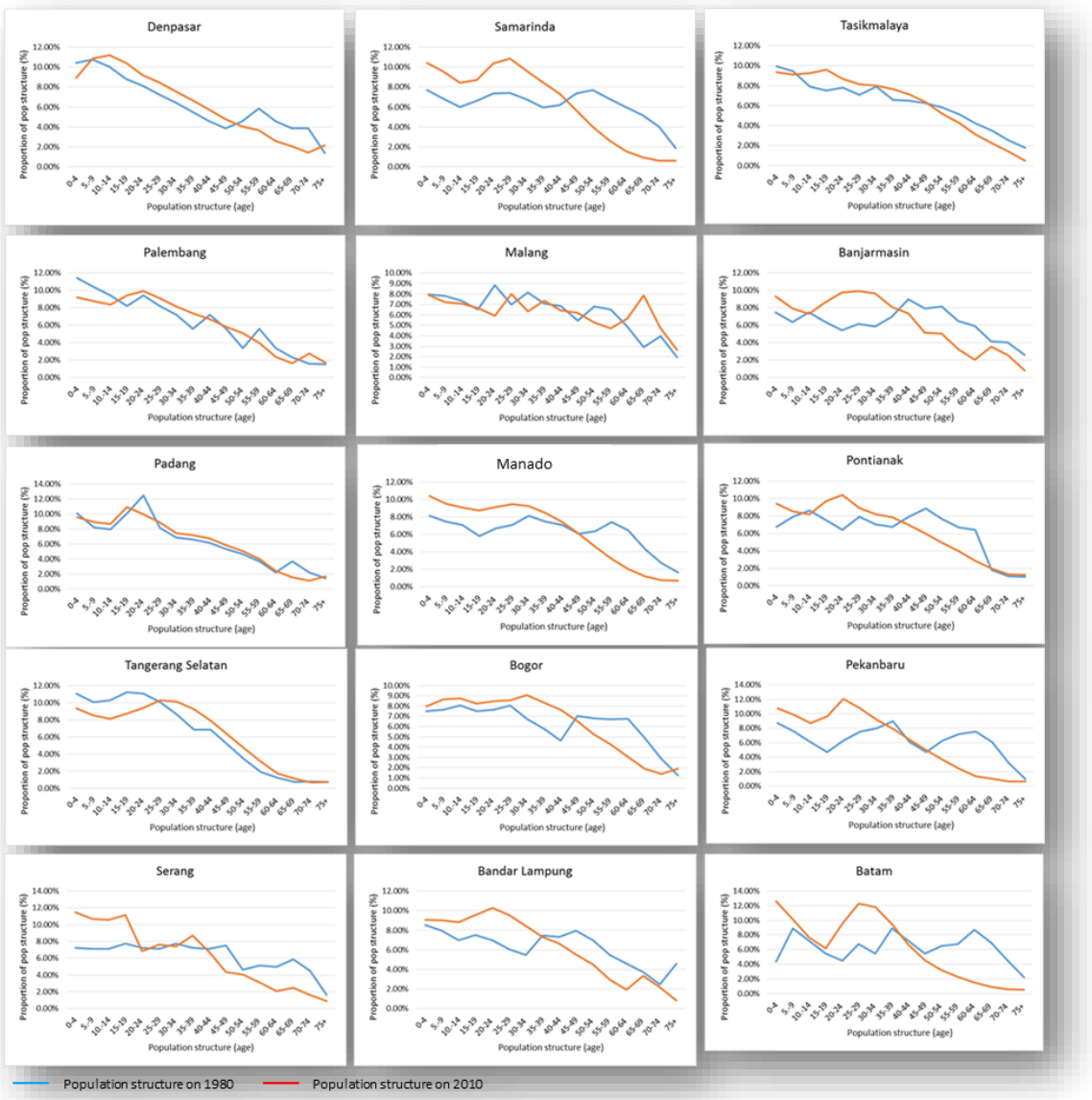
The productive group is the age group of 15 to 59 years. Post-productive groups are more than 60 years old. The author divides the population structure into these three groups by reason of this population structure group that will influence the development of cities. Cities will be influenced by young residents, working residents, and old residents. There are many things that we can understand when we know the pattern of population structure in each city. And we will compare this with population growth. We will find out the relationship between population growth with patterns of growth and population proportions based on this age group.

5.12.1 The population proportions

Therefore, if we look at the table, we will see an age group> 75 years with a large proportion of the population. And the authors estimate that the proportion will be even greater because the younger age groups who will grow old, the numbers are also quite large. The graph shows that there is a high proportion in the early and young age groups. Some cities show a decline in early age / birth rates. This is evidence that the population control policy held by the government since the 1980s has yielded results that deserve to be appreciated. But changes in the young population also need attention. Population growth in some cities shows that it has an impact on reducing fertilization rates. Population growth besides fertilization is migration. There are two kinds of migration, namely in-migration and out-migration. This will be discussed in another section.

The population structure in each city is different. This population structure influences the development of cities in the future. Population structure that is dominated by productive age will have a greater influence on the city compared to population structures that have an old population structure. This ultimately gives the assumption that the population has a large influence on the development of the city. If the city has a productive population structure, it will have an influence on the development of the city in the future. Denpasar has a relatively flat population structure.

Meanwhile, for other cities in Samarinda, Palembang, Malang and also attack, there is a tendency to have a very dynamic population structure change from year to year. And this can have an influence on the dynamics of city development and also the growth of other populations in the city. But there are also cities that have relatively flat population growth such as Tasikmalaya, Malang, and Denpasar, which have been explained previously.



Blue line: proportion in 1980. Red line: proportion in 2010.

Fig 53 Changes in population structure in 1980 and 2010

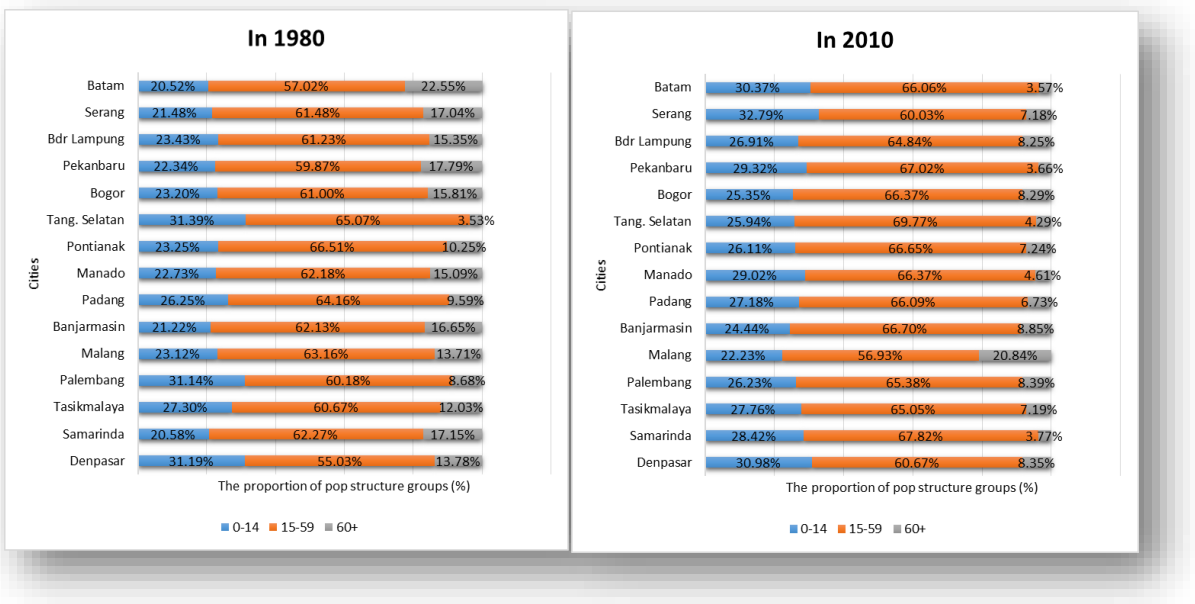
Source: author

The different patterns of population structure and the growth of population structures in each city can give us an idea and can provide a hypothesis for us towards population growth and other sectors in each city. Because as explained earlier that the population structure has an influence on population growth and also the development of the city. Governments usually have low attention to population structures because structures cannot be engineered in such a way. Population structure can be formed by itself and each city will have different blessings on population structure. Therefore, if a city has a

good population structure, this can have a positive influence on the development of the city as long as the local government can utilize the entire population created in the city or appear in the city. Unfortunately, there are many cities that cannot afford to utilize the population structure that appears in each city because the attention of urban development does not lie in the condition of the human resources they have. However, there are several other cities which show that the child birth rate is still very high. And this is a typical population in developing countries. Population control is a big challenge for the local government. Because, a large population will give influence to all elements of state life. The figure above shows that there is a change in population structure in each city. Denpasar shows that the generation born has decreased compared to the conditions in 1980.

5.12.2 Population structure grouping

In this section the author divides the population age group based on three major groups, namely: 0-14 years as pre-productive group 1, 15-59 years as productive group, and age group> 60 years as post-productive group.



*) Bdr Lampung = Bandar Lampung, Tang. Selatan = Tangerang Selatan.

Fig 54 Population structure based on age groups in 1980 and 2010

Source: author

In population analysis, there are three categoryes of population, such as those that have been delivered, namely the population groups that are pre-productive, productive and post-productive. For the pre and post-productive groups if combined, they enter into the category of dependency population. They do rely on productive groups that provide services and provide various things to meet the needs of dependency groups. Therefore, we must give attention to productive groups. Because, they give influence to the future of the city. All other age groups also rely heavily on productive age groups. city development policies must ensure that productive age groups become stronger and smarter, and can compete with productive age groups elsewhere. Because, the availability of resources is very limited while human needs are increasingly high. Only by competing with other regions and increasing the quality of the productive generation, will be able to put the city in a brighter future because it becomes very competitive with other cities. Inter-city development

competition has become a common trend throughout the world. All of this happens as an influence from the view that the future of the city depends on the quality of human resources. So, besides the quantity factor, quality factors must also get attention to this population issue.

5.13 Population growth based on age group

The figure shows that population growth is based on proportions so the productive group is higher than the other groups. Growth in each city tends to be the same. Different things are the value of growth. But all grow in the same format. Productive age will rise higher compared to dependency age groups.There are cities that tend to be flat in population growth. For example, like Denpasar. Denpasar is a city with growth rates that tend to be flat. Compared to other cities, there will be different formats in this city. Of course as a tourist city, Denpasar gives great hope to its citizens and also to migrants to live more calmly and comfortably because there are so many worldly facilities that can be accessed. And in the context of mentality, Denpasar also maintains a culture that influences the perspective of citizens. Akhinrya, the development of population based on age groups tends to be the same between one group and another group. However, if we look at the format of the changes, all cities have the same format which rises high in the productive age group, rises moderately for the pre-productive age group, and falls lower for the post-productive age group. They will influence the development of the city in the past and in the future.

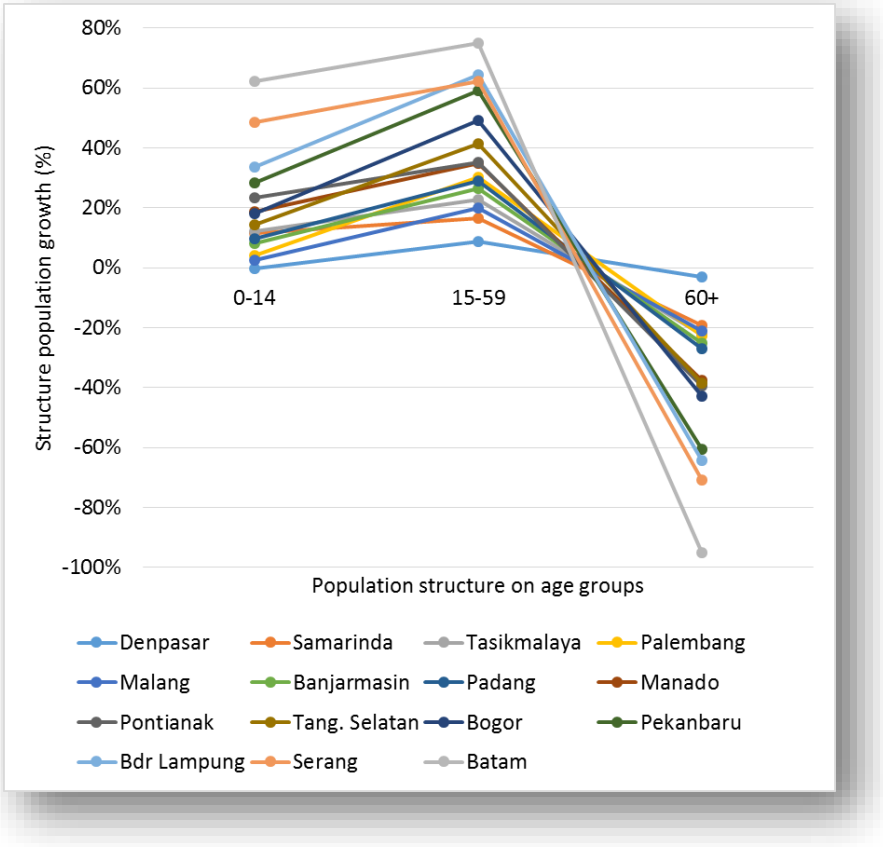


Fig 55 Growth in the proportion of the population in all cities from 1980 to 2010

Source: Author

5.13.1 Change in the proportion of the whole population

The figure shows changes in proportions in each age group. In general, we can say that the proportion of productive age is greater if compared with other age groups. But the pre-productive age group is higher than the post-productive age group. The pre-productive age group experienced a 3-point increase when compared to the proportion of 1980 with 2010. The productive age group rose 4 points and for the post-productive age group fell 7 points. Changes in proportion provide a view of the potential of human resources in the city. Cities can design city development and organize city areas by looking at the proportion of the population they have. This proportion will affect the provision of city infrastructure. Land use will be threatened to become all productive land, no longer is there green open land whose existence is very important for the city. This happened as a result of the people's purchasing power in the property and the need for housing as a result of limited capacity and government planning to provide flats for city residents. Three groups of population structures show very dynamic developments from 1980 to 2010. This very dynamic development has to do with population growth that occurred throughout the year. The population structure moves up and down following the tendency of the population in each city. The population group with 0-14 years of age shows growth in proportion when compared to the proportion of 1980 with proportion in 2010. This increase gives hope for future generations in the trade sector as well as industry because there is a young generation available as human resources working in the sector.

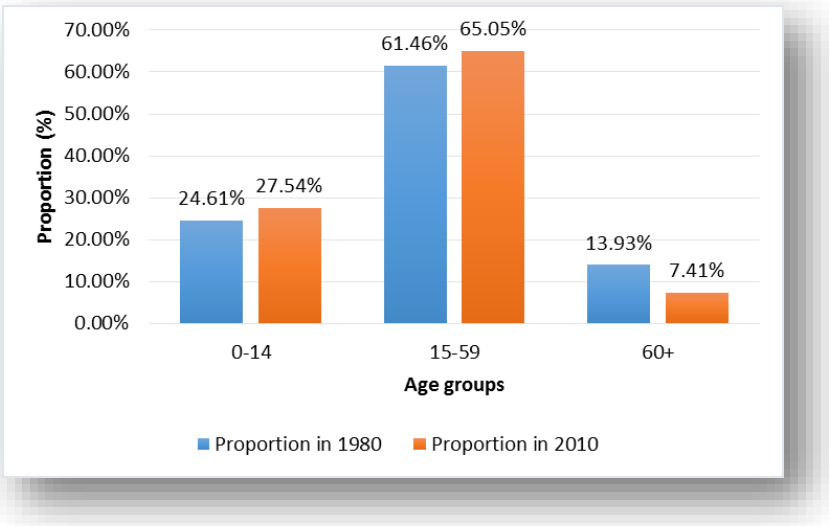


Fig 56 Changes in population proportions (%) between 1980 and 2010

Source; author

Meanwhile, for the 15 to 59 years age group, there was also a significant increase, difference between 1980 and 2010. This further strengthened the tendency for changes in urban space in each city because of the increasing number of young people who had economic levels more prosperous. Those who influence the changes in urban space. Meanwhile, for the age group more than 60 years showed a very large decline. The decline from 1980 to 2010. This phenomenon shows a decrease in the burden of the city to facilitate the third group, namely the age group for more than 60 years. Because the

number is getting smaller. But simultaneously, the city is also faced with a serious problem, namely the increasing age group and working age. They have very complex and diverse needs. They also need work and education. However, cities are faced with population structures like this. And this population structure will have an influence on changes in urban space as we will see in the next section.

5.13.2 Population growth and population proportions

The researcher investigated the effect of population growth on population proportions. We need to look at the relationship between population growth and growth or change in population structure based on age groups. The results are quite interesting to observe. Because the change becomes very dynamic and it can lead to different interpretations. The processed results of existing data can be seen in the table as well as some graphs after the table. As previously stated, the proportion of the population can influence the development of the city.

Table 23 Interaction of population growth and population proportions

CITY	YEAR	POPULATION GROWTH (%)	PROPORTION (%) OF EACH AGE GROUP		
			0-14 Y.O.	15-59 Y.O.	60+ Y.O
Denpasar	1980	21.55	0.31	0.55	0.14
	2010		0.31	0.61	0.08
Samarinda	1980	21.79	0.21	0.62	0.17
	2010		0.28	0.68	0.04
Malang	1980	25.59	0.23	0.63	0.14
	2010		0.22	0.57	0.21
Tasikmalaya	1980	26.99	0.27	0.61	0.12
	2010		0.28	0.65	0.07
Palembang	1980	35.58	0.31	0.60	0.09
	2010		0.26	0.65	0.08
Banjarmasin	1980	58.48	0.21	0.62	0.17
	2010		0.24	0.67	0.09
Manado	1980	61.75	0.23	0.62	0.15
	2010		0.29	0.66	0.05
Padang	1980	72.13	0.26	0.64	0.10
	2010		0.27	0.66	0.07
Pontianak	1980	90.91	0.23	0.67	0.10
	2010		0.26	0.67	0.07
Serang	1980	103.11	0.21	0.61	0.17
	2010		0.33	0.60	0.07
Pekanbaru	1980	130.36	0.22	0.60	0.18
	2010		0.29	0.67	0.04
Bogor	1980	141.56	0.23	0.61	0.16
	2010		0.25	0.66	0.08
Tangerang Selatan	1980	200.90	0.31	0.65	0.04
	2010		0.26	0.70	0.04
Bandar Lampung	1980	210.19	0.23	0.61	0.15
	2010		0.27	0.65	0.08
Batam	1980	1,609.40	0.21	0.57	0.23
	2010		0.30	0.66	0.04

Source; author

*) TANGSEL = Tangerang Selatan, BDR LPG = Bandar Lampung

Fig 57 Graph of population proportions in each population group

Source: author

So, these two things are population growth and the proportion of the population must be managed and directed to a common goal which is to have an impact on the progress of the city. If the city can

be floating then it can have an influence on the welfare of the community itself. So they influence each other. The relationship between these two things must get attention so that it can be managed to facilitate future planning.

The graph of the proportion of the population in each city shows a proportion in each year. The results show a similarity in the form of development of population proportions. To make it easier for readers to see changes in each group and each city, the authors will tabulate changes in the proportion of the population in each city. This can help the reader to understand the structural changes that occur. And that change will be associated with population growth. The chart below will show changes in population structure in each city. Some cities experience extreme changes in population structure, but there are also cities that experience changes in population structure not too large. The graph also shows that the composition or proportion of productive groups aged 15 to 59 years has a very large number compared to the population structure in other age groups.

This indicates that these cities have the potential to grow because they have a very large number of young and productive generations. But this condition will not change the city if there is no human resource management in the city. This group must be provided with education and health facilities as well as being guaranteed the availability of jobs so that their presence has a positive influence on the city. And however, their existence has had an influence on changes in the city as a whole, not just changes in urban space. So, increasing population growth in each city has contributed to changes in population structure that are increasingly productive and can be empowered as labor resources to bring better change to cities in Indonesia. If we read the data in the previous table, we can see that there is a consistent growth in the population structure for pre-productive age and productive age group.

Regardless of population growth that occurs in every city, it always shows that there is consistency. This indicates that the population structure in Indonesia, especially in cities where the object of this research indeed leads and reflects the condition of the city and the state which is proceeding to become a more developed city in the future. Because they have a population structure that can contribute to progress in all areas of the life of the local community. This population structure is a population structure that is highly expected by other countries because they are currently faced with a decline in population growth, especially in productive and productive group. The population they have currently tended to age.

5.14 The effect of population growth on population proportions

In the previous section, we looked at data about population growth related to changes in population structure. Results in general can be seen in the table. There are five tables that will explain the effect of population growth in each age group of the population. The proportion of the pre-productive population influences the proportion of productive population. Indonesia is one of the countries with a large number of pre-productive populations. They will have an influence on the national economy. However, on a city scale, an increase in the proportion of pre-productive residents will pose challenges in the management of cities because there must be facilities that suit their needs. city facilities such as education and health facilities are urgent to be provided because the request already exists. Although on the other hand, the post-productive population has dropped dramatically. If the post-productive population can decline, the city will be more productive. And the authors assume, if the

productive age changes higher to above> 65 years, then this will change the perspective related to the progress of the city.

Table 24 Proportion in all group

CITY	POP GROWTH (%)	INCREASING OF POP STRUCTURE (PROPORTION CHANGE)		
		0-14	15-59	60 +
Denpasar	21.55%	0.00	0.06	-0.05
Samarinda	21.79%	0.08	0.06	-0.13
Malang	25.59%	-0.01	-0.06	0.07
Tasikmalaya	26.99%	0.00	0.04	-0.05
Palembang	35.58%	-0.05	0.05	0.00
Banjarmasin	58.48%	0.03	0.05	-0.08
Manado	61.75%	0.06	0.04	-0.10
Padang	72.13%	0.01	0.02	-0.03
Pontianak	90.91%	0.03	0.00	-0.03
Serang	103.11%	0.11	-0.01	-0.10
Pekanbaru	130.36%	0.07	0.07	-0.14
Bogor	141.56%	0.02	0.05	-0.08
Tangerang Selatan	200.90%	-0.05	0.05	0.01
Bandar Lampung	210.19%	0.03	0.04	-0.07
Batam	1609.40%	0.10	0.09	-0.19

Source: author

Table 25 Proportion in the pre-productive group

CITY	POP GROWTH (%)	INCREASING OF POP STRUCTURE (PROPORTION CHANGE)		
		0-14	15-59	60 +
Denpasar	21.55%	0.00	0.06	-0.05
Samarinda	21.79%	0.08	0.06	-0.13
Malang	25.59%	-0.01	-0.06	0.07
Tasikmalaya	26.99%	0.00	0.04	-0.05
Palembang	35.58%	-0.05	0.05	0.00
Banjarmasin	58.48%	0.03	0.05	-0.08
Manado	61.75%	0.06	0.04	-0.10
Padang	72.13%	0.01	0.02	-0.03
Pontianak	90.91%	0.03	0.00	-0.03
Serang	103.11%	0.11	-0.01	-0.10
Pekanbaru	130.36%	0.07	0.07	-0.14
Bogor	141.56%	0.02	0.05	-0.08
Tangerang Selatan	200.90%	-0.05	0.05	0.01
Bandar Lampung	210.19%	0.03	0.04	-0.07
Batam	1609.40%	0.10	0.09	-0.19

Source: author

Table 26 Proportion in productive group

CITY	POP GROWTH (%)	INCREASING OF POP STRUCTURE (PROPORTION CHANGE)		
		0-14	15-59	60 +
Denpasar	21.55%	0.00	0.06	-0.05
Samarinda	21.79%	0.08	0.06	-0.13
Malang	25.59%	-0.01	-0.06	0.07
Tasikmalaya	26.99%	0.00	0.04	-0.05
Palembang	35.58%	-0.05	0.05	0.00
Banjarmasin	58.48%	0.03	0.05	-0.08
Manado	61.75%	0.06	0.04	-0.10
Padang	72.13%	0.01	0.02	-0.03
Pontianak	90.91%	0.03	0.00	-0.03
Serang	103.11%	0.11	-0.01	-0.10
Pekanbaru	130.36%	0.07	0.07	-0.14
Bogor	141.56%	0.02	0.05	-0.08

CITY	POP GROWTH (%)	INCREASING OF POP STRUCTURE (PROPORTION CHANGE)		
		0-14	15-59	60 +
Tangerang Selatan	200.90%	-0.05	0.05	0.01
Bandar Lampung	210.19%	0.03	0.04	-0.07
Batam	1609.40%	0.10	0.09	-0.19

Source: author

Table 27 Proportion in the post-productive group

CITY	POP GROWTH (%)	INCREASING OF POP STRUCTURE (PROPORTION CHANGE)		
		0-14	15-59	60 +
Denpasar	21.55%	0.00	0.06	-0.05
Samarinda	21.79%	0.08	0.06	-0.13
Malang	25.59%	-0.01	-0.06	0.07
Tasikmalaya	26.99%	0.00	0.04	-0.05
Palembang	35.58%	-0.05	0.05	0.00
Banjarmasin	58.48%	0.03	0.05	-0.08
Manado	61.75%	0.06	0.04	-0.10
Padang	72.13%	0.01	0.02	-0.03
Pontianak	90.91%	0.03	0.00	-0.03
Serang	103.11%	0.11	-0.01	-0.10
Pekanbaru	130.36%	0.07	0.07	-0.14
Bogor	141.56%	0.02	0.05	-0.08
Tangerang Selatan	200.90%	-0.05	0.05	0.01
Bandar Lampung	210.19%	0.03	0.04	-0.07
Batam	1609.40%	0.10	0.09	-0.19

Source: author

Because the workforce or the proportion of productive population will be even higher. But a low birth rate indicates that there is population migration. If it is not managed properly it will lead to social and cultural segregation. This will reduce the future prospects of the city.If we pay attention, for the pre-productive age group, the city of Malang, Palembang and South Tangerang have negative growth from 1980 to 2010.

Table 28 Trend analysis of proportion change of population structure

CITY	POP GROWTH (%)	INCREASING OF POP STRUCTURE (PROPORTION CHANGE)		
		0-14	15-59	MORE 60
Denpasar	21.55%	0.00	0.06	-0.05
Samarinda	21.79%	0.08	0.06	-0.13
Malang	25.59%	-0.01	-0.06	0.07
Tasikmalaya	26.99%	0.00	0.04	-0.05
Palembang	35.58%	-0.05	0.05	0.00
Banjarmasin	58.48%	0.03	0.05	-0.08
Manado	61.75%	0.06	0.04	-0.10
Padang	72.13%	0.01	0.02	-0.03
Pontianak	90.91%	0.03	0.00	-0.03
Serang	103.11%	0.11	-0.01	-0.10
Pekanbaru	130.36%	0.07	0.07	-0.14
Bogor	141.56%	0.02	0.05	-0.08
Tangerang Selatan	200.90%	-0.05	0.05	0.01
Bandar Lampung	210.19%	0.03	0.04	-0.07
Batam	1609.40%	0.10	0.09	-0.19

Source: author

This negative growth occurs randomly, there is no correlation with population growth. Meanwhile for growth in productive groups, there is negative growth in Malang and Serang and this does not indicate the influence of population growth because of its position which tends to be random. And for the age

group> 60 years, everything is negative except Malang, Palembang and South Tangerang. And the conditions that occur in the post-productive group show inversely proportional to the growth of the pre-productive group.

The results of the trend analysis do not indicate a correlation between population growth and changes in population structure that occur in all age groups. But there was a tendency for the influence of population growth on the pre-productive and post-productive age groups. The form of its influence is to create a different relationship between pre-productive age and post-productive age. If one group has a positive body value, the other group will have a negative value.

5.15 Population increase per km2 and population proportions

In this section, author wants to know the factor of population increase in changes in the proportion of the age group. The investigations that the authors conducted in the pre-productive age group, productive age and post-productive age showed the same results with the previous hypothesis that there was no trend that showed a relationship between population increases per km2 and changes in population proportions. An increase or decrease in proportion can be caused by an increase in population per km2 that occurs in the city.

But the results of the analysis show that population increases are not related to changes in population structure in all age groups. So the authors can say that the authors found no correlation between population increase per km2 with changes in population proportions that occur in each city or even in all cities.

Table 29 Proportion in all group

CITY	INCREASE OF PEOPLE / KM2	INCREASING OF POP STRUCTURE (PROPORTION CHANGE)		
		0-14	15-59	60+
Tangerang Selatan	5909	-0.05	0.05	0.01
Bogor	4700	0.02	0.05	-0.08
Bandar Lampung	3030	0.03	0.04	-0.07
Banjarmasin	2852	0.03	0.05	-0.08
Pontianak	2575	0.03	0.00	-0.03
Malang	1720	-0.01	-0.06	0.07
Denpasar	1038	0.00	0.06	-0.05
Palembang	982	-0.05	0.05	0.00
Batam	864	0.10	0.09	-0.19
Serang	826	0.11	-0.01	-0.10
Pekanbaru	804	0.07	0.07	-0.14
Tasikmalaya	783	0.00	0.04	-0.05
Samarinda	513	0.08	0.06	-0.13
Padang	503	0.01	0.02	-0.03
Manado	436	0.06	0.04	-0.10

Source: author

Table 30 Proportion in the pre-productive group

CITY	INCREASE OF PEOPLE / KM2	INCREASING OF POP STRUCTURE (PROPORTION CHANGE)		
		0-14	15-59	60+
Tangerang Selatan	5909	-0.05	0.05	0.01
Bogor	4700	0.02	0.05	-0.08
Bandar Lampung	3030	0.03	0.04	-0.07
Banjarmasin	2852	0.03	0.05	-0.08
Pontianak	2575	0.03	0.00	-0.03

CITY	INCREASE OF PEOPLE / KM2	INCREASING OF POP STRUCTURE (PROPORTION CHANGE)		
		0-14	15-59	60+
Malang	1720	-0.01	-0.06	0.07
Denpasar	1038	0.00	0.06	-0.05
Palembang	982	-0.05	0.05	0.00
Batam	864	0.10	0.09	-0.19
Serang	826	0.11	-0.01	-0.10
Pekanbaru	804	0.07	0.07	-0.14
Tasikmalaya	783	0.00	0.04	-0.05
Samarinda	513	0.08	0.06	-0.13
Padang	503	0.01	0.02	-0.03
Manado	436	0.06	0.04	-0.10

Source: author

Table 31 Proportion in productive group

CITY	INCREASE OF PEOPLE / KM2	INCREASING OF POP STRUCTURE (PROPORTION CHANGE)		
		0-14	**15-59**	**60+**
Tangerang Selatan	5909	-0.05	0.05	0.01
Bogor	4700	0.02	0.05	-0.08
Bandar Lampung	3030	0.03	0.04	-0.07
Banjarmasin	2852	0.03	0.05	-0.08
Pontianak	2575	0.03	0.00	-0.03
Malang	1720	-0.01	-0.06	0.07
Denpasar	1038	0.00	0.06	-0.05
Palembang	982	-0.05	0.05	0.00
Batam	864	0.10	0.09	-0.19
Serang	826	0.11	-0.01	-0.10
Pekanbaru	804	0.07	0.07	-0.14
Tasikmalaya	783	0.00	0.04	-0.05
Samarinda	513	0.08	0.06	-0.13
Padang	503	0.01	0.02	-0.03
Manado	436	0.06	0.04	-0.10

Source: author

Table 32 Proportion in the post-productive group

CITY	INCREASE OF PEOPLE / KM2	INCREASING OF POP STRUCTURE (PROPORTION CHANGE)		
		0-14	**15-59**	**60+**
Tangerang Selatan	5909	-0.05	0.05	0.01
Bogor	4700	0.02	0.05	-0.08
Bandar Lampung	3030	0.03	0.04	-0.07
Banjarmasin	2852	0.03	0.05	-0.08
Pontianak	2575	0.03	0.00	-0.03
Malang	1720	-0.01	-0.06	0.07
Denpasar	1038	0.00	0.06	-0.05
Palembang	982	-0.05	0.05	0.00
Batam	864	0.10	0.09	-0.19
Serang	826	0.11	-0.01	-0.10
Pekanbaru	804	0.07	0.07	-0.14
Tasikmalaya	783	0.00	0.04	-0.05
Samarinda	513	0.08	0.06	-0.13
Padang	503	0.01	0.02	-0.03
Manado	436	0.06	0.04	-0.10

Source: author

This also indicates that the flow of cityization which cannot be determined by the age group and also the birth rate of babies whose numbers cannot be regulated, quantitatively has no relationship or even influence the changes in the proportion of population structure. But the fact that there is an

increase in the productive age group in all the results of the analysis suggests that the city is a place for citizens to exercise and earn a living.

There are many out-of-town residents who have to work in the city even though they live outside the city in the following years to decide to stay within the city administration area. When residents move into the city administrative area, they will be listed as city war. And this has an effect on the proportion of the population as a whole. The author estimates that cities that have a decline in the productive age group, namely Malang and Serang must pay attention to the development of the economic sector. Because the decrease in proportion in their city indicates that there is a decline in productivity. Population increases on this scale can have an influence on population proportions. city management needs to look at changes and the influence of density on population proportions to gain an understanding of future city changes physically. The population will choose the location to be the place that best fits their plans and needs. Therefore, the condition of each settlement location must be able to meet the needs of the population.

Table 33 Trend analysis

CITY	INCREASE OF PEOPLE / KM2	INCREASING OF POP STRUCTURE (PROPORTION CHANGE)		
		0-14	15-59	60+
Tangerang Selatan	5909	-0.05	0.05	0.01
Bogor	4700	0.02	0.05	-0.08
Bandar Lampung	3030	0.03	0.04	-0.07
Banjarmasin	2852	0.03	0.05	-0.08
Pontianak	2575	0.03	0.00	-0.03
Malang	1720	-0.01	-0.06	0.07
Denpasar	1038	0.00	0.06	-0.05
Palembang	982	-0.05	0.05	0.00
Batam	864	0.10	0.09	-0.19
Serang	826	0.11	-0.01	-0.10
Pekanbaru	804	0.07	0.07	-0.14
Tasikmalaya	783	0.00	0.04	-0.05
Samarinda	513	0.08	0.06	-0.13
Padang	503	0.01	0.02	-0.03
Manado	436	0.06	0.04	-0.10

Source: author

The results of data analysis show that there is no correlation between population increase and changes in population proportions. This answers the question about the influence of population growth on population structure. We see the population structure in terms of the division of the three age groups. And the results we compare with other parameters are expected to have an effect on changes in population proportions.

Some studies mention factors that can influence changes in population proportions. But the majority said that the most influencing factor was cityization selection factors. Theoretically this is acceptable but in reality changes in population proportions cannot be adjusted like that. Therefore, an increase in certain population structures is a design that cannot be rejected and cannot be planned. The challenge of city managers is how to manage all the resources they have. They must be able to ensure the resources they have have an impact on people's welfare.

5.16 The effect of city size on population proportions

In this section we will look at the effect of city size on population proportions. In the previous section it was stated that the population structure with ages 15 to 59 is very dominant in every city in Indonesia. We will see whether the size of a city influences such population structures. Because the size of the city has a large influence on population growth and population density. Many parties believe that the population structure is a blessing. He cannot be engineered to be in a city. So, the city only accepts these conditions without the need to fight with engineering. The high proportion of the productive population is a positive proportion for city managers because it will increase the chances of economic growth and the welfare of the city and city residents. With a high proportion of the population for productive population, the structure will have an impact on the amount of labor available that can be utilized to improve the city's economy and also improve the welfare of society as a whole.

Table 34 Proportion in all group

CITY	AREA (KM2)	INCREASING OF POP STRUCTURE (PROPORTION CHANGE)		
		0-14	15-59	60+
Batam	1038.84	0.10	0.09	-0.19
Samarinda	717.11	0.08	0.06	-0.13
Padang	694.93	0.01	0.02	-0.03
Pekanbaru	632.26	0.07	0.07	-0.14
Manado	508.39	0.06	0.04	-0.10
Palembang	400.61	-0.05	0.05	0.00
Serang	266.74	0.11	-0.01	-0.10
Bandar Lampung	197.22	0.03	0.04	-0.07
Tasikmalaya	183.85	0.00	0.04	-0.05
Tangerang Selatan	147.19	-0.05	0.05	0.01
Denpasar	127.78	0.00	0.06	-0.05
Bogor	118.50	0.02	0.05	-0.08
Malang	110.06	-0.01	-0.06	0.07
Pontianak	107.82	0.03	0.00	-0.03
Banjarmasin	98.46	0.03	0.05	-0.08

Source: author

Table 35 Proportion in the pre-productive group

CITY	AREA (KM2)	INCREASING OF POP STRUCTURE (PROPORTION CHANGE)		
		0-14	15-59	60+
Batam	1038.84	0.10	0.09	-0.19
Samarinda	717.11	0.08	0.06	-0.13
Padang	694.93	0.01	0.02	-0.03
Pekanbaru	632.26	0.07	0.07	-0.14
Manado	508.39	0.06	0.04	-0.10
Palembang	400.61	-0.05	0.05	0.00
Serang	266.74	0.11	-0.01	-0.10
Bandar Lampung	197.22	0.03	0.04	-0.07
Tasikmalaya	183.85	0.00	0.04	-0.05
Tangerang Selatan	147.19	-0.05	0.05	0.01
Denpasar	127.78	0.00	0.06	-0.05
Bogor	118.50	0.02	0.05	-0.08
Malang	110.06	-0.01	-0.06	0.07
Pontianak	107.82	0.03	0.00	-0.03
Banjarmasin	98.46	0.03	0.05	-0.08

Source: author

Table 36 Proportion in productive group

CITY	AREA (KM2)	INCREASING OF POP STRUCTURE (PROPORTION CHANGE)		
		0-14	15-59	60+
Batam	1038.84	0.10	0.09	-0.19
Samarinda	717.11	0.08	0.06	-0.13
Padang	694.93	0.01	0.02	-0.03
Pekanbaru	632.26	0.07	0.07	-0.14
Manado	508.39	0.06	0.04	-0.10
Palembang	400.61	-0.05	0.05	0.00
Serang	266.74	0.11	-0.01	-0.10
Bandar Lampung	197.22	0.03	0.04	-0.07
Tasikmalaya	183.85	0.00	0.04	-0.05
Tangerang Selatan	147.19	-0.05	0.05	0.01
Denpasar	127.78	0.00	0.06	-0.05
Bogor	118.50	0.02	0.05	-0.08
Malang	110.06	-0.01	-0.06	0.07
Pontianak	107.82	0.03	0.00	-0.03
Banjarmasin	98.46	0.03	0.05	-0.08

Source: author

Table 37 Proportion in the post-productive group

CITY	AREA (KM2)	INCREASING OF POP STRUCTURE (PROPORTION CHANGE)		
		0-14	15-59	60+
Batam	1038.84	0.10	0.09	-0.19
Samarinda	717.11	0.08	0.06	-0.13
Padang	694.93	0.01	0.02	-0.03
Pekanbaru	632.26	0.07	0.07	-0.14
Manado	508.39	0.06	0.04	-0.10
Palembang	400.61	-0.05	0.05	0.00
Serang	266.74	0.11	-0.01	-0.10
Bandar Lampung	197.22	0.03	0.04	-0.07
Tasikmalaya	183.85	0.00	0.04	-0.05
Tangerang Selatan	147.19	-0.05	0.05	0.01
Denpasar	127.78	0.00	0.06	-0.05
Bogor	118.50	0.02	0.05	-0.08
Malang	110.06	-0.01	-0.06	0.07
Pontianak	107.82	0.03	0.00	-0.03
Banjarmasin	98.46	0.03	0.05	-0.08

Source: author

Table 38 Trend analysis

CITY	AREA (KM2)	INCREASING OF POP STRUCTURE (PROPORTION CHANGE)		
		0-14	15-59	60+
Batam	1038.84	0.10	0.09	-0.19
Samarinda	717.11	0.08	0.06	-0.13
Padang	694.93	0.01	0.02	-0.03
Pekanbaru	632.26	0.07	0.07	-0.14
Manado	508.39	0.06	0.04	-0.10
Palembang	400.61	-0.05	0.05	0.00
Serang	266.74	0.11	-0.01	-0.10
Bandar Lampung	197.22	0.03	0.04	-0.07
Tasikmalaya	183.85	0.00	0.04	-0.05
Tangerang Selatan	147.19	-0.05	0.05	0.01
Denpasar	127.78	0.00	0.06	-0.05
Bogor	118.50	0.02	0.05	-0.08
Malang	110.06	-0.01	-0.06	0.07
Pontianak	107.82	0.03	0.00	-0.03
Banjarmasin	98.46	0.03	0.05	-0.08

But the results obtained from this study indicate that there is no direct or indirect correlation between city size and population proportion. As mentioned earlier, the size of a city has an influence on population density. And population density should have an influence on population proportions. Because population density will make many residents productive to be able to exist in the social environment where they gather. Serang and Malang are cities that have negative population proportion growth. Next, we need to look at the relationship between the size of the city and the proportion of the population. city size has an influence on population density. And this may have an effect on the proportion of the population.

5.17 Closing remarks

Population density is influenced by city size and district size. Because this is related to the capacity of space to accommodate the population. Measuring density based on the size of the region which is an administrative measure is a way to connect city planning with city administration policies. Evaluation is carried out on population density per city and district administrative boundaries related to the authority of each level of government which is limited by regional administrative boundaries. Therefore, this study rests on the administrative boundary, although it may be slightly different from the city logic in planning. Because administrative boundaries are the limits of authority. Planning and or evaluation of city development must be done by looking at the limits of authority. Density is also influenced by the distance of the center of the district to the city center. The closer a district is to downtown Amaka, the higher the population density will be.

Related to the population structure, the authors can say that the population structure in the object of this research shows the existence of gifts from the creator. Engineering structures of the population cannot be done, especially in such a large city scale. Because of the gift, the step that can be taken is managing the human resources. Because the change in population structure in 1980 to 2010 was not related to population growth, city and district size, population density, population increase. But the population structure in cities in Indonesia shows the situation of the position of Indonesia as a developing country that has begun to become progressive because it has a high workforce. The post-productive age group population declined but the population of the pre-productive age group and productive age group increased scalatically.

Population growth has an influence on population density in each city. As stated earlier, the size of the city does have an influence on population density. And we find that population density in areas close to the city center and also in suburban areas is much higher than in other regions. This analysis is associated with the distance between the city center and the district center. The phenomenon that must get more attention from all of us is the high growth of population density in suburban areas, in this case, the growth of the district population located on the edge of the city.

Population growth, as well as population density at this location, is very high and it indicates that the city is proceeding to become a densely populated city in the Suburbs. If this is allowed and there is no policy related to population, then the city will be wider and will expand beyond the limits of the city administration. Indeed, there are a number of cities in Indonesia that are increasingly widening and this is an implication of the progress of the city, the surrounding area is also pleased with the development of their region which has implications for the progress of the main city. This has led to the emergence of the megapolitan because the city is getting bigger and it is often seen as a form of urban progress. Whereas there is a lot of data that says that megapolitan that has no balance in

population density has a negative impact on the city's economy and also on the environment. This condition should be of concern to the government. They must reduce their desire to become a super big city from the size of the city by becoming a megapolitan. But if for example, the city government wants to have a very high population, has a very high population density, then this condition must get support from all parties. Vertical housing development must be supported through policy.

If we look at the results of the analysis relating to population growth and its effect on population density and population structure, we will see a relatively close relationship between the three factors. Population density does occur as a result of population growth, although this is strongly influenced by the size of each city. So the effect of population growth on population density is indeed high, it's just that he will be influenced by the size of the 15 cities that are the object of this study. Meanwhile, matters relating to population structure also indicate that population growth occurring in 15 cities influences the proportion of each population structure that is the object of research. As it is known that in this study the authors used three types of population structure, namely pre-productive, productive, and post-productive. From the research conducted by the author, this shows that the structure of the pre-productive and productive population will always increase, but the structure of the post-productive population has a tendency to decrease.

The population close to the city center will tend to be denser than the population that is outside the city. But the authors also find that population density growth that occurs in the suburbs will tend to be higher than population density growth that occurs in the city center. This phenomenon must be read as an indication of the tendency of populations to live outside the city center. The effect of smooth mobility will be one of the considerations for the community to choose to live outside the city center. High mobility that can be done by the community occurs because of the convenience for the community to own and also use vehicles such as cars and motorbikes. Smoothness in the field of transportation influences the development of the city physically and also non-physical. Changes in the shape of urban space will increase and changes in land use functions will also be quite high as a result of the distribution of population supported by fluency in the transportation sector because they have vehicles such as cars and motorbikes. As we know that cities are faced with the problem of the availability of mass public transportation.

CHAPTER 6 – THE ANALYSIS OF POPULATION GROWTH EFFECT TO URBAN FABRIC AND LAND USE

The shape of the city on a small scale can be seen in the form of city space called the urban fabric. urban fabric is strongly influenced by patterns of development that occur in a space. There is space formed through the design of space carried out by professionals who are implemented, but there is also a space formed by itself. Space patterns or urban fabric can be formed by design or organically. Each city will have space in different forms. In this part of the study, the author will discuss the urban fabric in the city which is the object of research. urban fabric and its changes in 1980 to 2010 will be compared with population changes and population density. The author considers that urban fabric is strongly influenced by the population because it is related to the needs of human physical space. urban fabric will have a variety of forms. Therefore, the author will approach the changes in urban fabric quantitatively by looking at the speed of change in urban fabric. In the initial stage, we will use satellite maps as material for making urban fabric. The author will use a line map as an ingredient to calculate the built and unbuilt area which is the material formed by the urban fabric space.

6.1 Creating urban fabric images

At this stage the writer will analyze population growth which has an influence on the urban fabric. Urban fabric is a form of urban space caused by buildings in the area or zone.

6.1.1 Plot a city map on a grid map

Satellite photos that have been adjusted to the shape of the city administratively are placed on a grid page that has a size of 500 m x 500 m per grid. Each grid will be grouped according to the proportion of buildings in the block, with certain conditions that will be explained in other sections.

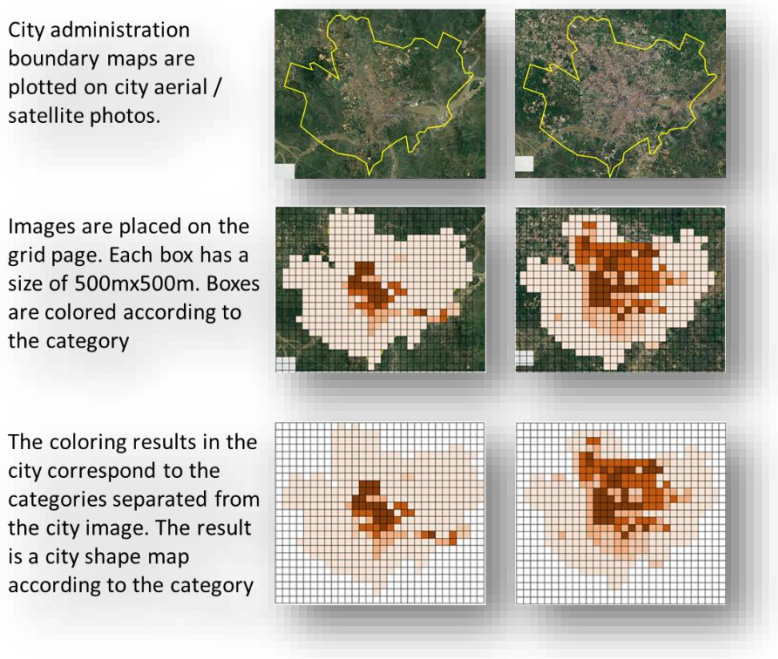


Fig 58 Satellite maps are placed on a grid map

Source: municipal, author

The author identifies maps based on predetermined categories of all cities that are the object of research. To do this, it is really necessary to be careful and also see and calculate the map blocks in detail so that more precise analysis and calculations are produced. The appropriate analysis is needed in making an analysis of changes in the shape of space. Moreover, the analysis carried out is not only seeing changes in the shape of space visually but also seeing changes in the shape of space quantitatively. As mentioned earlier, the analysis of the shape of the space indicated by the shape of the Urban fabric will be done quantitatively and visually. The authors also performed visual and quantitative analysis of 15 cities that were the object of this research. The overall results can be seen in the appendix. The next step taken by the author is to group each map in the same category. This grouping is done to find the area that has the most filled form or space. And the author made a comparison between the forms of space in 1980 with the shape of space in 2010. Changes in the shape of this space will be calculated quantitatively to see changes in space quantitatively after previously seen visually. Related to this can be seen in the following section.

6.1.2 Identify similar blocks

Blocks that have the same proportion of built land will be included in the same group. The author will divide block groups into 5 categories. This category will be represented by different block colors. This color difference will help the writer to understand the differences between the categories contained in the blog page line. Each group will consist of several map blocks. The author will take one block of maps in each category. The map taken is a blog map that has the highest percentage of filled buildings that have an influence on the shape of space in each block. By using the chosen map blog, the author can create a form of urban space called the urban fabric. Then the author will calculate changes in the shape of space in each urban fabric and conduct quantitative analysis.

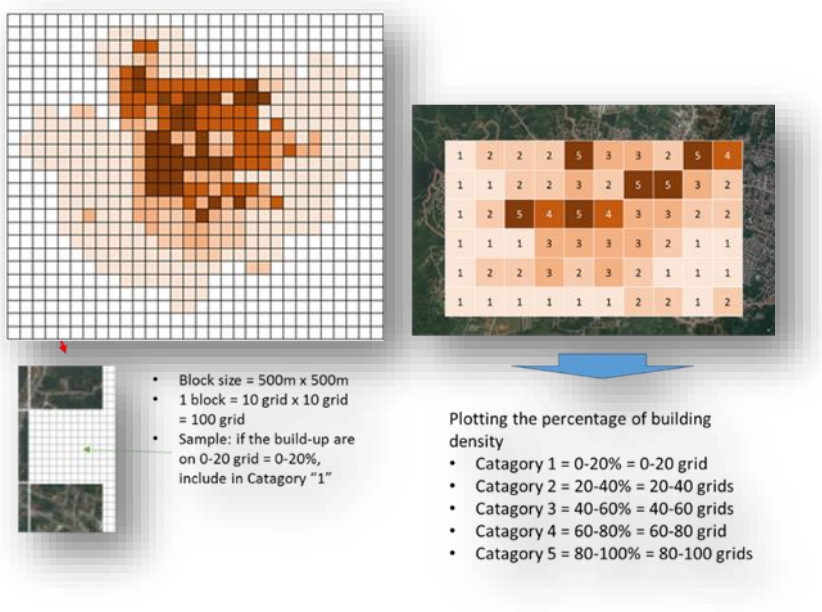


Fig 59 Formation of categories based on the number of grids

Source: author

6.1.3 Groups of similar pattern

Analysis results that have similarities in form will be combined into one group with the same composition. Later in another section, the author will explain the group categoryes. Although, the

previous image has shown the type of category. Based on these categoryes, the results of image analysis included in the similarity of categoryes will be combined. This merger is done to facilitate the process of selecting the urban fabric that has the highest value in each category that has been previously set.

Every form of space that visually has similarities will be grouped into one category group. As mentioned earlier, the author will take the form of space that has the largest value in 1 category. That image will be used as material for further analysis. The picture will also be compared with the picture in 1980. So the author made a comparison of the shape of space in 1980 and 2010. This form of space will be analyzed quantitatively, the results of which can be seen in the following section.

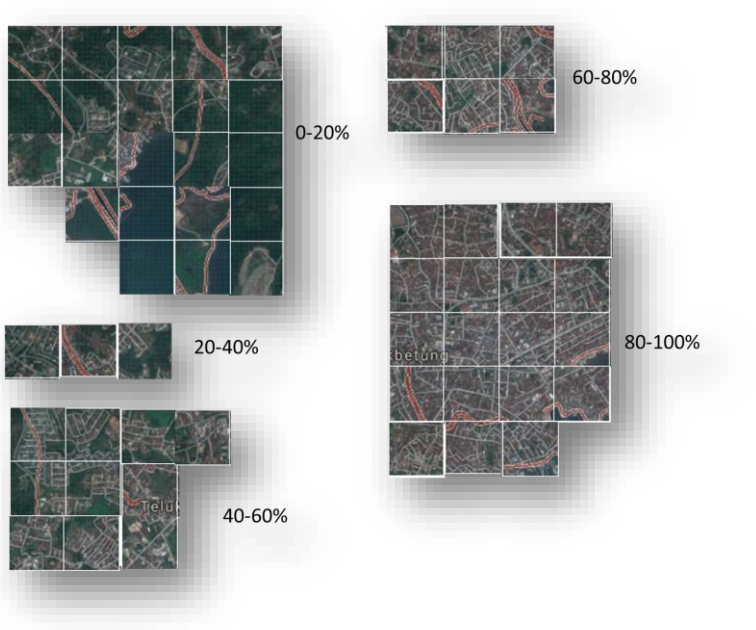


Fig 60 Space that has the same proportion of awakening is included in the same group

Source: author

The categoryzation is expected to help us understand the changes in the shape of the urban fabric. So, we change the analysis of the urban fabric into quantitative analysis. Thus, we can see quantitative changes in form in 1980 to 2010. These changes can be caused by various things. However, this research limits its study of changes caused by population growth and population density. The author limits it because there are many parameters for analyzing or guessing the causes of changes in shape from an city factory.

Therefore, the authors chose these two parameters to streamline research and deepen the issues to be achieved. The results that the authors get from the grouping of spaces performed on all cities indicate that there is a tendency that the shape of space has undergone a fairly drastic change in several cities in all categories. Nevertheless, there are still cities that experience minor changes in all categories. This shows that changes in the shape of space experience dynamics in line with changes in population growth that occur in each city. The author continues to hypothesize that changes in population growth have an influence on changes in the shape of space. The large or small changes in the shape of space are greatly influenced by many things, but one of them is influenced by changes in population growth that occur in the city.

6.1.4 Categoryze of similar pattern

Grouping is done by looking at the number of blocks filled. The author divides the 5 categoryes of urban fabric. The five categoryes:

- Category 1: 0-20 blocks filled = 0-20%
- Category 2: 21-40 blocks filled = 21-40%
- Categaori 3: 41-60 blocks filled = 41-60%
- Category 4: 61-80 blocks filled = 61-80%
- Category 5: 81-100 blocks filled = 81-100%

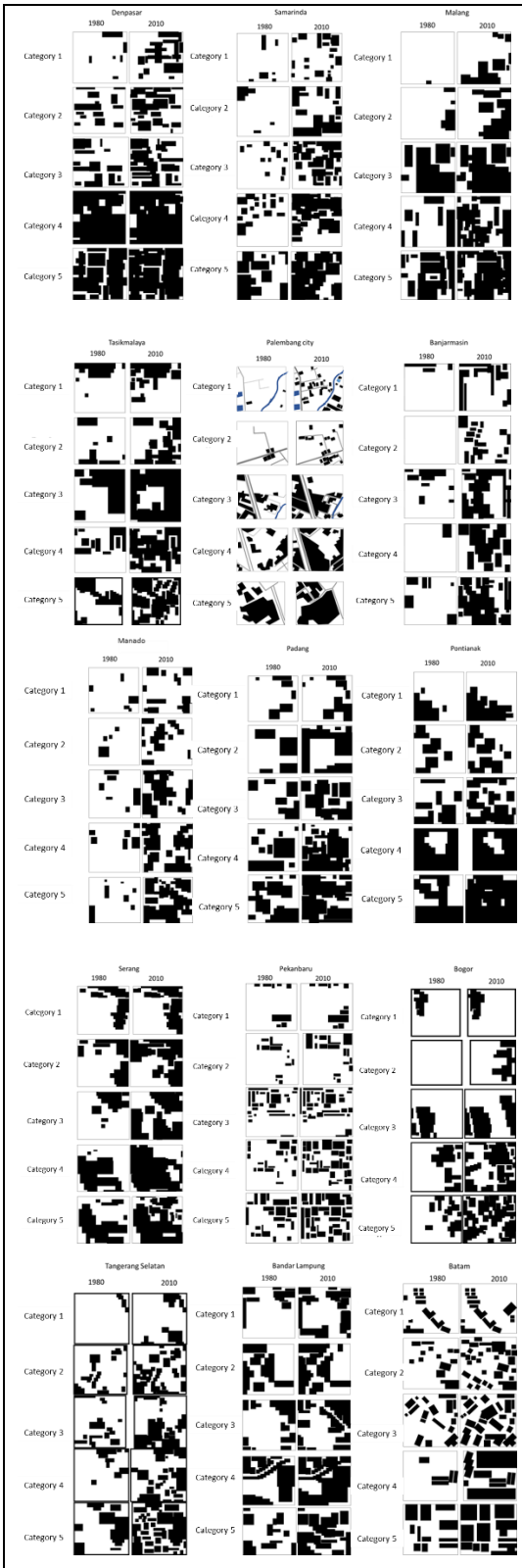
The author grouped images based on the categoryzation of land built and not yet built. The author gets a number of different blocks between one category and another. Then in each category, the writer takes a block of space which has the highest proportion of built-up space (2010). From this picture, the author draws in 1980 using data owned by local government and national government. The author wants to know the changes in the shape of urban fabric in 1980 and 2010. The change will reflect the conditions and situations in the form of city space in certain blocks that are considered to represent changes in other forms of city space. Because the block has been chosen from the most block shapes. To be more clear, can be seen in the picture after this which will show the dynamics of changes in the shape of the urban fabric. The changes are very interesting and there are cities that have urban fabric changing rapidly but there are also those that fall into groups that change slowly. This change after change is compared with population changes in two forms, namely the overall population and population density.

It is hoped that this method will provide an overview of changes in urban fabric and its relation to population changes. In carrying out calculations as material to carry out this quantitative analysis, the author is faced with so many challenges that must be faced. The author must be very detailed and careful in carrying out calculations because not all images are very clear in the form of space. Therefore the author must do it gradually to get results that are close to the actual conditions. The author must acknowledge that the results obtained from the analysis have not exactly matched what happened in the field, or the same as what happened in the field in each city. Because the author is dealing with the results of photographs that do not all show the exact shape of the space. But the author uses this process as a step to get quantitative calculations of all forms of space that are changing. This process certainly has advantages and disadvantages, but will still produce the correct analysis. For future research, it can use new technology, so that it can produce quantitative calculations that are more precise.

6.1.5 Results of identification of pattern

All forms of urban fabric in accordance with the highest results in each category can be seen in the following figures. The results of spatial analysis in 1980 and 2010 showed relatively dynamic conditions. The development of city space is always a surprise when we read the development from the side of the city space. Dynamic development is very varied between one city and another city. But the impact is the same which shows the development of the city, showing the existence of several factors that cause city space to grow rapidly or change rapidly. There are many ways to do an analysis of this actions. One of them is to see the changes quantitatively. Changes in the shape of space shown by urban fabric are visual changes. And the shape of the space in the urban fabric will always be different in each city and in every place. Therefore, to analyze changes in space, we must use

quantitative methods. This method is done to find out how much change in space has been previously shown visually by the image of the urban fabric.



Denpasar: changes in the shape of space occur in the category 1,2,3. For other categories because it has been dense since the 1980s, there have been no significant changes.

Samarinda: changes in space occur in all categories. Cities are increasingly filled with buildings and spaces formed randomly, there is no spatial control.

Malang: the old city is growing bigger and bigger. So that there is a change in the function of land in areas 1 and 2. Population growth has a big influence on land use change.

Tasikmalaya: there was no significant change in form in all categories.

Palembang: there is no significant change in land despite changes in the shape of space by buildings. Land ownership has an influence on changes in urban land.

Banjarmasin: population growth has a major influence on changes in the shape of space by buildings. The physical condition of the city changes.

Manado: major changes occur in city space. Population growth increases housing needs and that changes the shape of urban space.

Padang: there are changes but not too big. The shape of the space already exists and only the development of space occurs

Pontianak: there were additional buildings that changed the shape of the city space. Changes occur in all categories but are regional development with new buildings with various functions.

Serang: as an industrial city and has long been formed, city space has not experienced significant changes. Because the shape of the space has been around for a long time. Development just happened.

Pekan Baru: There were significant changes in categories 1,2 and 4.

Bogor: changes occur in categories 2 and 3. Changes occur very significantly and have an influence on the shape of urban space

Tangerang Selatan: there have been significant changes in activities 1 and 4. As an old city, the form of space has been formed.

Bandar Lampung: There were no significant changes in all spaces. All categories have been formed but only development has occurred.

Batam: there is a change in the shape of space in category 4. Proximity to the center of economic activity has an influence on changes in the shape of urban space in the category.

Fig 61 Form of urban fabric in all cities on all categories

Source: author

6.2 Quantitative analysis of urban fabric

After we see the form of urban fabric through images, using block calculation data that forms the urban fabric, the writer can calculate the percentage value of changes in the built-up space in each city with a predetermined category. Hasil perhitungan dapat dilihat pada tabel di bawah ini. Perubahan ruang secara kuantitatif menunjukkan kecenderungan yang sangat dinamis. Beberapa kota mengalami perubahan besar pada kategori tertentu, terutama pada kategori 1 dan 2 yang merupakan kategori ruang yang masih belum padat oleh bangunan. Sehingga perubahan sebesar apapun yang terjadi pada dua kategori ini akan memberikan perubahan besar secara kuantitatif. Tetapi ada juga beberapa kota yang menunjukkan perubahan pada kategori 3 dan 4. Kota yang mengalami perubahan pada kategori ini adalah kota yang memiliki ukuran kota yang kecil tetapi berhadapan dengan pertumbuhan populasi yang sangat tinggi. Sehingga, semua ruang kota yang dekat dengan pusat kota sebagai pusat ekonomi dan bisnis serta pemerintahan, anne-marie di lokasi utama yang dibangun untuk memenuhi kebutuhan masyarakat terhadap berbagai jenis bangunan seperti permukiman, perkantoran, pasar, dan fasilitas sosial lainnya.

Table 39 The evolution of urban fabric changes

Evolution of urban fabric in 15 cities on Indonesia (1980-2010)

City	Build up land 0%-20%		Build up land 20%-40%		Build up land 40%-60%		Build up land 60%-80%		Build up land 80%-100%	
	1980	2010	1980	2010	1980	2010	1980	2010	1980	2010
Palembang	7.60	18.30	5.30	21.20	27.50	49.40	22.70	63.50	67.50	82.40
Tangerang Selatan	6.20	19.80	19.60	36.40	13.70	42.60	18.90	61.40	32.50	81.60
Bogor	10.60	14.40	0.00	22.40	22.50	58.50	28.70	66.40	27.60	81.50
Batam	12.20	17.90	9.50	29.60	27.50	51.60	12.60	68.50	46.70	82.50
Pekanbaru	12.50	15.60	8.70	22.50	28.60	45.70	21.50	62.50	38.40	80.50
Bandar Lampung	10.80	19.90	22.50	37.60	31.40	56.50	53.60	74.50	28.50	80.30
Padang	9.70	15.40	26.40	39.70	26.10	52.20	47.60	71.50	48.60	87.50
Malang	1.40	18.70	8.10	31.20	51.50	59.80	27.50	65.60	64.50	88.60
Denpasar	4.70	14.80	19.60	35.40	34.80	52.70	71.50	78.60	84.50	92.50
Samarinda	5.30	12.60	10.80	37.50	5.20	48.60	18.90	64.50	51.40	84.60
Tasikmalaya	13.20	19.40	16.60	33.60	48.70	59.50	28.50	66.60	46.50	84.50
Banjarmasin	3.30	17.40	0.00	26.50	11.50	54.50	6.50	67.60	31.20	82.60
Serang	11.60	19.70	26.30	38.40	21.40	52.60	38.60	71.40	42.60	84.50
Manado	4.60	12.40	6.40	28.40	9.20	49.60	14.70	65.50	8.30	87.60
Pontianak	11.90	19.80	27.40	31.30	28.50	57.40	71.40	79.60	75.50	93.70

Source: author

Furthermore, the data above will be used to see changes in each category. We will explore the city that has the biggest and smallest changes in each category and do a macro analysis to see the cause of the change.

6.2.1 Category 1

For category 1 there was a big change in Malang. Malang experienced changes up to 17.3 points or grew 12.36%. Meanwhile, Pekanbaru became the city with the lowest change, which was only 3.1 points or grew by 0.25%. Malang is a city that has the biggest change in category 1. Malang is an education city that is currently being developed into a city of tourism and trade. This city is located in East Java, which is the region with the highest population on a provincial scale. Malang also has surrounding satellite cities such as Batu City which has developed into a tourism industry city. This condition creates an attraction for the people to live in a poor city that has various advantages, which can provide facilities for a better life for its citizens. Meanwhile, there are many investors who enter this city that have an influence on the increasing number of physical developments. This is what gives effect to changes in urban fabric space. Meanwhile, Pekanbaru is a city that has the smallest change in category 1. Pekanbaru is in Riau province which is the province that produces the largest production

of forest products and mines in Sumatra. Pekanbaru has a relatively large city size but simultaneously has a relatively low population.

Table 40 Changes in land are constructed by forming urban fabric category 1

CITY	BUILD UP LAND 0%-20%		CHANGE	GROWTH
	1980	2010		
Palembang	7.60	18.30	10.70	1.41
Tangerang Selatan	6.20	19.80	13.60	2.19
Bogor	10.60	14.40	3.80	0.36
Batam	12.20	17.90	5.70	0.47
Pekanbaru	12.50	15.60	3.10	0.25
Bandar Lampung	10.80	19.90	9.10	0.84
Padang	9.70	15.40	5.70	0.59
Malang	1.40	18.70	17.30	12.36
Denpasar	4.70	14.80	10.10	2.15
Samarinda	5.30	12.60	7.30	1.38
Tasikmalaya	13.20	19.40	6.20	0.47
Banjarmasin	3.30	17.40	14.10	4.27
Serang	11.60	19.70	8.10	0.70
Manado	4.60	12.40	7.80	1.70
Pontianak	11.90	19.80	7.90	0.66
Average	**8.37**	**17.07**	**8.70**	**1.99**

Source: author

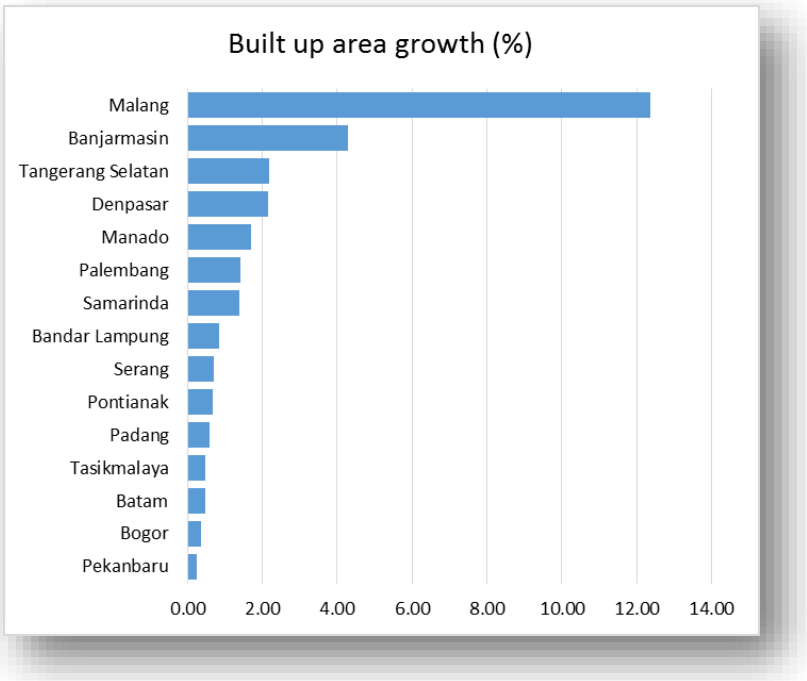


Fig 62 Land growth is built in category 1 (%)

Source: author

We can see sequentially from cities that have the highest to lowest changes, Malang, Banjarmasin, South Tangerang, Denpasar and so on, up to 3 cities with the smallest change in category 1, namely Batam, Bogor and Pekanbaru. For more details, we can see changes in all cities for category 1 in the picture. Each city will have a background on each change in category 1. In the next section we will look at the visual changes in urban fabric in this category. After before, we saw these changes in a macro and quantitative manner.

If we see visually the changes in urban fabric in each city, indeed this picture shows a change in the use of space. And, how many cities experienced small changes but there were also cities that experienced major changes. Malang as the city that experienced the biggest change, the picture visually showed the change. Indeed there is a very large change in this category 1 in the city of Malang. Meanwhile Pekanbaru visually shows small changes. Previously there was a quantitative analysis related to this. Quantitative and visual analysis provides us with a more comprehensive understanding of the patterns of spatial change.

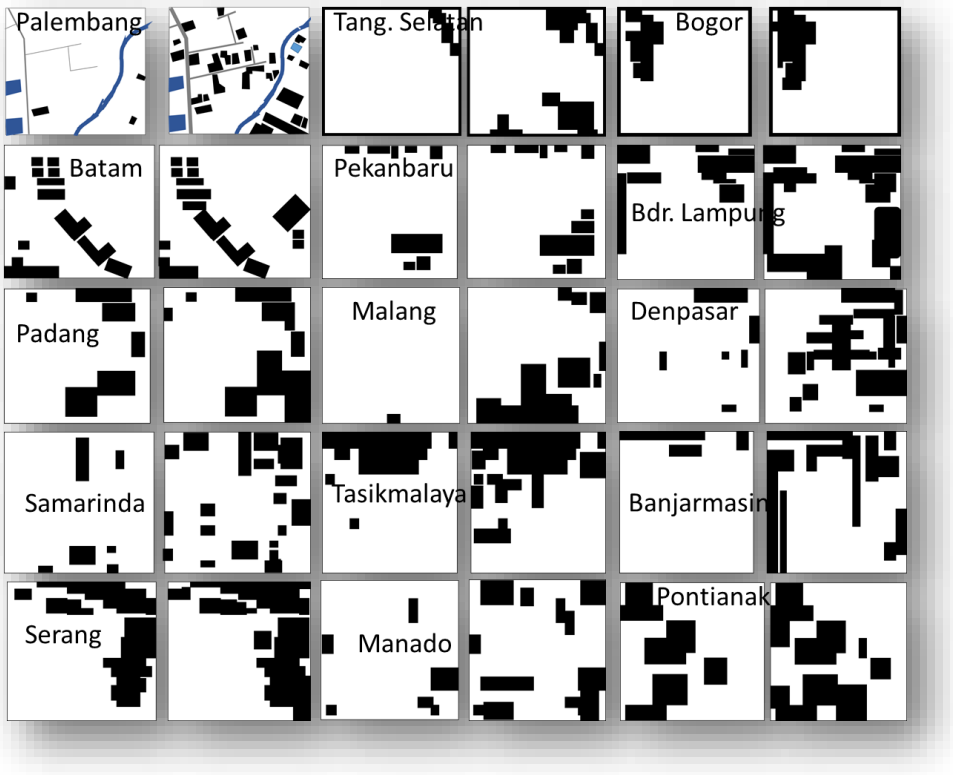


Fig 63 Changes in the form of urban fabric category 1

Source: author

Other cities also experience changes as shown in the quantitative analysis in the previous graph. Visually, we can see the changes that occur in all cities that are the object of this research. Two other cities that experienced major changes were Banjarmasin and Tangerang Selatan. But the changes compared to the poor are not comparable to the changes that occur in the poor. Changes in other cities are relatively far compared to changes in other cities, in this case, the city of Banjarmasin and Tangerang Selatan. We can see these changes visually in the picture above.

6.2.2 Category 2

For category 2 the biggest change occurred in Banjarmasin, which reached 26.50 change points or grew up to 26.5 times compared to the previous conditions. Meanwhile for category 2 with the lowest change occurring in Pontianak, the change was only 3.9 points or with a growth of 0.14. For category 2, banjarmasin is the city with the biggest change. Banjarmasin is indeed on the island of Kalimantan. Banjarmasin has a large infrastructure such as an international airport and indeed has long been used as a liaison city between the cities on the island of Kalimantan and other cities on other islands. Because of its function as a connecting city, Banjarmasin became a city that developed quite rapidly. Changes in space occur quickly too because there are many investors and people who invest the money they have to build property or other buildings. And this has an effect on changes in the urban fabric space which are shown quantitatively in the table below. Interestingly, the city with the smallest change in category 2 is Pontianak. Pontianak is a city that is also located on the island of Kalimantan. But indeed its position is very far from other cities. The city was formed from immigrant communities who came from various countries. For changes in category 2, there are three cities faced with changes in the physical space of the largest cities, namely Banjarmasin, Bogor, and Manado. And three cities with the smallest changes are Pontianak, Serang and Padang.

Table 41 Changes in land are constructed by forming urban fabric category 2

CITY	BUILD UP LAND 20%-40%		CHANGE	GROWTH
	1980	2010		
Palembang	5.30	21.20	15.90	3.00
Tangerang Selatan	19.60	36.40	16.80	0.86
Bogor	0.00	22.40	22.40	22.40
Batam	9.50	29.60	20.10	2.12
Pekanbaru	8.70	22.50	13.80	1.59
Bandar Lampung	22.50	37.60	15.10	0.67
Padang	26.40	39.70	13.30	0.50
Malang	8.10	31.20	23.10	2.85
Denpasar	19.60	35.40	15.80	0.81
Samarinda	10.80	37.50	26.70	2.47
Tasikmalaya	16.60	33.60	17.00	1.02
Banjarmasin	0.00	26.50	26.50	26.50
Serang	26.30	38.40	12.10	0.46
Manado	6.40	28.40	22.00	3.44
Pontianak	27.40	31.30	3.90	0.14
Average	**13.81**	**31.45**	**17.63**	**1.28**

Source: author

In the category 2 section, there are two cities that have almost the same space change growth, namely Banjarmasin and Bogor. These two cities experienced considerable changes in category 2 which caused the physical form of space in the Urban fabric in both cities to undergo very basic changes. In the section after this, we will see changes in space visually, which shows clearly related to changes in space that occur in the cities of the object of research. For the cities of Pontianak, Serang, and Padang, all three experienced very small changes in Urban Fabric category 2.

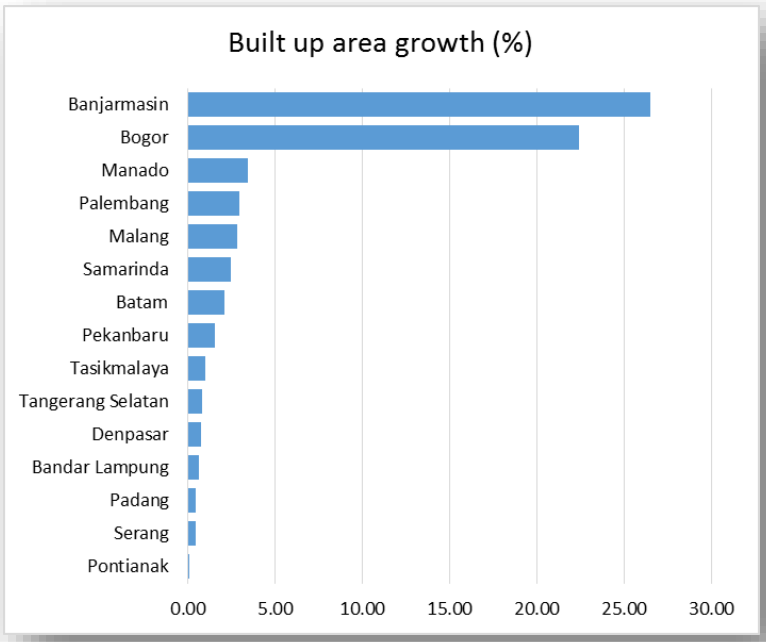


Fig 64 Land growth is built in category 2 (%)

Source: author

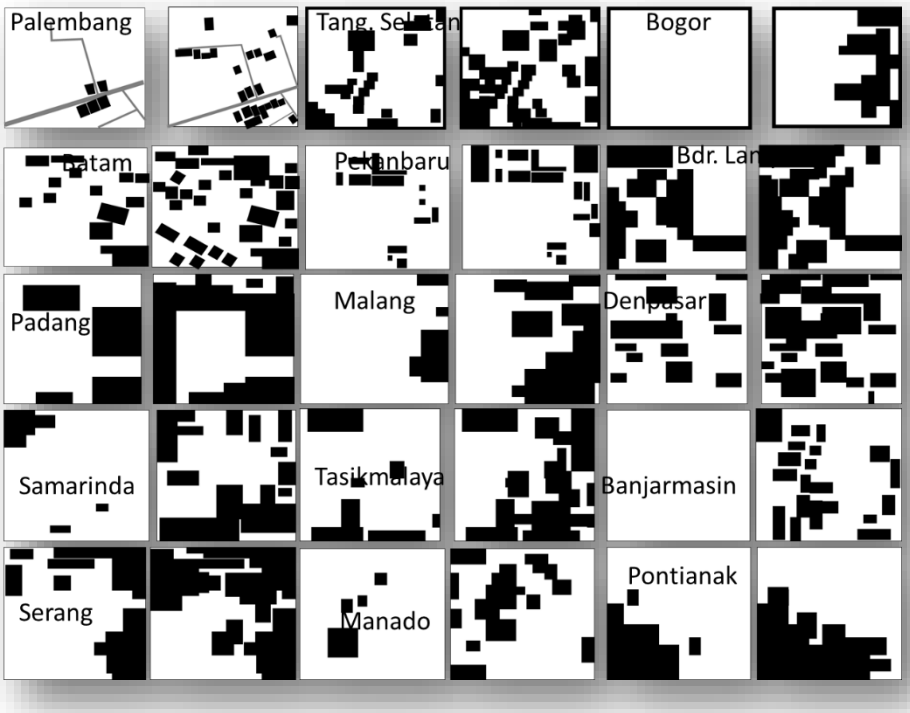


Fig 65 Changes in the form of urban fabric category 2

Source: author

The figure below shows clearly the changes in space that occur in all cities. Bogor, Banjarmasin in, Malang, and Pekanbaru becoming cities visually seem to experience very big changes. Followed by Banjarmasin Tasikmalaya and Samarinda. Almost all cities experience changes in category 2. But as mentioned earlier, there are cities that have major changes and there are also cities that experience minor changes. Quantitatively we have done the calculation and visually we have shown the changes. Changes in category 2 show that population growth has an influence on changes in urban fabric space in the city which is the object of research.

Space change In category 2 shows that changes in Urban Febri space also occur in blocks of areas that have relatively many buildings. This indicates that space development can occur anywhere. Although in this category 2 the price of land is more expensive than land in Category 1. Because the excess land in category 2 is already flanked by buildings. So, this land is no longer a new land. But the land is ready to use because there are many buildings around it and that indicates that there is a lot of infrastructures already built in the area. And this has an effect on land prices. But the development and change of function of land into building land also occurs in this category 2. This shows that population growth creates pressure on land changes everywhere.

6.2.3 Category 3

For category 3, the biggest change occurred in Samarinda. The city changed 43.4 points and grew 8.35 times compared to the previous size. Malang is the city with the lowest change in category 3 which is 8.30 points with a change of 0.16 times from the previous condition. Samarinda became a city that experienced major changes in the shape of Urban fabric space in category 3. Samarinda is one of the cities in Kalimantan. Kalimantan is known as an island that still has a small population. But there were major changes in the cities of Kalimantan, one of which was Samarinda.

Table 42 Changes in land are constructed by forming urban fabric category 3

CITY	BUILD UP LAND 40%-60%		CHANGE	GROWTH
	1980	2010		
Palembang	27.50	49.40	21.90	0.80
Tangerang Selatan	13.70	42.60	28.90	2.11
Bogor	22.50	58.50	36.00	1.60
Batam	27.50	51.60	24.10	0.88
Pekanbaru	28.60	45.70	17.10	0.60
Bandar Lampung	31.40	56.50	25.10	0.80
Padang	26.10	52.20	26.10	1.00
Malang	51.50	59.80	8.30	0.16
Denpasar	34.80	52.70	17.90	0.51
Samarinda	5.20	48.60	43.40	8.35
Tasikmalaya	48.70	59.50	10.80	0.22
Banjarmasin	11.50	54.50	43.00	3.74
Serang	21.40	52.60	31.20	1.46
Manado	9.20	49.60	40.40	4.39
Pontianak	28.50	57.40	28.90	1.01
Average	**25.87**	**52.75**	**26.87**	**1.04**

Source: author

Population growth that occurs in this city has a major influence on changes in the shape of Urban fabric space in category 3. Category 3 is a category that shows the population of buildings in the range 41-60 of the total area within the block. So, even though the area in category 3 has been filled with buildings and the price of the land has also been expensive, the consumption of materials to be used as buildings in various forms still continues to occur in this city. It also occurs in other cities. Manado, Banjarmasin, and South Tangerang became cities that also experienced major changes. For category 3, the three cities with the biggest changes were Samarinda, Manado and Banjarmasin. For the three cities with the lowest change are Malang, Tasikmalaya and Denpasar. All cities experienced changes in category 3. In fact, the authors could say that there was a tendency for all cities to experience major changes. Except for the other two cities, namely Malang and Tasikmalaya. These two cities experienced not big changes in category 3 when compared to the changes that occurred in other cities.

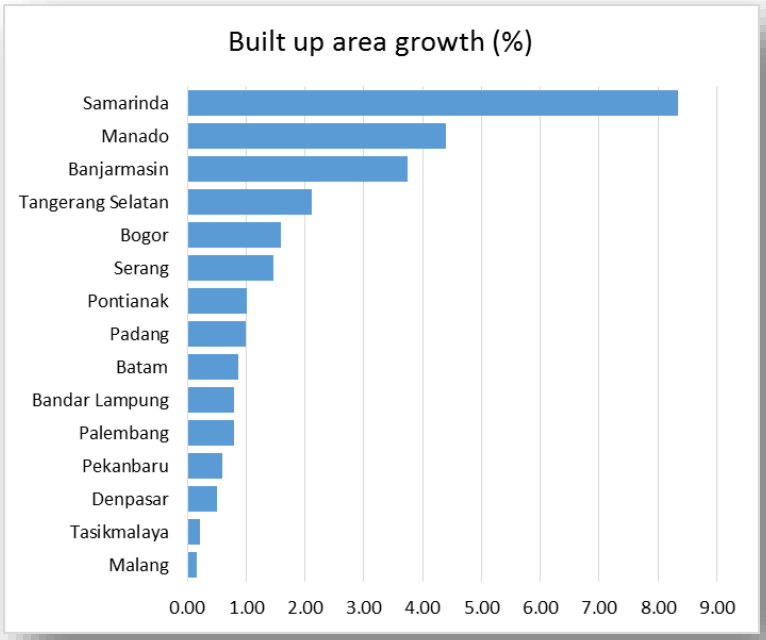


Fig 66 Land growth is built in category 3 (%)
Source: author

In the next section, we will see the changes in the Urban fabric space visually. So, we can see the changes in the physical shape of the urban fabric space in 15 cities that are the object of research. The number of buildings in the blocks included in category 3 is relatively large. So that changes in the urban fabric space visually must be viewed carefully. This visual change of space provides confirmation related to changes in quantitative data carried out previously. And we can see very large changes in several cities that have been discussed and mentioned before. We can guess that changes in urban fabric space that occur in category 3 tend to occur in cities that have just undergone changes. They changed from cities that experienced slow development to become cities that experienced rapid development. Population growth is one of the factors that influence the rapid change. But, as previously discussed, population growth tends to be caused by economic factors. And this is supported by an increase in the welfare of the local community which then has an influence on the high needs of settlements and other buildings that encourage changes in the shape of the Urban fabric space. The size of land in category 3 is smaller than the size of land in Category 1 and 2.

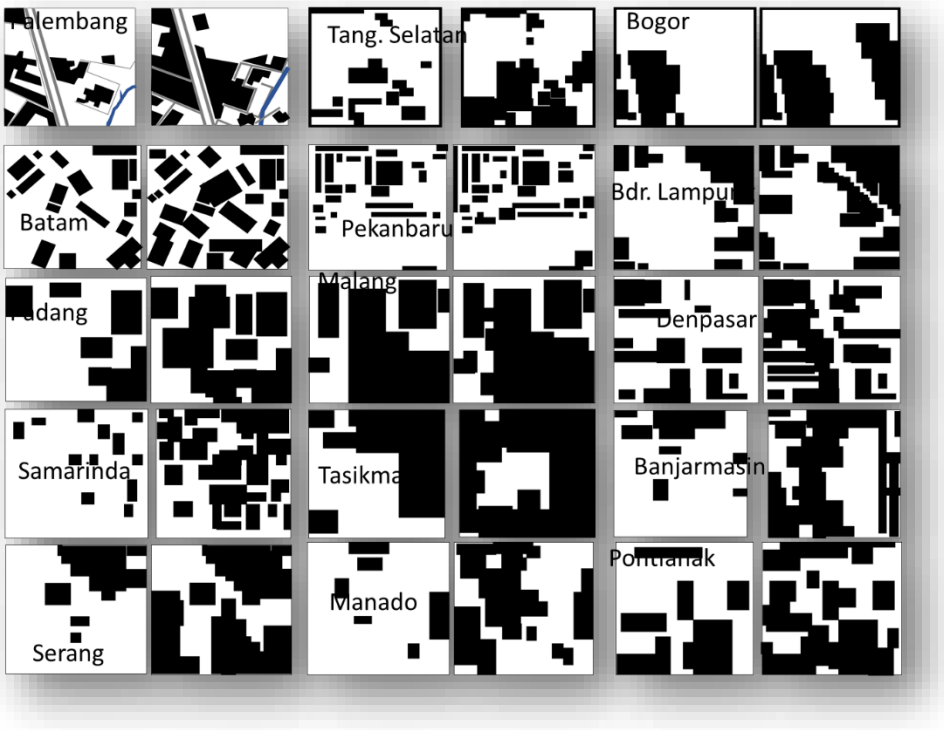


Fig 67 Changes in the form of urban fabric category 3

Source: author

The price of the land is also higher than in the category below. But it turned out that there was a big change in the block area included in category 3. This indicates that the community's needs for certain buildings located in category 3 are very high. And the community has the ability to buy or finance the development. This condition shows that there is a fairly close relationship between land use, population growth, population and income that is increasing. Collaboration between these factors puts pressure on changes in the shape of urban fabric space in category 3. And the authors estimate that in other higher categories there will be changes caused by the high income of the community and the needs of the community for certain buildings.

6.2.4 Category 4

For category 4, the city with the biggest change is Banjarmasin, which is 61.1 points with a growth of 9.4 times than before. While Denpasar is the city with the lowest change of 7.1 with a growth of 0.1 times from the previous condition. In category 4 there was a big change in Banjarmasin. The city is again a city that has undergone major changes. This is due to the progress experienced by Banjarmasin. Banjarmasin has developed into a new trading and industrial city in Kalimantan. Meanwhile, Denpasar became the city that experienced the smallest change in category 4. This is understandable because Denpasar is a city of tourism and culture that already has a definite form of space.

Because Denpasar has many hotels and trade centers, especially on the blog area in category 4. Thus, changes in Urban fabric space are very low. Because the remaining land is a yard from an existing building. But that does not mean that all cities have a tendency to use space as experienced by Denpasar. Existing data shows that the majority of cities that are the object of this study experienced a major change in the existence of urban fabric category 4. For category 4, three cities that faced major

changes were Banjarmasin, Batam and Bogor. Meanwhile, the three cities that faced the lowest changes were Denpasar, Pontianak, and Bandar Lampung. There are 13 cities experiencing major changes outside of the small changes faced by Denpasar and Pontianak. The 13 cities faced with the phenomenon of increasingly intensive land use in spaces that had been filled with buildings. But still experiencing changes in the shape of the Urban fabric space due to development in the area categorized as 4.

Table 43 Changes in land are constructed by forming urban fabric category 4

CITY	BUILD UP LAND 60%-80%		CHANGE	GROWTH
	1980	2010		
Palembang	22.70	63.50	40.80	1.80
Tangerang Selatan	18.90	61.40	42.50	2.25
Bogor	28.70	66.40	37.70	1.31
Batam	12.60	68.50	55.90	4.44
Pekanbaru	21.50	62.50	41.00	1.91
Bandar Lampung	53.60	74.50	20.90	0.39
Padang	47.60	71.50	23.90	0.50
Malang	27.50	65.60	38.10	1.39
Denpasar	71.50	78.60	7.10	0.10
Samarinda	18.90	64.50	45.60	2.41
Tasikmalaya	28.50	66.60	38.10	1.34
Banjarmasin	6.50	67.60	61.10	9.40
Serang	38.60	71.40	32.80	0.85
Manado	14.70	65.50	50.80	3.46
Pontianak	71.40	79.60	8.20	0.11
Average	**32.21**	**68.51**	**36.30**	**1.13**

Source: author

This indicates that the ability of the community to buy and utilize buildings in category 4 is very high. Because, the land in urban Febri category 4 is very small, so it has a very expensive price. But development still occurs in this category 4 urban fabric area. This means that the economic capacity of the community and the high demand of the community for buildings in the Urban Febri category 4 are very high. Buildings built in the category 4 urban fabric area are built by the community, entrepreneurs or investors, or even the government. Because, as the writer stated earlier, the price of land in the category 4 Urban fabric area is already very high. And the high development in category 4 urban fabric shows that the city center is increasingly full of buildings. It should be noted that almost all regional blogs included in categories 4 and 5 are blocks of areas close to the city center which are the center of economy and business as well as the government office.

When there is a higher development in category 4 Urban fabric space, it can only indicate that the Compact development model is in process in that city. But the author did not assess whether the city was in a complex category or not. Because related to this matter needs further research and not become part of this research. We can see visual changes in other parts. Visually we can see that there are several cities that have experienced major changes and this can be seen visually besides using quantitative data that can be seen in the previous section.

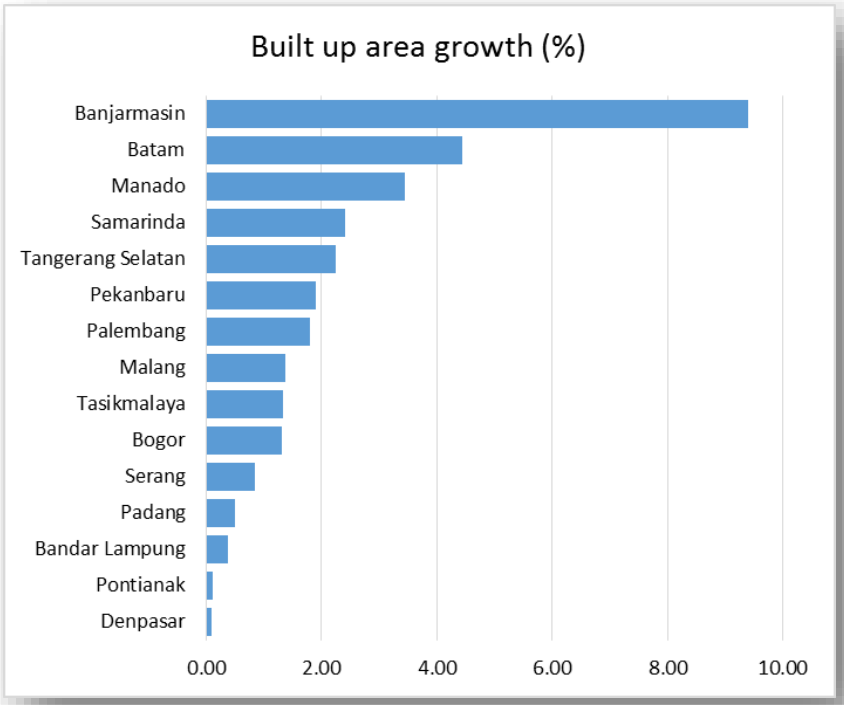


Fig 68 Land growth is built in category 4 (%)

Source: author

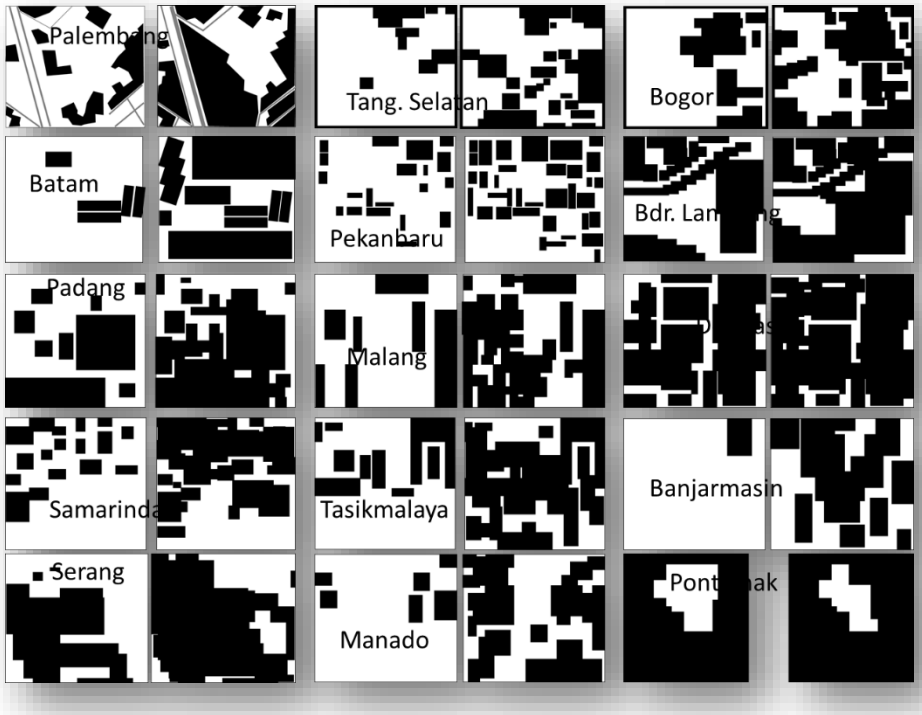


Fig 69 Changes in the form of urban fabric category 4

Source: author

Visually we can see that Batam, South Tangerang, Manado, Bogor, and Banjarmasin are cities that visually show very real and very large changes. This condition shows that there are several cities that experienced major changes in category 4 and there were also cities that did not experience major changes but still faced changes in the shape of space. In the next section we will look at changes in the shape of the Urban fabric space that occurs in category 5. This discussion of changes in category five will be the culmination of a discussion of changes in the shape of space.

6.2.5 Category 5

For category 5, the city that faces the biggest change is Manado, with a change of 79.3 or growing 9.55 times from the previous condition. For the city with the lowest change is Denpasar with a change of 8 points or growing 0.09 times from the previous condition. Changes in the form of urban fabric space in category 5 occur in the city of Manado on a very large scale. When compared with other cities such as Bogor, the difference in change in category 5 is very large. Manado is a city that has the biggest urban fabric changes. Manado is one of the cities that has experienced very rapid development, especially for areas close to the city center and also the center of government. Block areas included in category 5 do tend to be close to the center of government and business centers.

That it has a very high density and building density compared to other areas. Therefore, the changes that occurred in Manado City in category 5 showed that the city was growing into a city that has high economic activities. Population growth that occurred in this city has had an influence on the development of the city center which previously was an area with a low building density into an area that has a high building density. Manado along with several other cities that have growth in urban fabric space changes in category 5 are cities that are proceeding to become quotas with a higher scale of economic activity.

Table 44 Changes in land are constructed by forming urban fabric category 5

CITY	BUILD UP LAND 80%-100%		CHANGE	GROWTH
	1980	**2010**		
Palembang	67.50	82.40	14.90	0.22
Tangerang Selatan	32.50	81.60	49.10	1.51
Bogor	27.60	81.50	53.90	1.95
Batam	46.70	82.50	35.80	0.77
Pekanbaru	38.40	80.50	42.10	1.10
Bandar Lampung	28.50	80.30	51.80	1.82
Padang	48.60	87.50	38.90	0.80
Malang	64.50	88.60	24.10	0.37
Denpasar	84.50	92.50	8.00	0.09
Samarinda	51.40	84.60	33.20	0.65
Tasikmalaya	46.50	84.50	38.00	0.82
Banjarmasin	31.20	82.60	51.40	1.65
Serang	42.60	84.50	41.90	0.98
Manado	8.30	87.60	79.30	9.55
Pontianak	75.50	93.70	18.20	0.24
Average	**46.29**	**84.99**	**38.71**	**0.84**

Source: author

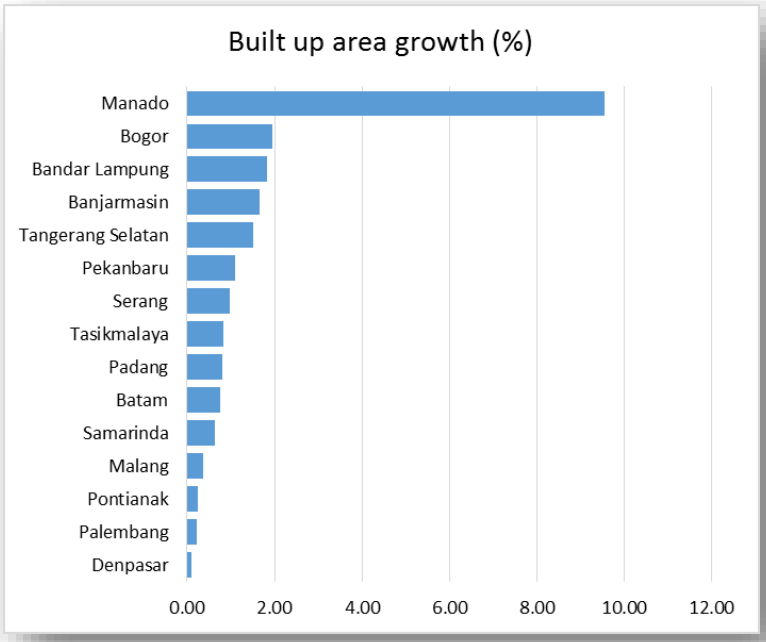


Fig 70 Land growth is built in category 5 (%)

Source: author

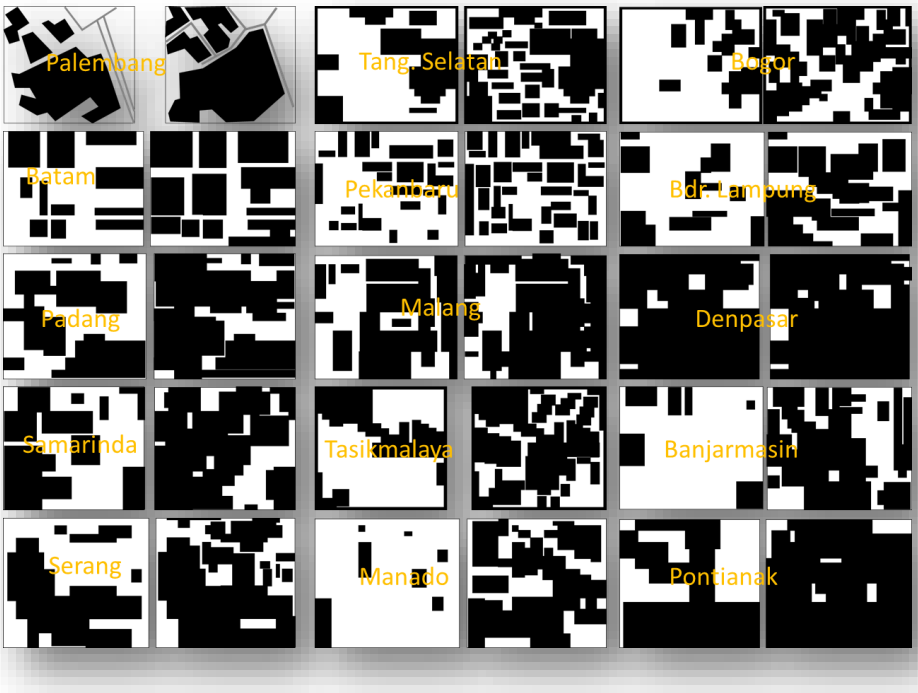


Fig 71 Changes in the form of urban fabric category 5

Source: author

Because development in the city center tends to be the construction of centers of economic activities such as markets, shopping centers, malls, and hotels, as well as private apartments and offices. Because the land in category 5 urban fabric is very narrow so the price of land in this location is very expensive. Buildings that are suitable to be built on very expensive land are commercial buildings and

government buildings. For category 5, the three cities that faced the biggest changes were Manado, Bogor and Bandar Lampung. meanwhile, the three cities with the lowest changes were Pontianak, Palembang and Denpasar.

Denpasar is a city with urban fabric changes in the smallest category 5. As previously stated, Denpasar is in Indonesia's tourism center. So the space in category 5 is already very crowded by buildings. If there is still sufficient land and seems open, the land is actually part of a commercial building in that location. Some other cities that have similarities with Denpasar are Palembang, Pontianak, and Malang. They have very high building density in category 5. Meanwhile, other cities have relatively stable changes. That is, changes in the shape of urban fabric space in category 5 in other cities tend to change that fall into the normal category. In another section, we will see changes in the shape of space visually that occur in each city that is the object of this research. The change is a change in category 5 so it takes precision to see changes in the shape of space visually.

Visually we can see that there are some cities that have experienced major changes. We can see this in the condition of the space blocks in 1980 which tend to be quiet from buildings. But in 2010, the building density inside the block of urban fabric was very high. So that the area included in this category 5 seems to have been full of buildings. Visually we can see Manado, Banjarmasin, Bogor and South Tangerang as cities whose changes are very visually clear. This change is of course influenced by various factors. One of these factors is the influence of population growth that occurs in each city.

6.2.6 Summary of quantitative changes in urban fabric pattern

This section shows a data set of cities that experienced the highest and lowest changes in the form of the urban fabric in all categories. In this section, we can find out that there are several cities included in the category of many experiencing changes. Especially changes on the highest scale and on the lowest scale in each category.

Table 45 The evolution of changes in urban fabric shape to maximum and minimum changes

Evolution of urban fabric in 15 cities on Indonesia (1980-2010)

City	Build up land 0%-20%		Build up land 20%-40%		Build up land 40%-60%		Build up land 60%-80%		Build up land 80%-100%	
	1980	2010	1980	2010	1980	2010	1980	2010	1980	2010
Palembang	7.60	18.30	5.30	21.20	27.50	49.40	22.70	63.50	67.50	82.40
Tangerang Selatan	6.20	19.80	19.60	36.40	13.70	42.60	18.90	61.40	32.50	81.60
Bogor	10.60	14.40	0.00	22.40	22.50	58.50	28.70	66.40	27.60	81.50
Batam	12.20	17.90	9.50	29.60	27.50	51.60	12.60	68.50	46.70	82.50
Pekanbaru	12.50	15.60	8.70	22.50	28.60	45.70	21.50	62.50	38.40	80.50
Bandar Lampung	10.80	19.90	22.50	37.60	31.40	56.50	53.60	74.50	28.50	80.30
Padang	9.70	15.40	26.40	39.70	26.10	52.20	47.60	71.50	48.60	87.50
Malang	1.40	18.70	8.10	31.20	51.50	59.80	27.50	65.60	64.50	88.60
Denpasar	4.70	14.80	19.60	35.40	34.80	52.70	71.50	78.60	84.50	92.50
Samarinda	5.30	12.60	10.80	37.50	5.20	48.60	18.90	64.50	51.40	84.60
Tasikmalaya	13.20	19.40	16.60	33.60	48.70	59.50	28.50	66.60	46.50	84.50
Banjarmasin	3.30	17.40	0.00	26.50	11.50	54.50	6.50	67.60	31.20	82.60
Serang	11.60	19.70	26.30	38.40	21.40	52.60	38.60	71.40	42.60	84.50
Manado	4.60	12.40	6.40	28.40	9.20	49.60	14.70	65.50	8.30	87.60
Pontianak	11.90	19.80	27.40	31.30	28.50	57.40	71.40	79.60	75.50	93.70

Source: author

Each city shows different conditions in 1980 with 2010 in all categories. For example, the city of Tasikmalaya and Malang in Category 1. In 1980 Tasikmalaya was a city with the highest density of buildings and Malang was a city with the lowest density of buildings as a form of the urban fabric. But in 2010 there was a change in status. South Tangerang is a city with the highest building density as a form of Urban fabric and Manado is a city with low building density in Category 1. Conditions that occur in cities analyzed for other categories have the same conditions as those in Category 1. Almost no city experienced the same changes and the same position in each category except Malang City

which showed the highest change in category 3. Besides this, there was no longer any similarity in position and building density conditions as forming urban fabric in each city. Different positions in each research year, 1980 and 2010 show that the development of urban space utilization is very dynamic. Urban development planning carried out by the government must refer to situations and conditions that affect the development of the city. Population growth must be viewed comprehensively by the government because it has an effect on changes in the shape of urban space as indicated by the shape of the urban fabric.

6.3 Interaction between population growth and shape change

At this stage, the author will present the results of the analysis relating to population growth and changes in the shape of each urban fabric in all categoryes. The author examines the relationship between these two factors. The results can be seen in the following figures.

6.3.1 Category 1

For category 1, the highest space change occurs in cities with low population growth. This indicates that changes in category 1 are not always related to the growth of the urban population. The population spread to the area with the function of non-building land which later turned into residential land. Changes from non-agricultural land to residential land caused a change in space in large sizes. However, some cities with high population growth do not cause large changes in space.

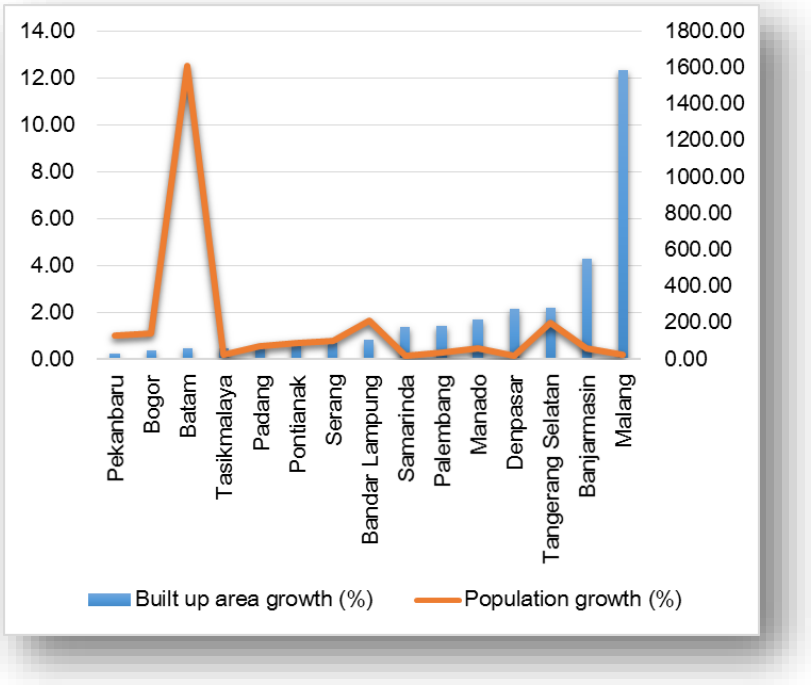


Fig 72 Relationship between population growth and changes in urban fabric category 1

Source: author

6.3.2 Category 2

Category 2 shows conditions that are not much different from the previous category. Although there is a tendency that population growth gives influence to changes in space by buildings. In general, buildings that cause changes in space are residential buildings. Banjarmasin and Bogor as cities with

major changes in category 2 have a high increase in population growth. This picture shows the influence of population growth on changes in the shape of space for buildings in category 2.

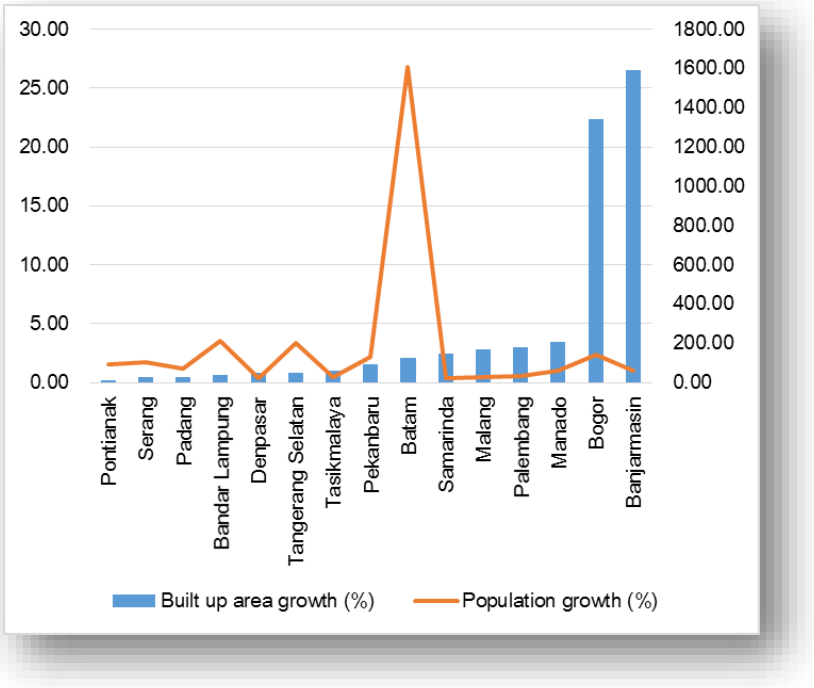


Fig 73 Relationship between population growth and changes in urban fabric category 2

Source: author

The spaces included in categories 1 and 2 are spaces that tend to be far from the city center as a center of economy and government. Therefore the developments that occur in the spaces included in categories 1 and 2 should not be too large. This happens because there is a tendency for the population to choose to live close to the economic center. But interestingly there is an opposite tendency. There is a tendency for populations to grow high in suburban areas. This has implications for the form of urban space that is increasingly congested in the outer part of the city or parts close to the edge of the city. Every district that is included in this zone must adapt to population development that continues to occur all the time.

Meanwhile, the spaces included in categories 3 4 and 5 are spaces that tend to be close to the center of economic activity. Similar to what happens in other categories, namely 1 and 2, space in this category is faced with population growth. So, the authors find conditions in which population growth falls into all categories and changes the shape of the space in each category. This phenomenon shows that population growth influences all things and all levels.

6.3.3 Category 3

For category 3, there is a tendency that is quite interesting to note. The highest space change occurs in cities with low population growth. This indicates that there is a possibility of expansion of land use carried out to meet the internal needs of the existing population. other high factors such as the economy can affect the increase in demand and use of urban land which has an effect on changes in urban space.

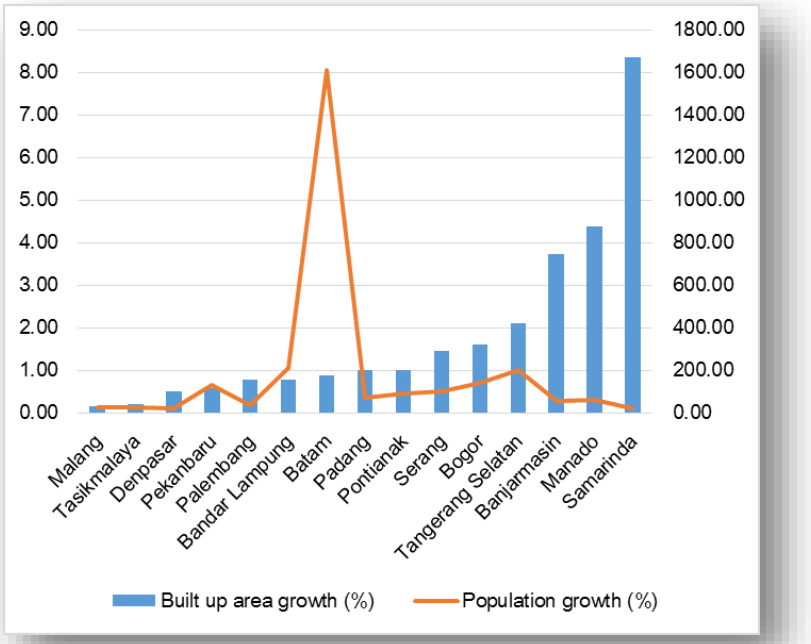


Fig 74 Relationship between population growth and changes in urban fabric category 3

Source: author

6.3.4 Category 4

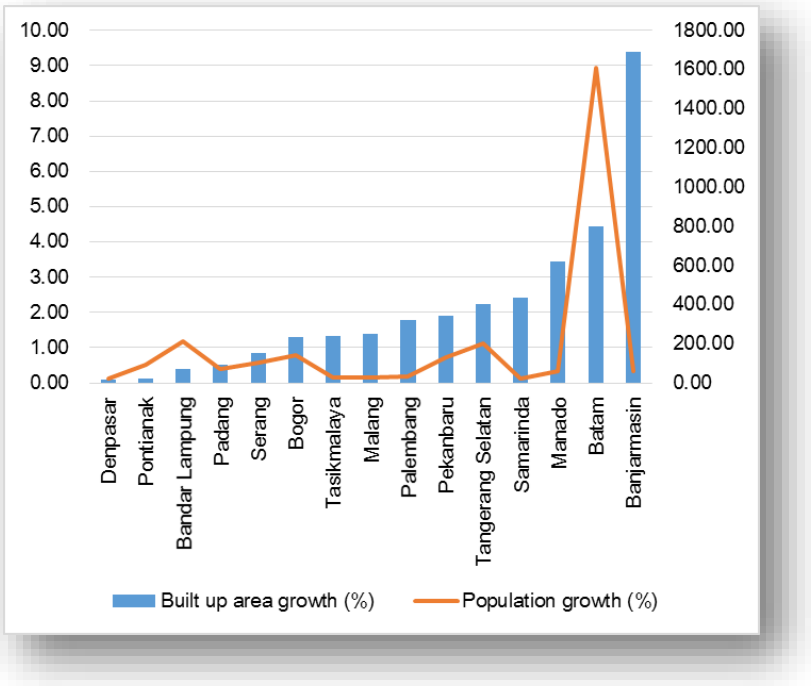


Fig 75 Relationship between population growth and changes in urban fabric category 4

Source: author

Category 4 shows the relationship that is high between population growth and changes in space in this category. High change occurs in cities with population growth. This indicates that there is an

increase in the intensity of urban land use, especially land with the second highest density lecel. This can be categorized as a direct buffer zone in the center of economic activity which is in the next category. This then has an effect on the high changes in space because it becomes a buffer for the surrounding economic activities.

6.3.5 Category 5

For category 5, change is not directly related to population growth. Because, this category already has a very high density of buildings so that the changes will be low. Manado has become the city with the highest city center changes because in general the condition of the city space has not been built on a large scale.

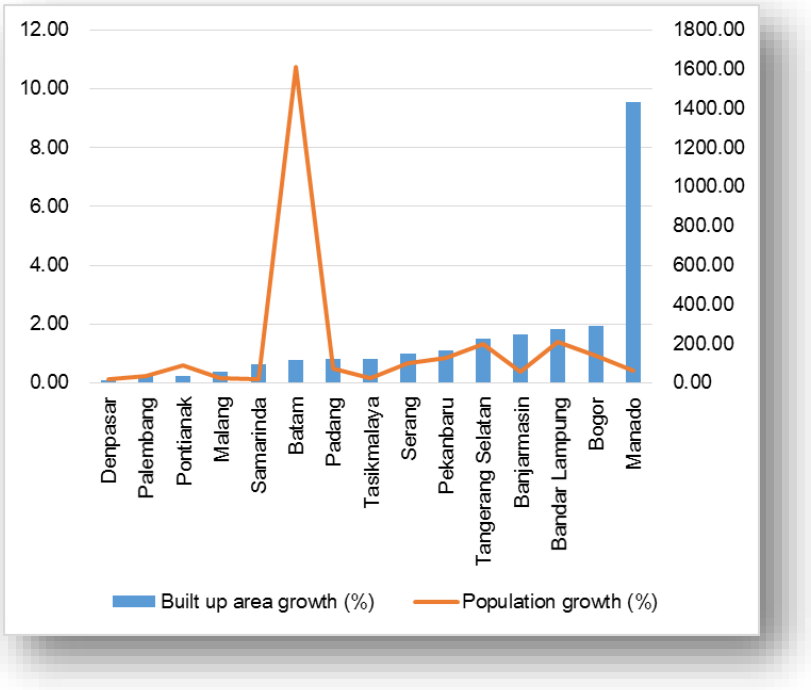


Fig 76 Relationship between population growth and changes in urban fabric category 5

Source: author

In contrast to other cities that already have space conditions with a dense category 5. But in general there is a tendency for spatial utilization to occur on a high scale in cities with high population growth. however, high populations do have an influence on changes in urban space in all categories.

6.4 Interaction between population density and shape change

In this section, the author will show the results of an analysis of the relationship between population density and changes in the shape of urban fabric. Previously we discussed changes in shape caused by population growth. In this section, we will discuss population density, which we will see its influence on changes in urban fabric in each category.

6.4.1 Category 1

For category 1, population density influences changes in urban space. Population density provides knowledge about the number of populations in a particular space scale. So, when the population is

high, there should also be high-scale use of space. This category 1 shows conditions of density and land use in 1980 and 2010. We can see that there are changes in cities with increasing population densities. The condition of space change will be stable when population density begins to stabilize.

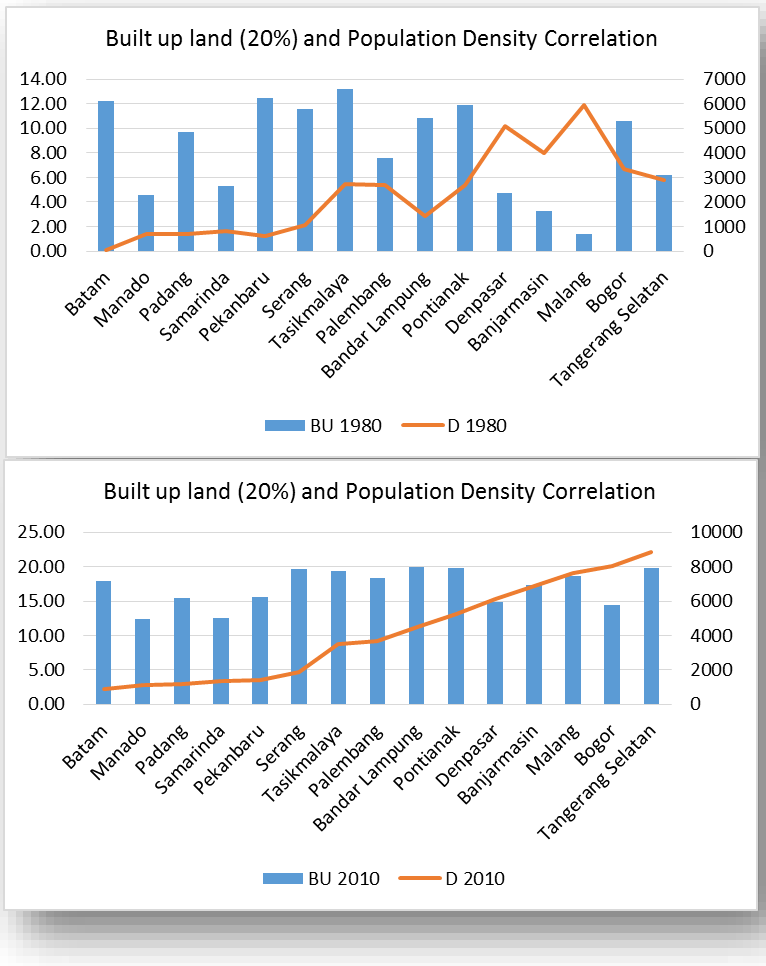


Fig 77 Relationship between population density and changes in urban fabric category 1

Source: author

Population density has an influence on the shape of urban fabric space in Category 1. This occurs when population density has become more stable. When population density has become more stable then automatically changes in the shape of space that occurs in Category 1 also shows an increasingly stable condition. The population density in a zone or urban fabric block does affect each other. Because population density has a correlation with the existence of buildings, especially residential buildings and supporting facilities. If the population density is higher, buildings will emerge and cause the density in space.

6.4.2 Category 2

For category 2, the same conditions also occur in this category. Population density and the intensity of the use of space are still very irregular at the beginning of the study, which is 1980. However, population density gives a bearing on the intensity of land use. When the intensity of land use has touched a stable condition, it also simultaneously shows the condition of population density which has also been stable. But in general changes in land use always occur in cities with high levels of level.

therefore, we can say that population density does have an influence on the intensity of the use of space for buildings that affects the shape of urban space.

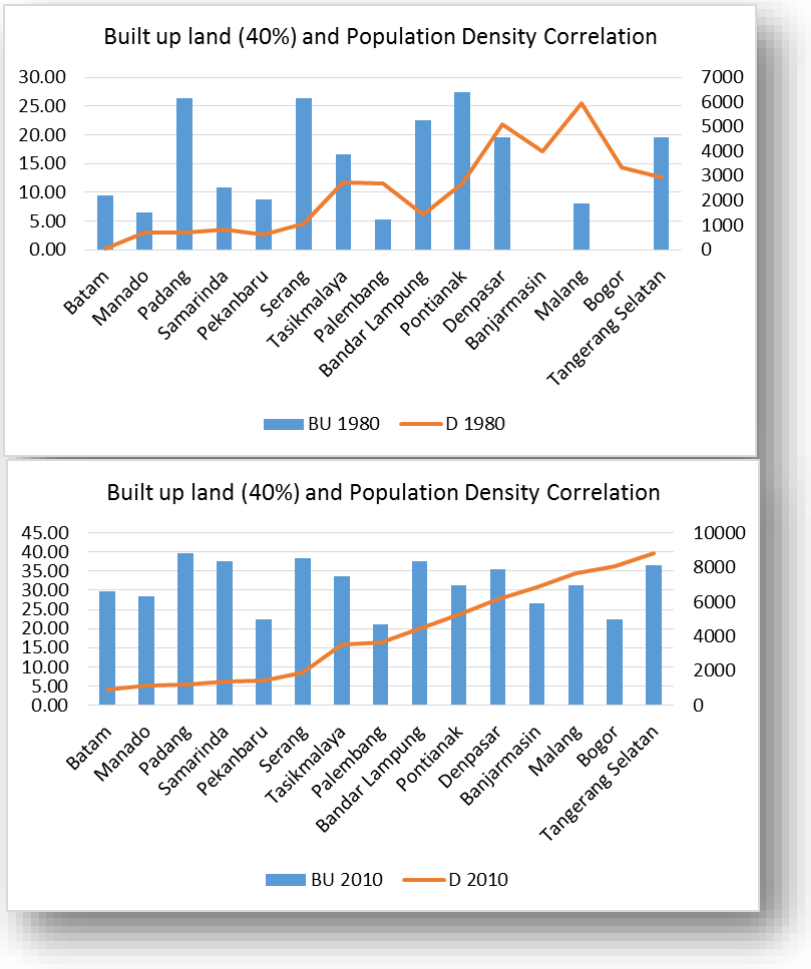


Fig 78 Relationship between population density and changes in urban fabric category 2

Source: author

The population density in Banjarmasin and Bogor, in 1980, did not form the existing space in the city. This is caused by the accumulation of population in a particular space or in a certain residential area because of the inability of the community to own buildings or make permanent buildings as their place of residence. This has an impact on the high level of population density but simultaneously it has no effect on the shape of space. There was no change in the shape of the room at that time. However, in 2010, when the city's economic progress and community welfare increased, the population density in the city had an influence on the existence of new buildings and that changed the shape of space in category 2.

Because population density has an influence on the shape of space. Actually, the relationship between population density and the shape of space is very high. But all indeed depends on the economic situation and conditions in each city. If the community and the government do not have the funds to build settlements and supporting facilities then this will not change the shape of space in all categories. Because many factors can influence the relationship between these two things. The change in the shape of urban space is greatly influenced by city development policies that have been set by the government.

6.4.3 Category 3

For category 3, density influences the intensity of building use. Population density does not directly affect a certain extent, but the population density in this category indicates that the city has a pattern of space use for buildings to be high when population density is also high. several cities at the beginning of the study showed unclear conditions between the density and intensity of space use, then gradually becoming cities with high land use intensity in line with the density of urban populations that are increasingly growing.

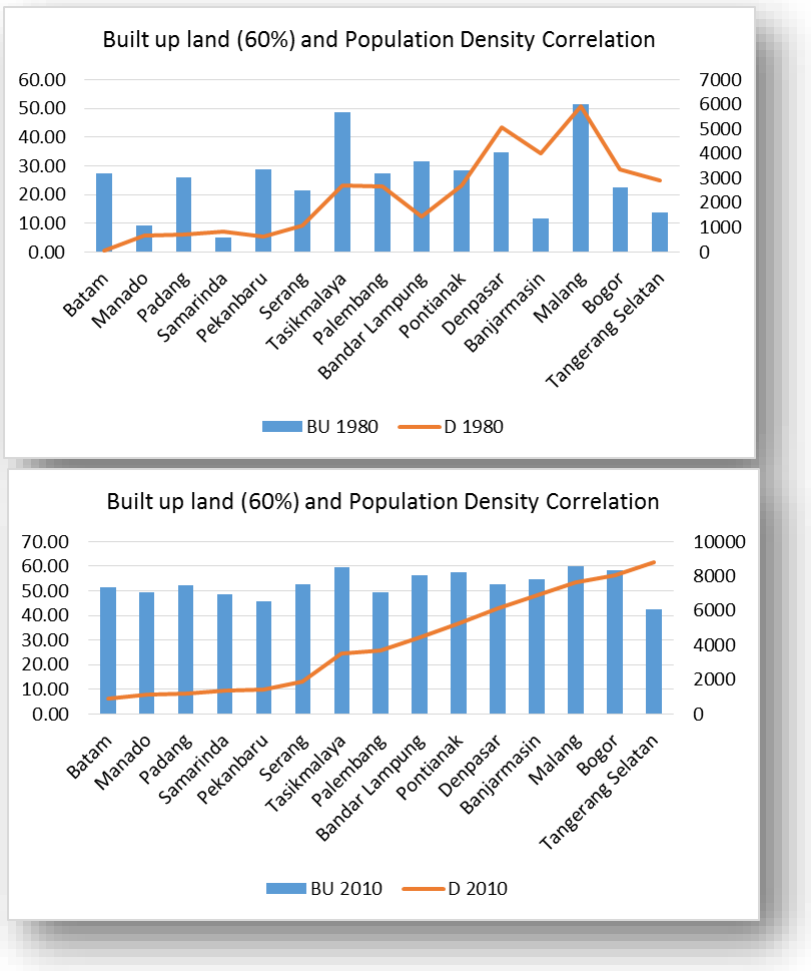


Fig 79 Relationship between population density and changes in urban fabric category 3

Source: author

In categories 3, Banjarmasin and Bogor, cities have anomalous conditions. The population density is high but the space occupied by the building is very low. A very high difference occurred in Banjarmasin followed by Tangerang Selatan and then continued by Bogor. Anomalous conditions between population density and the presence of buildings in these locations indicate a welfare imbalance between cities. Because there are cities that have high welfare but there are also cities that have low welfare. Cities that have low welfare have a low ability to build settlements for their citizens and build buildings supporting community activities. When the community is also not Prosperous, it is difficult for the community to be able to build houses, especially in the category 3 location. Because the price of land is already very expensive. But in 2010 there was a huge change. The population density in each

city, evenly, has an influence on the proportion of buildings in each area block. And the existence of the building has changed the shape of space in category 3.

6.4.4 Category 4

For category 4, the condition between population density and the intensity of the use of city space for buildings at the beginning of the study showed an unstable condition. But the condition experienced a change in 2010 when the density became stable in all cities, so that the internal use of city space became stable. Indeed, the intensity of the built up space in each city has stabilized in all cities in that category. This indicates that all cities are indeed faced with the intensity of intensive use of space in all cities. And this is indirectly affected by population density in each city.

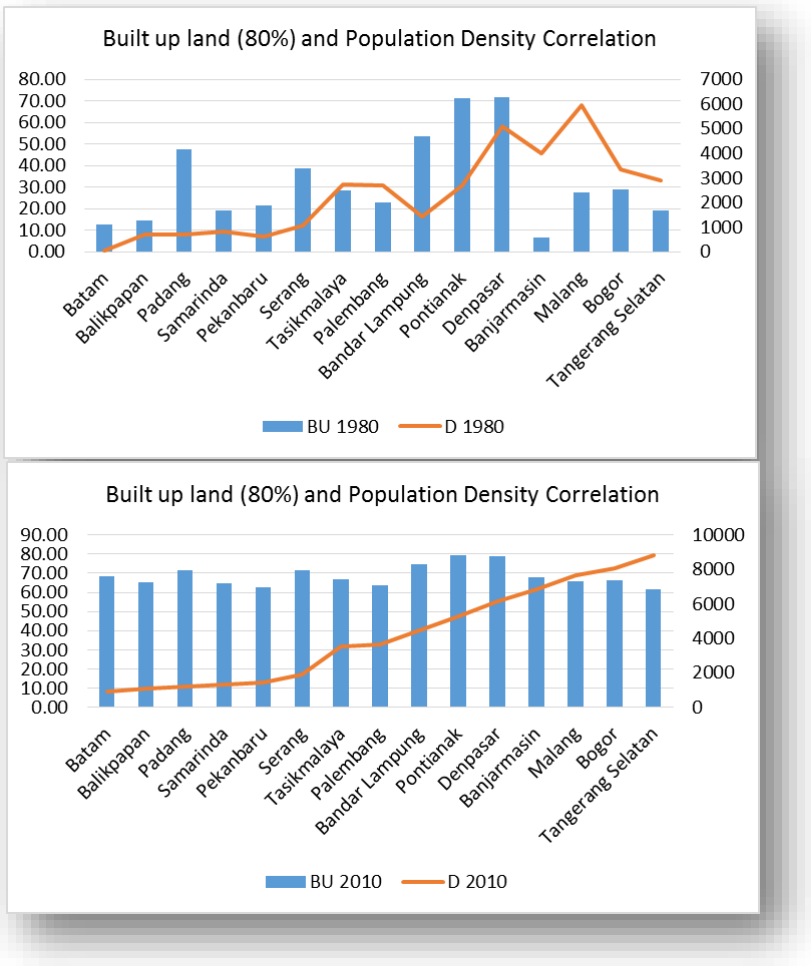


Fig 80 Relationship between population density and changes in urban fabric category 4

Source: author

Some cities show an imbalance between population density and building space. Some of these cities are Banjarmasin, Malang, Bogor, South Tangerang, Palembang, and Tasikmalaya. They have a high population density but have a building occupancy in space in category 4 which is very low, especially if we compare it to situations and conditions that occur in other cities. Cities continue to be known as cities that have a population that is economically very weak at the temperature of 1980. There are many national programs to improve residential areas in that location or in the city. But in 2010 there were significant changes in these cities. Although there are still cities that show conditions where

density is high but building density in category 4 is still low. There are three cities that show these conditions, namely Malang, Bogor, and South Tangerang. Availability of land in category 4 has indeed been very little and this has an effect on the price of land in that location. If the price of land is already very expensive, it is difficult for the community, especially the middle to lower income groups, to be able to build houses or buy residential buildings in that location. There is a tendency, changes in the shape of space in locations included in category 4 can occur when there are investments in public and commercial buildings carried out by private companies.

6.4.5 Category 5

For category 5, population density and intensity of urban space use do not have a high influence on one another. We can see this condition in some cities that have high density but the condition of the intensity of land use is not high. this happens as a result of land use in category 5 which tends to have high-scale economic activities. In general, land in category 5 is already crowded with buildings such as settlements, offices and shopping centers so that there is no major change in land use even though the population density increases. Residential buildings tend to still be able to accommodate the increase in population density.

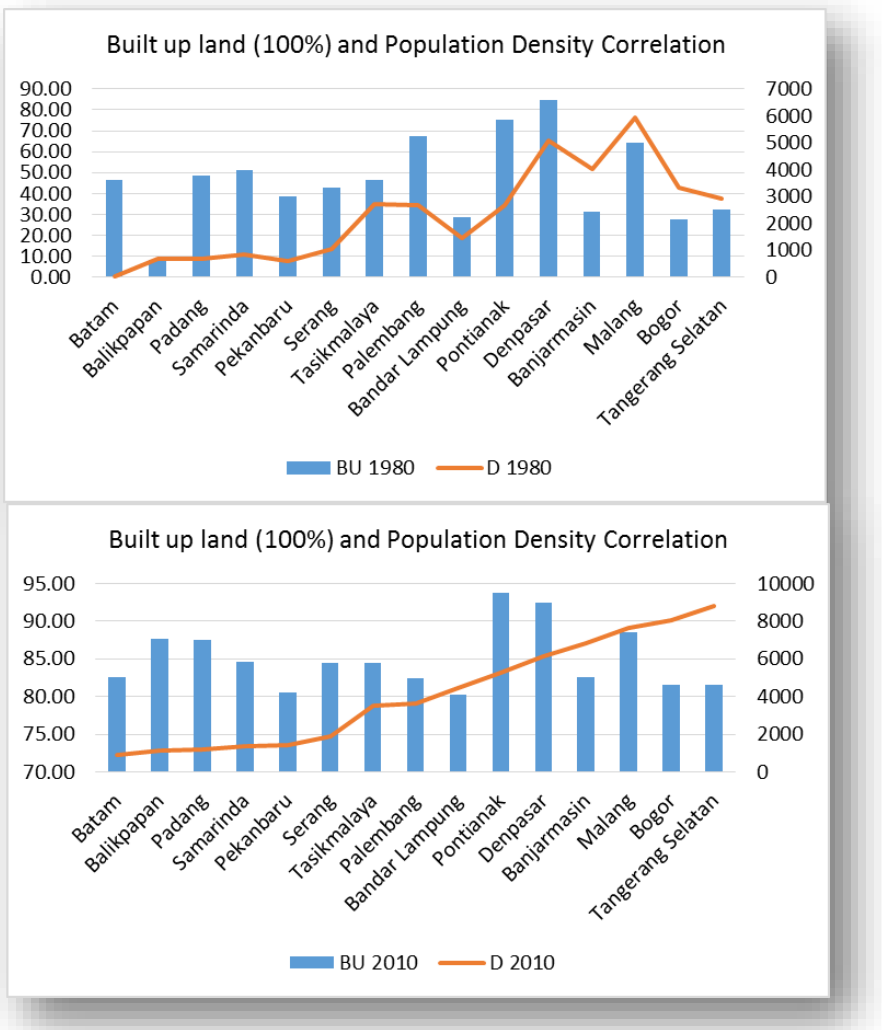


Fig 81 Relationship between population density and changes in urban fabric category 5

Source: author

The existence of land in category 5 has been very little which has caused the price of land in this location to be very expensive. So the construction of residential areas in this location has been very difficult to do, especially for medium-scale settlements. Therefore population density in this location does not have a correlation with the density and density of buildings that have an influence on the shape of space in category 5. In fact, cities that have high economic progress will tend to have relatively large open spaces in category 5. and Bogor, which has many commercial buildings in the category 5 space that make the space that has not been built cannot be built into residential areas because the open space is part of the commercial building facilities that exist in that location.

People also cannot build new housing in locations that fall into category 5 because the price is very expensive. If there is housing development, the building is exclusive and only certain community groups can access it or buy it. And this phenomenon also shows that people tend to want to live in areas that are already dense with buildings because they tend to have adequate infrastructure. So that when the population density is high it tends not to have a correlation with the density of buildings in that location. Therefore changes in the shape of space that occurred in category 5, in some cities, showed conditions that remained low even though the population density increased. In the next section, we will discuss changes in land use, which occur as a result of changes or population growth, which occur in each city. In this other section, we will understand the effect of population growth on several types of land use.

6.5 Land use types

If previously we saw the form of urban fabric by forming a space between built up land and land not built, in this section we discuss land use which includes several types of land grouped in 5 types of land. The author elaborates between population growth and population density with changes or developments (positive or negative) the functions of certain land identified. Land changes can have an impact on the city and the city environment. Therefore, land changes must be controlled to obtain sustainable city environment conditions.

Table 46 Land use grouping

No	Land use	Description of classification
1	Building	All parcels that fill space and cover the ground. Can be housed, buildings, roads, ports, and other types.
2	Agriculture	All parcels in the city space are in the form of plants and have produced such as rice fields and gardens
3	Forest	city parcels that tend to be similar to agricultural parcels. But it does not have regular production. Usually, the condition is denser compared to agriculture.
4	Pasture	It tends to be similar to dry rice fields. But it does not have production and is not utilized. For waste, the land is used so that it produces results.
5	Others	Other things that are not defined or other things that have a definition outside the definition above.

Source: modifed from Bo Sun and Derek T. Robinson, Comparison of Statistical Approaches for Modelling Land-Use Change, Land 2018, 7(4), 144; doi:10.3390/land7040144.

Sustainable city development has become an international agenda to maintain the survival of the citizens of the earth. Various ways have been done by various parties to provide certainty that there are efforts to preserve the environment. One of them is by controlling land use changes that have a negative impact on the environment. In this study the author will present the results of the analysis of changes in land use compared to changes in population. Land use has proportions in accordance

with city development. In new cities that grow organically, proportions are often not regulated. The proportion of land use is formed by itself and changes by itself in accordance with the development of the city, especially its population development. For cities that are formed by design and initial planning will have a balanced land use proportion.

To facilitate the identification of existing land conditions at the research location, the authors conducted an analysis using GIS to obtain the value of land change from the total administrative area owned by a city. From the total land, there is a percentage value for each category using color. Every change in size in each color that has been determined through computerization will get a percentage change of the total city land.

6.6 Land use changes

6.6.1 Factors that affect changes in land use

Changes in land use can be caused by many factors. Changes in land use in urban areas often tend to lead to changes in land for buildings. All other land functions will experience negative changes while changes to land for buildings experience positive changes. This means that changes in land for buildings will show a trend of a temporary increase in other land functions experiencing a tendency to experience a decline. Changes in land use function are influenced by population growth and also the emergence of other activities influenced by an increase in population.

Table 47 Land use change in Palembang

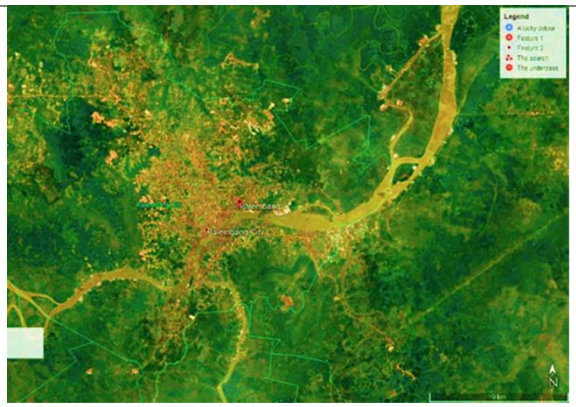
Palembang	
1980	2010
	
Palembang is an old city that has been formed for a long time. The city of Palembang became the capital of several cities which at this time had separated themselves from the city of Palembang and formed their own city or independent city. The city of Palembang has been established since the era of the kingdom began to develop in Indonesia. Therefore the pattern of development of the city of Palembang tends to approach the area or flow of transportation that relies on water. The city of Palembang is close to the Musi River as one of the largest rivers on the island of Sumatra. Urban development is strongly influenced by the geographical conditions affected by the river. Palembang is also a city of trade and services for the cities around it because the city already has a fairly clear service trading system. Mining areas in the vicinity of Palembang make this city an industrial city and city that produces economic activities associated with mining. The population of Palembang city consists of many tribes.	

Table 48 Land use change in Tangerang Selatan

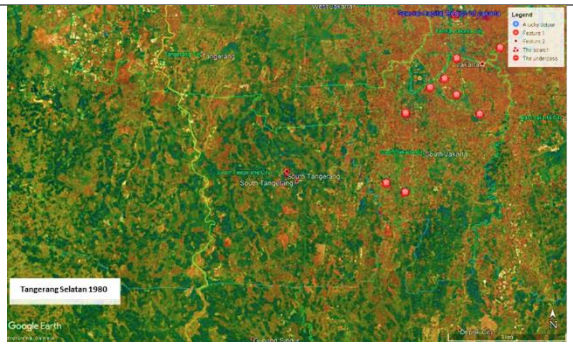
Tangerang Selatan	
1980	2010
	
The location of South Tangerang City is very close to Jakarta as the country's capital. This condition has an influence on the development of cities in South Tangerang because there is a population spill from Jakarta out of the administrative boundaries of Jakarta and ones of them leads to the City of South Tangerang. Especially at this time the transportation problem is no longer an obstacle to the way people mobility and goods cause the distribution of population outside the center of economic activity is no longer considered a problem because the movement can be facilitated by the availability of public transportation that already exists in that location and also supported by the availability of private cars and motorbikes that can be used as a mobilization tool to any area and to any location. So accessibility issues are no longer a problem.	

Table 49 Land use change in Bogor

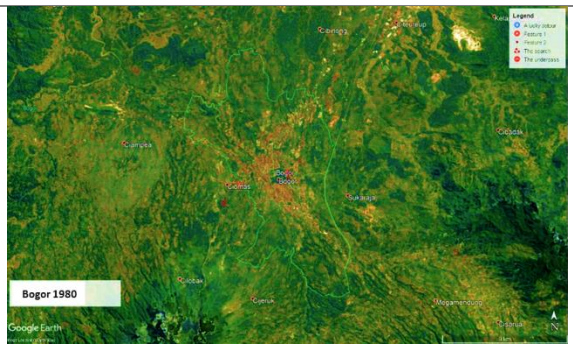
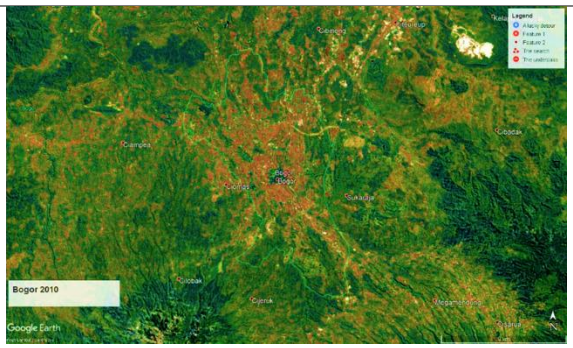
Bogor	
1980	2010
	
Bogor has experienced rapid development since the city is connected with Jakarta through the existence of toll roads. People who have been living in the city of Jakarta finally chose to live in the city of Bogor as a satellite city that still has good environmental conditions. The community finally chose to live in this city too because it was worthy of being a place to live and make Jakarta the location where they worked. The community at that time did have a tendency to separate the location of residence and also the workplace because of the desire to separate from one condition to another. Until now, the city of Bogor continues to grow from the population size as an implication of its closeness and connectedness with Jakarta. Bogor is also known as the location of the Puncak tourist area, which is a location that relies on mountainous areas as tourist attractions with various other attractions. Because of that the city of Bogor finally became a city that was very liked by the community as a place of residence.	

Table 50 Land use change in Batam

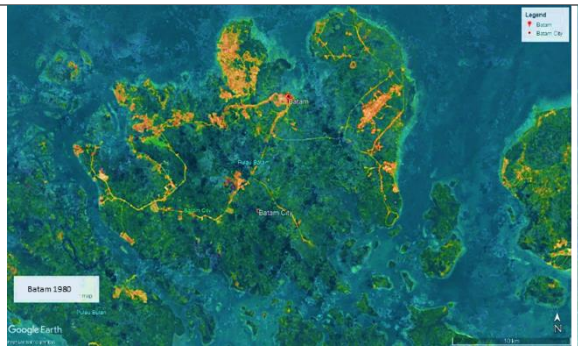
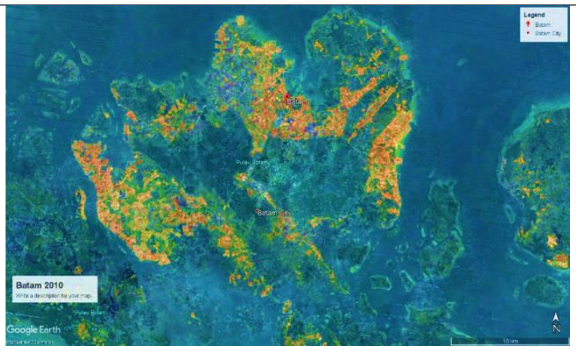
Batam	
1980	2010
	
Batam is a city close to Singapore so that the Indonesian government has the desire to develop Batam City so that it can be the same as the conditions in Singapore. Licensing policies, as well as economic policies, decided in Batam City finally had an influence on the population increase in the city. Batang has experienced a very high population development and this provides room for an increase in the amount of investment in the city because there are many workers entering the city and are available at relatively cheap prices. Batam will continue to develop into a city that has high economic activities because economic development has become increasingly clear and the population is also available in very large quantities and this will have an influence on the availability of labor.	

Table 51 Land use change in Pekanbaru

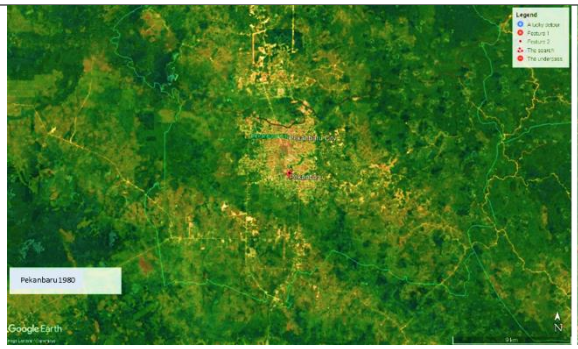
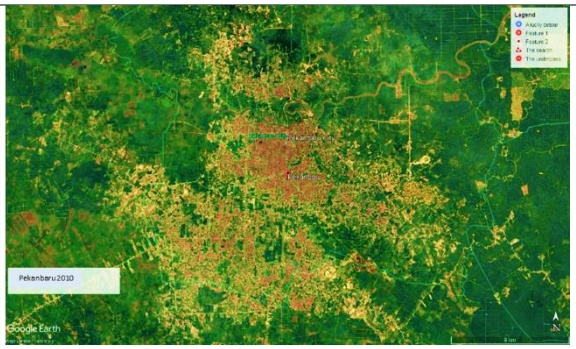
Pekanbaru	
1980	2010
	
Pekanbaru is a city included in the new city category because the development of the city is still new and only a few years after Indonesia's independence the city began to gradually form into large-scale settlements. Population growth in this city is strongly influenced by plantation and forestry activities because the city relies heavily on the two economic activities, namely Forestry and plantations. If this sector can continue to survive and continue to grow, more and more workers will be absorbed in this location and when the city is unable to meet human resource needs independently, urbanization will emerge into the city of Pekanbaru. People from outside the city will come and also live in the city to work and live in it because there is an opportunity to increase income. Pekanbaru is also a city close to the trunk as a new economic business center developed by the Indonesian government to be the same as Singapore. This condition finally had an influence on the development of the city of Pekanbaru because there are economic activities that are interrelated between one city and another city.	

Table 52 Land use change in Bandar Lampung

Bandar Lampung	
1980	2010
	
Bandar Lampung is a city of trade and services that is growing rapidly because it is close to the Cilegon industrial area on Java and not too far from Jakarta as the center of national government. Therefore the development of the trade and services sector and also industrial activities is growing rapidly and this has an effect on increasing the demand for labor. To meet the needs of the workforce, a high population emerges as an influence of the increasing level of urbanization to provide services to investment activities that do require considerable labor. A high population is a population that emerges from a high process of urbanization. Previous data shows that the level of urbanization has had a huge influence on the increase in the population of the city.	

Table 53 Land use change in Padang

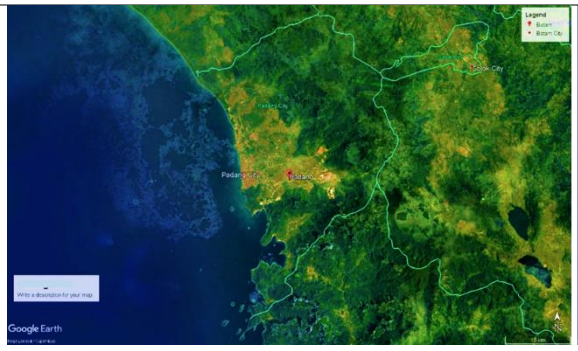
Padang	
1980	2010
	
Padang developed into a city with trade services and tourism activities. This city has a cultural appeal that has an influence on increasing population from within and from outside the city itself. This population increase has an influence on developments in various sectors, especially the housing and tourism sectors which have an influence on land change. Changes in the function of land in the city is an application of increasing housing needs and supporting commercial activities that can change the proportion of land in the city. Padang is a port city that has grown quite rapidly in the past but is experiencing a slowdown at this time. The slowdown occurred because the port owned by this city was Samudera Harbor. There are limitations that the ship has and also the ability of the Port to provide a sense of security and ease in the city. Commercial activities in cities tend to be influenced by port activities. Therefore, the existence of the port in this city is very important because it can have an influence on the development of the city, including the population and also urban activities.	

Table 54 Land use change in Malang

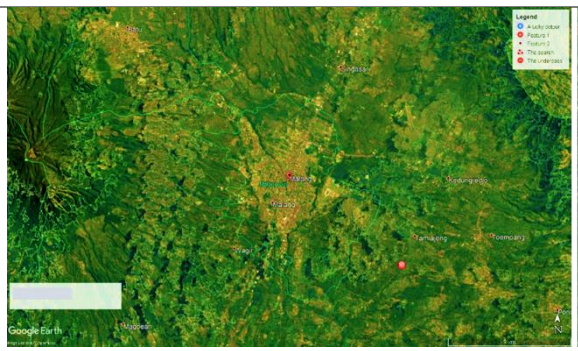
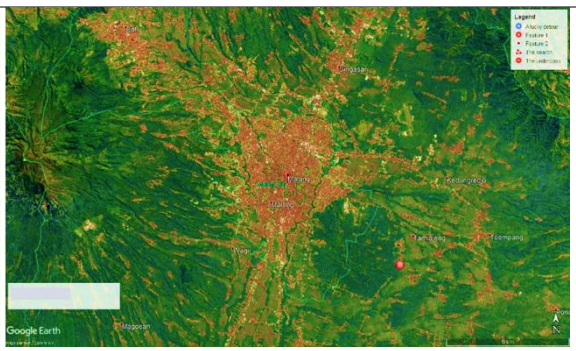
Malang	
1980	2010
	
Malang developed into a city of trade and services because the city developed the education sector as one of the main urban activities. Economic activity was strongly influenced by educational activities and the population experienced an increase due to the arrival of students and also the emergence of new residential investments in this location. Educational activities do have a considerable influence on changes in land functions within the city. Because the education function provides an impetus for the emergence of new activities that require land on a fairly broad scale. One activity that gives effect to land function change is commercial activities that appear to provide services or also benefit from the existence of students in this city. Over the past few years, the city has also developed into a city that has tourism activities.	

Table 55 Land use change in Denpasar

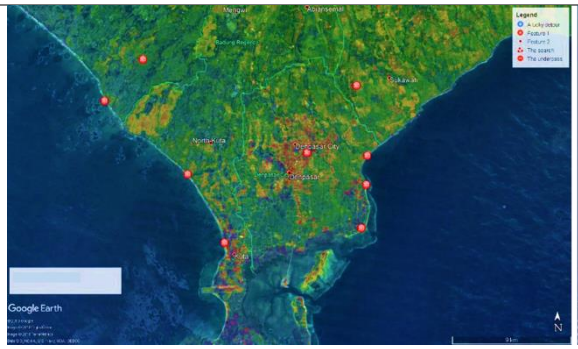
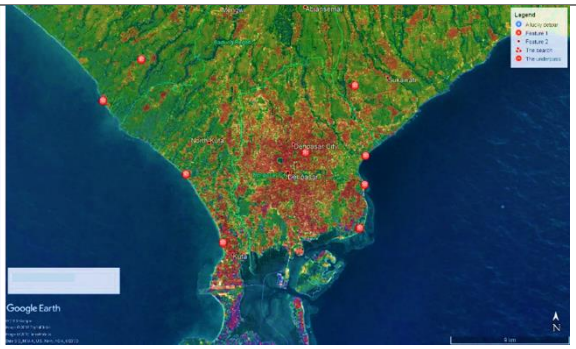
Denpasar	
1980	2010
	
The city has long been known as a city of tourism in Indonesia. Many people abroad know the city better than Indonesia as a country. Therefore economic activities in this city tend to lead to economic activities related to tourism activities. Changes in the function of land in the city are strongly influenced by tourism activities. Because tourism activities lead to cultural and environmental sustainability, the increase in population that occurs in this city is more likely to lead outside the city and they are spread to various locations and this is done in order to avoid the negative impact of land use for settlements to environmental problems. Therefore changes in the function of urban land within the city are strongly influenced by the activities of settlements and tourism. Tourism activities have become a mainstay of economic activity in this city. Various kinds of activities and programs on a national scale as well as many international charts are held in this city because the tourism sector has developed and the conditions of the urban environment are supportive to make this city an eco-friendly tourism city.	

Table 56 Land use change in Samarinda

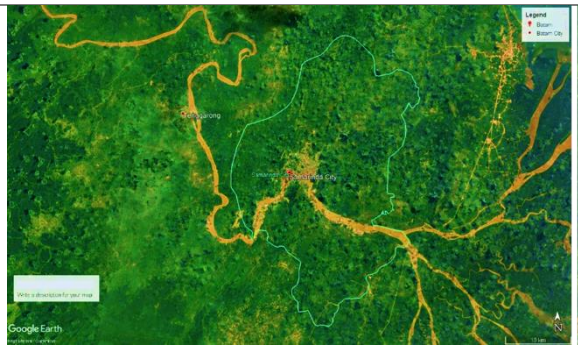
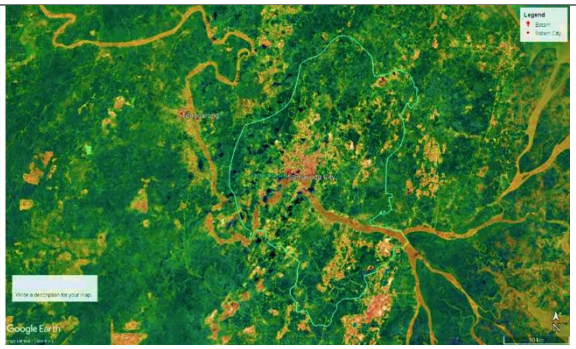
Samarinda	
1980	2010
	
The city is known as a city with economic activities trading services and relying on agricultural and forestry activities around the city. Then the economic activities in the city are strongly influenced by the pattern of economic activity outside the city area, namely agriculture and forestry. This city is indeed known as a city that is in the forest and forest area on this island is a forest that is included in the protected category by various countries in the world. Therefore the direction of urban development which tends to lead to efforts to destroy forests can have implications for the emergence of international responses related to land use. Because of that the very big challenge experienced by this city is how to develop the city by relying on all the land in the city itself. So they do not develop out of town and physical development does not occur outside the city because land outside the city is land that tends to be protected and or adjacent to internationally protected land, namely protected forest areas.	

Table 57 Land use change in Tasikmalaya

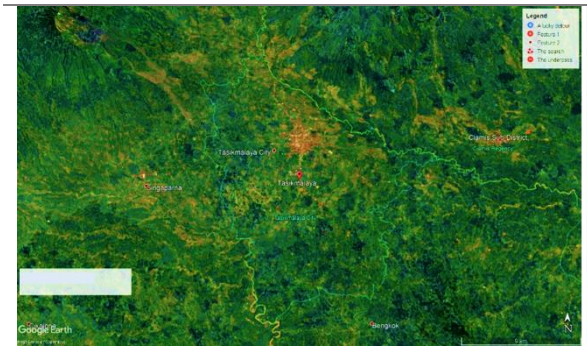
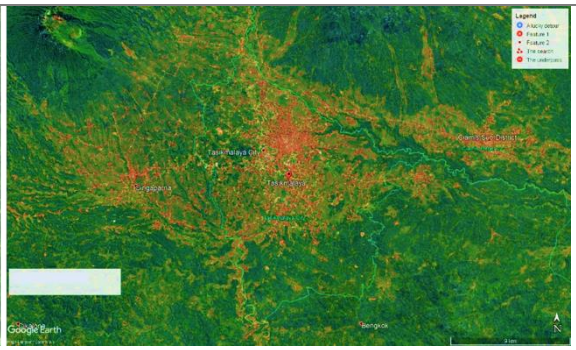
Tasikmalaya	
1980	2010
	
Tasikmalaya is a city that is quite interesting to observe the development of urban population growth. Because the city is relatively far from the river or the sea but has a fairly rapid development of economic activities that can increase the population they have. The population growth that emerged as an influence from urbanization has had an impact on various kinds of activities emerging within the city. Changes in land function are the implications of population increases that occur in this city. Land for settlement activities is very dominant when compared to other land function changes. Therefore, farmers must be able to control the use of permits for the construction of new settlements so that other lands with other functions are still available which causes the emergence of a diversity of activities within this region. The city is known as a city with economic activities trading services and relying on agricultural and forestry activities around the city.	

Table 58 Land use change in Banjarmasin

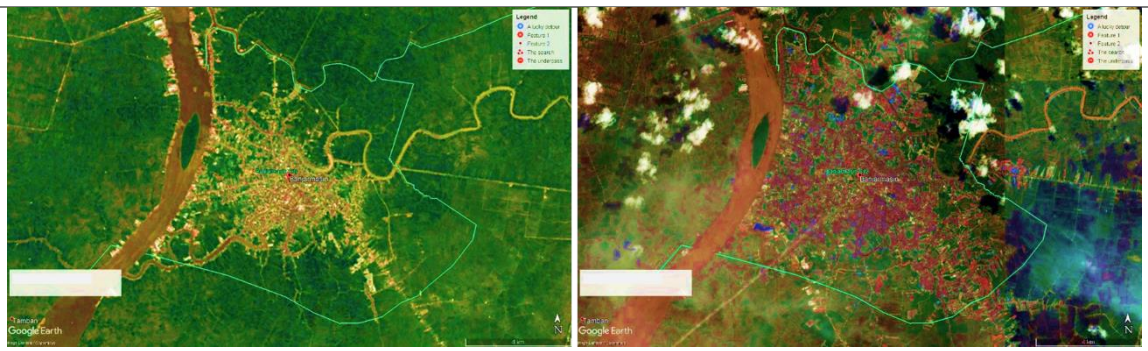
Banjarmasin	
1980	2010
	
Banjarmasin has similarities with several other cities on the island of Borneo. They will have a city around it that is protected by the forest and the existence of these forests must be protected. Despite the fact that efforts to protect the forest have problems because the majority of land belongs to the community, not the government. Unfortunately, in the forest, there are also many mining products that can be utilized and become international needs. Changes in the function of urban land became very large because the community was indeed encouraged to only live in the city administration area that had been previously set. Moreover, some of the cities on the island of Borneo also have relatively large city sizes so that people can stay free at any location within the city administration boundary.	

Table 59 Land use change in Serang

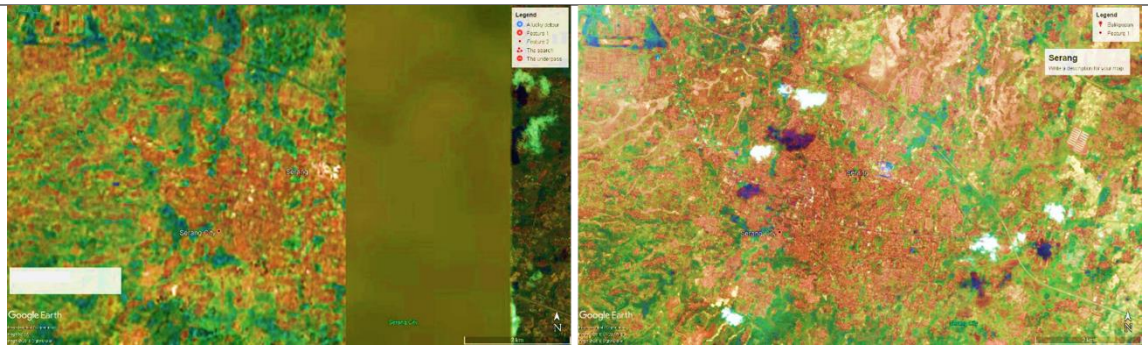
Serang	
1980	2010
	
Serang is an industrial city that is meant to be formed by the government for a long time. The city's industrial activities have indeed been very numerous and are also one of the cities formed into Industrial Estates. The main industrial estate is located in the city of Cilegon, but the city of Cilegon has a relatively low population because it is also not a residential area. Meanwhile, other industries that are mostly inhabited by communities as residential areas are Serang city. Serang will develop into a residential area that is also an industrial area and gradually becomes a trade and service area. Population growth in changing the function of urban land in this city tends to change the area of plantation land into building land. Agricultural land has undergone many functional changes to become land for residential buildings that are also commercial buildings because of the increasing need for settlements and commercial buildings. And until now the land change has occurred because of an increase in population that occurs in the city. The function of land in a city that is proportionally subject to change can have an effect on the overall urban environment.	

Table 60 Land use change in Manado

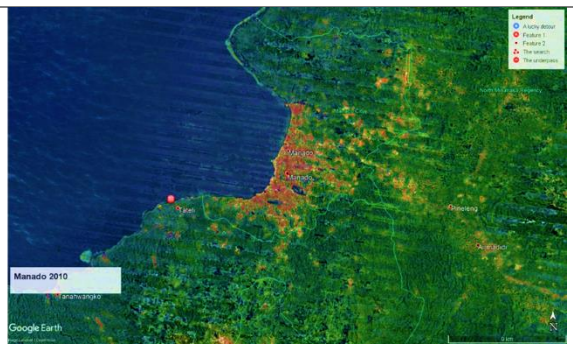
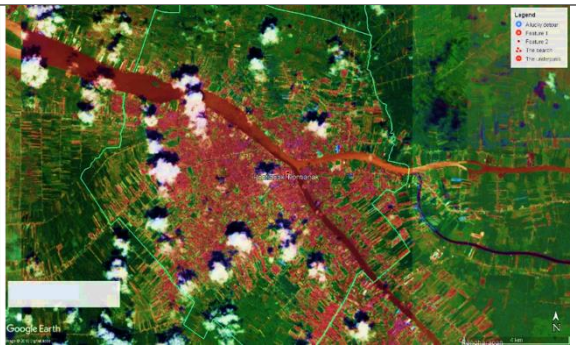
Manado	
1980	2010
	
Manado developed into a city with considerable trade and service activities. This ultimately has an impact on land use change. The population also experienced an increase which required the construction of new residential areas. Every effort to build new settlements has affected the change in the proportion of land for other land functions. The proportion of land for residential areas has always increased when compared to the proportion of land for other functions that have decreased. Increasing the proportion of land for settlements shows that the population has an influence on increasing demand for residential areas. Simultaneously there will also be a need for other commercial buildings. And increasing the function of commercial buildings has had an impact on decreasing proportions for other land functions.	

Table 61 Land use change in Pontianak

Pontianak	
1980	2010
	
This city is on the banks of the river. The city is developing because there are trade activities and services related to river transportation. Therefore city development is always related to the development of the trade sector and services through river transportation. Changes in the function of land in the city are implications of economic development. The development of commercial buildings continues to occur throughout the year and this is also related to the increase in population that occurs in the city. In this city, not so much land can be used as residential or commercial building land. Therefore, urban development only occurs within the city inflation limits which are already projected to be suitable land to become residential locations and also the location of commercial and supporting buildings. Meanwhile, for areas that are outside the administrative boundaries of the city, the area is indeed relatively inadequate as a residential land because there are many swamps and protected forests.	

Because after all the increase in the population gives effect to the emergence of other buildings besides settlements to provide services or to benefit from the increase in the number of populations that appear in these locations. So not only did businesses appear to provide land and buildings for settlements but also land use emerged for commercial buildings as a supporting facility for the existence of an ever-increasing population in that location or within the city. Because of the increase in population influences changes in land functions and the emergence of other commercial buildings, there needs to be an understanding related to the impact of population increases on land use change. Land changes are often considered a blessing for the community because the community does have a tendency to change the function of the land they have and some are also interested in selling it to new owners so that they can benefit from the existence of land and changes in land functions in certain areas within the city that is.

6.6.2 Land use proportion change

In this section, we will look at the proportion of function changes in each field. The proportion of each land in the city has a difference between one city and another city. The magnitude of each proportion of land depends on the existing conditions when the city was formed at first. Every city has a history and also has a story about the reasons why they developed into a city that is liked by the community to become a place to live and breed in it. Because each city has a history and a different story, in looking at the proportion of land in each city we must adjust the history that is indeed within the city itself. We cannot compare the development of each city with other cities. What we can do is look at trends or see the tendency of each city to see a similar change in the proportion of land and also changes in the city's population. Because we want to see how much influence the proportion of urban land changes with population changes that occur throughout the year. City population will indeed continue to experience changes, be it changes or increases in population decline. Each change certainly has an impact on urban space and also has an impact on the proportion of land based on the function of urban land. This condition we will look at to determine the effect of population changes on changes in proportions in each land function. Because after all the balance in the proportion of the function of urban land will greatly affect the future of the city itself.

If we look at the function of each city land, the function of urban land for settlements or for buildings will tend to be more dominant compared to the function of land with other functions. This is strongly influenced by the tendency for more land use for buildings compared to other land uses within the city. There are often used assumptions that cities tend to have trade and service activities and that means the development of the property sector becomes more dominant than non-property activities. When the property sector develops, the proportion of land for buildings will appear in the city. Meanwhile, for land functions related to green open space, the agriculture and plantation sectors will experience a decline in terms of the proportion of land in the city. Because the land is opened by many people outside the city, not in urban areas. Especially if we associate the condition of the function of this city land with the tax that must be paid by the community as landowners.

In some cases, there are also cases where people have the desire to change the function of the land they have. The community wants to change the function of the land they have because it is considered unproductive and does not provide income in the form of income for the community. If the function of their land is changed and makes the land more economically productive, the land change that occurs in a city is a favorable economic change for the city and also for the people who own the land. Therefore, we need to pay attention to changes in land functions.

Table 62 Land use function proportion

LANDUSE		PALEMBANG		TANGERANG SELATAN		BOGOR	
		1980	**2010**	**1980**	**2010**	**1980**	**2010**
Building	%	28.3	62.5	24.1	54.3	17.4	49.3
Agriculture	%	35.2	20.1	22.3	18.2	45.6	27.6
Pasture	%	6.9	4.2	45.4	22.6	7.3	3.2
Forest	%	28.4	12.4	5.1	3.8	27.4	19.1
Others	%	1.2	0.8	3.1	1.1	2.3	0.8
LANDUSE		**BATAM**		**PEKANBARU**		**BANDAR LAMPUNG**	
		1980	**2010**	**1980**	**2010**	**1980**	**2010**
Building	%	12.7	32.3	19.6	49.5	18.9	50.6
Agriculture	%	17.4	15.3	18.2	13.2	33.4	13.5
Pasture	%	38.5	24.2	19.4	16.4	8.7	2.4
Forest	%	29.4	26.5	41.2	20	37.2	32
Others	%	2	1.7	1.6	0.9	1.8	1.5
LANDUSE		**PADANG**		**MALANG**		**DENPASAR**	
		1980	**2010**	**1980**	**2010**	**1980**	**2010**
Building	%	22.6	53.7	18.7	62.3	17.4	54.3
Agriculture	%	37.6	27.5	43.3	22.4	36.2	16.9
Pasture	%	4.9	3.1	3.2	1.7	2.1	1.9
Forest	%	34.8	14.8	33.6	12.5	42.7	26.3
Others	%	0.1	0.9	1.2	1.1	1.6	0.6
LANDUSE		**SAMARINDA**		**TASIKMALAYA**		**BANJARMASIN**	
		1980	**2010**	**1980**	**2010**	**1980**	**2010**
Building	%	9.7	28.3	12.4	43.6	31.1	52.1
Agriculture	%	24.6	23.7	48.3	28.4	28.6	23.4
Pasture	%	1.4	1.8	2.1	1.9	4.1	8.2
Forest	%	63.2	45.2	36.4	25.2	35.2	15.1
Others	%	1.1	1	0.8	0.9	1	1.2
LANDUSE		**SERANG**		**MANADO**		**PONTIANAK**	
		1980	**2010**	**1980**	**2010**	**1980**	**2010**
Building	%	64.3	82.4	21.2	39.8	23.1	49.9
Agriculture	%	18.4	11.3	31.2	27.6	39.6	30.1
Pasture	%	2.1	0.3	1.1	2.7	1.5	5.2
Forest	%	13.8	4.9	43.7	28.5	35.4	13.6
Others	%	1.4	1.1	2.8	1.4	0.4	1.2

Source: Municipal in all cities, author

This is not only related to changes in land use but also related to the positive impact caused by changes in the land. Indeed, economic change in land can be a very profitable change. But on the other hand changes in the land are also often considered as changes that can cause environmental losses. Even though land changes should have a positive impact on the environment and also for the economy. The challenge that must be solved by various parties related to the change of function of this land is how to find the right formulation so that any land change can provide positive economic changes for the community and the city and it can also balance land availability based on the function of land in a city. Often land changes must indeed be made so that there is a balance in the functioning of urban land. Because we often see that the development of a city is often out of control. So that the function of the land has changed a lot and this has not caused a balance in land use. When the imbalance is known, the next step is to improve so that the balance appears in land use. From here we will be able to find out that land changes need to be done to create a balance in the utilization of urban land functions.

6.7 Land use analysis by type

In this section, the author will present data on the results of analysis of land use based on the type of each land use. Changes in land use from 1980 to 2010 will give us an understanding that land changes will take place gradually. Little by little and in a certain period of time there will be changes in land use that are inherent in the environment. We see there are many events related to land use changes that are not balanced. Land use change is a thing that is certain to happen but changes in land use must be able to adopt the concept of sustainable development. Land use is an integral part of ecosystems and the environment.

6.7.1 Building area

Land area with building functions increased during 1980-2010. The increase in land use for buildings was caused by an increase in housing and housing needs, followed by an increase in other building needs such as hospital buildings, schools and others. Significant changes in building land occur in all cities. This change indicates that population growth has an influence on increasing land for buildings with all types of functions.

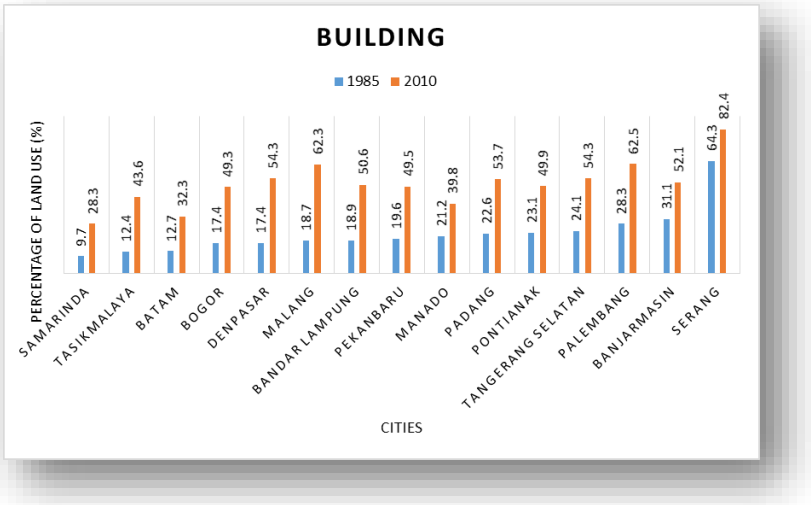


Fig 82 Change in land use: building area in 1980 to 2010

Source: author

6.7.2 Agriculture area

Agricultural land has decreased in 1980 to 2010. The cause of the decline in extensive agriculture is the licensing of other building construction on this land. So that agricultural land becomes the most reduced land. Moreover, there is a view that was developed unconsciously that the city is a trade and service area, there is no correlation with agriculture. Thus, agricultural land has decreased to what it should be because agricultural land is characteristic of the countryside, not the city.

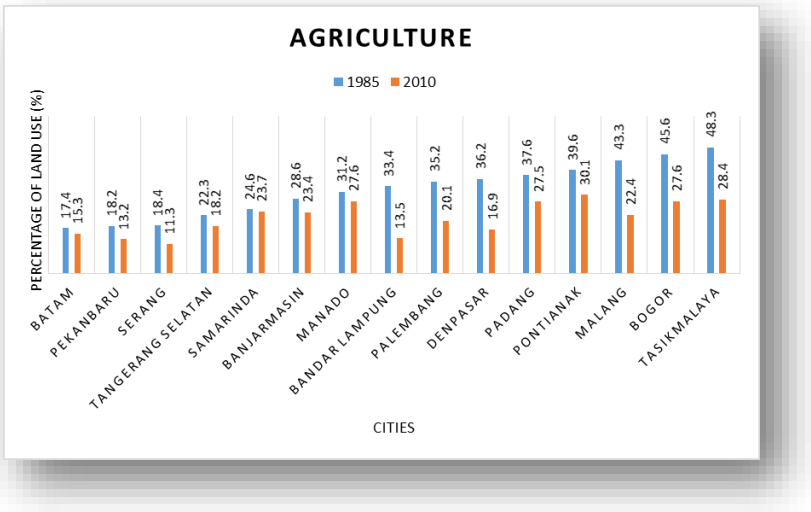


Fig 83 Change in land use: agriculture area in 1980 to 2010

Source: author

6.7.3 Pasture area

Many pasture lands have decreased due to the desire of the community to make the land not function as land with other functions. There is a tendency, the pasture land has turned into new residential land because there are many developers who are looking for land that can be used directly and suitable land is pasture land.

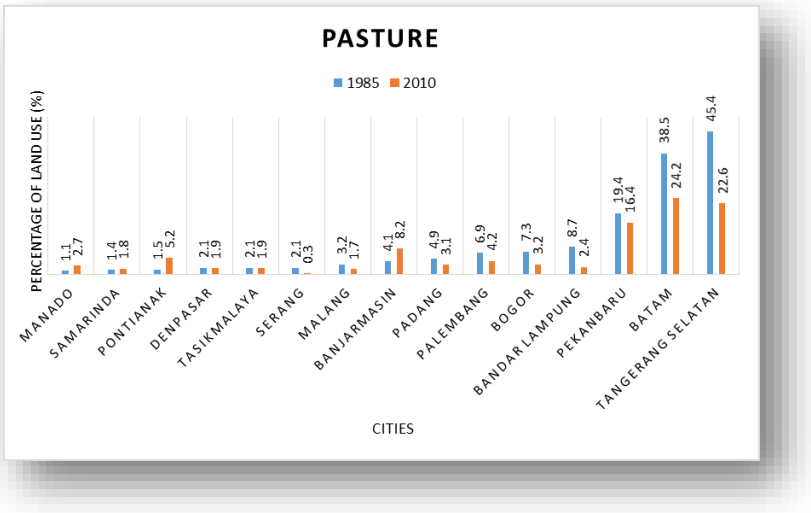


Fig 84 Change in land use: pasture area in 1980 to 2010

Source: author

6.7.4 Forest area

Forest land will be affected a lot because the change in function of the land is not only for settlements but also can be turned into other land. Thus, changes in forest area are very drastic as a result of the pressure of land requirements for various functions. In fact, wood in the forest is used by the community as an energy source because wood is burned and the heat is used to cook food.

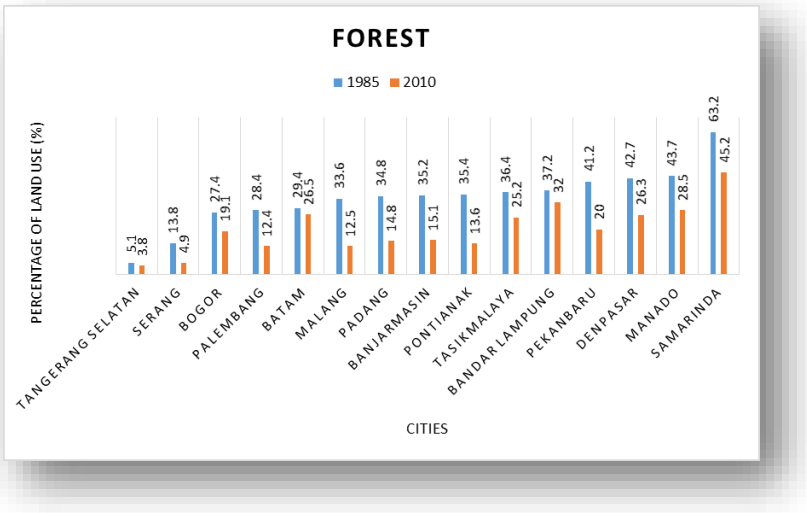


Fig 85 Change in land use: forest area in 1980 to 2010

Source: author

6.7.5 Others area

The results of counts that cannot be identified are also the authors included in this study to balance the area of land to become full of city land. All cities show the existence of land that is not clearly identified despite a decrease in area. This means that more land can be identified in 2010 compared to the land area that was not identified in the initial year of the study.

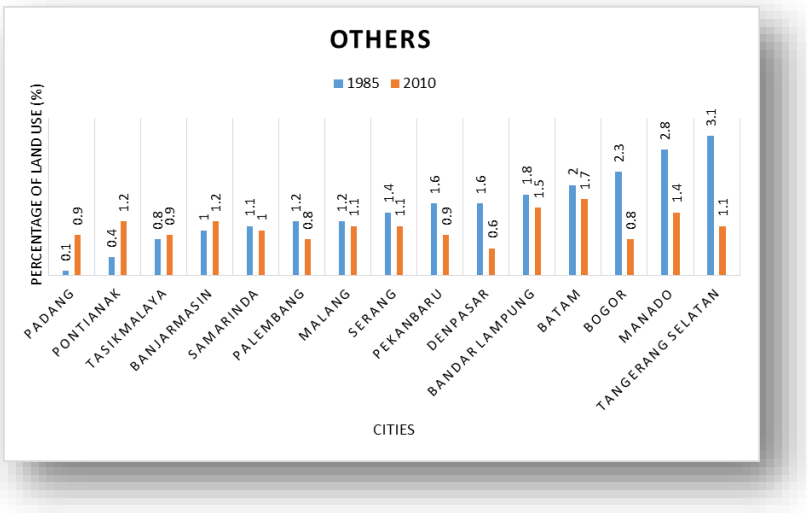


Fig 86 Change in land use: others area in 1980 to 2010

Source: author

6.8 Land use growth

Changes in land use previously explained provide an understanding of land use changes. In this section we will look at the growth of land use changes in the study period (1980 and 2010). We can see the percentage change in land use in the section below. Land use change is something that is certain to happen, especially when there is population growth in the city. When the population increases it will change land functions positively and negatively. We will see the growth of land change one by one below.

6.8.1 Building area growth

The growth of changes in land use functions occurred in Tasikmalaya, Malang and Denpasar. These three cities have changes in land for buildings on a large scale. Meanwhile, three cities with changes in land use functions for small scale buildings are Serang, Banjarmasin and Manado. As mentioned earlier, population growth has an influence on land changes, especially land changes for buildings. When the population increases, there is an increase in the demand for new settlements as the location where people live. And when the new settlement is built, there will be an increase in the provision of supporting infrastructure and new service buildings for the community. This has an effect on land changes for buildings that will increase over time. Cities being objects of this study indicate that there were major changes in their genius, especially for buildings.

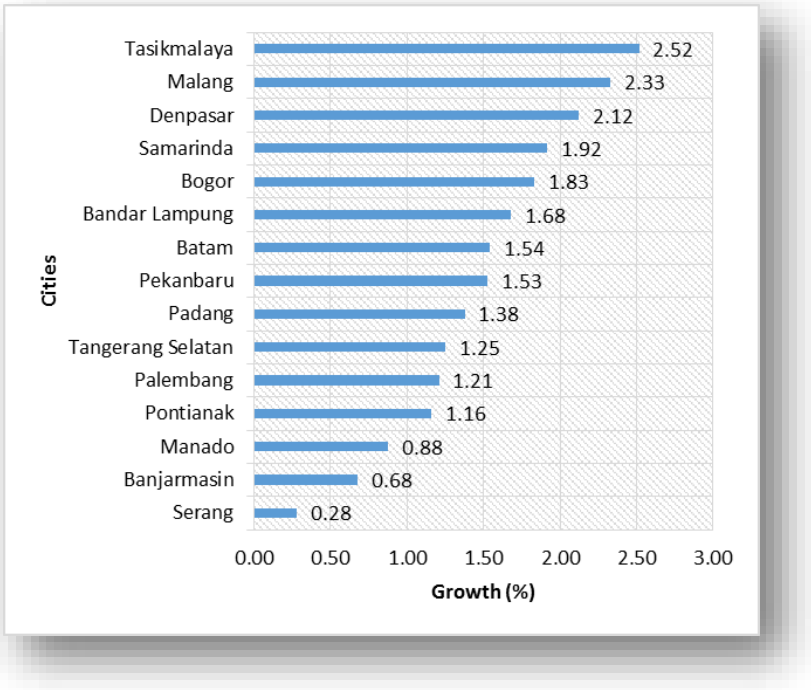


Fig 87 Land use: building area growth in 1980 to 2010

Source: author

Cities that have still not been crowded with buildings and have not been crowded by the population, in 2010 showed different conditions. This is the reason why the growth of land for buildings has increased very high from 1980 to 2010. Community welfare has increased so that they can build new settlements, the government has sufficient funds to build infrastructure, and investors are interested in investing in commercial buildings in these cities. This is what gives effect to the change of land for

this building. And the city is increasingly filled with buildings that have various functions, with varying sizes, which form the city space to become in a densely populated area.

6.8.2 Agriculture area growth

To decrease land use growth with agricultural functions, Bandar Lampung, Denpasar and Malang occur. These three cities have the largest decline in agricultural land compared to other cities. Meanwhile cities with a decline in land growth with the smallest agricultural functions are Samarinda, Manado and Batam. These three cities do have small amounts of agricultural land so that land changes for functional changes are not large. Agricultural land is always land that often changes function, especially as a function of new settlements or new trade areas or new industrial zones. This phenomenon is indeed interesting to observe and even there must be a way to prevent it. Because agricultural land is fertile land and can help the city to provide basic needs for the city, namely food. But interestingly, agricultural land is always suppressed by high taxes, which makes the land no longer feasible to become agricultural land. Because income from the agricultural sector is unable to pay taxes and finance the lives of the managers of the agricultural land. The most relevant function to finance taxes and the lives of landowners is commercial buildings. This is the cause of changes in the function of agricultural land. Because many landowners sell the land they have to other parties, new voters change the function of land from agriculture to commercial areas.

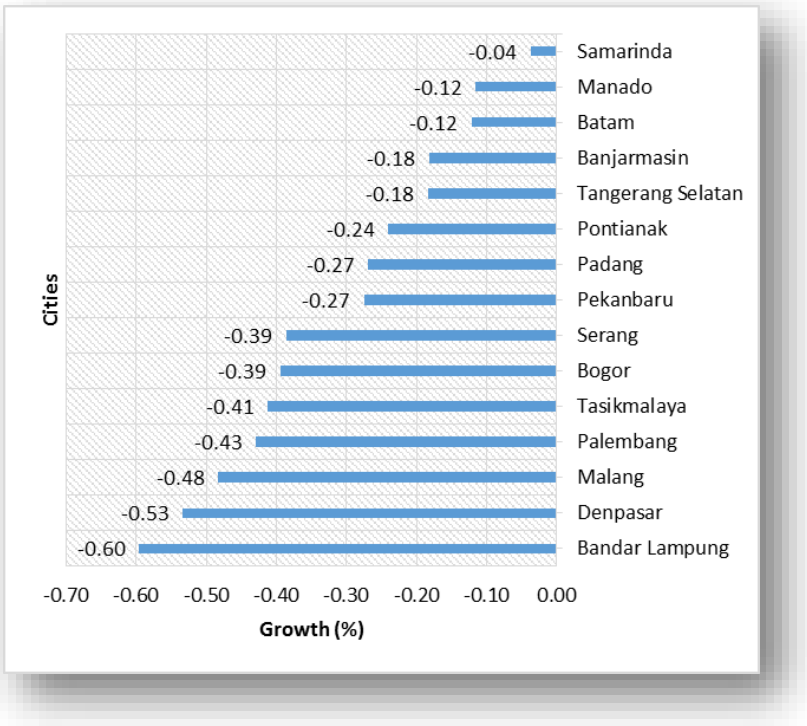


Fig 88 Land use: agriculture area growth in 1980 to 2010
Source: author

Therefore, if there is a decline in agricultural land growth, this is a negative implication of the pattern of development carried out in the city. The existence of agricultural land should be maintained to its existence. But what happened was the opposite, agricultural land was allowed to change function into new commercial land. Cities with large-scale changes in agricultural land are facing an increasing population. When populations increase the need for food also increases. But agricultural land as a

source of food has decreased. This is what causes many boxes to have the independence to meet their own needs, especially for strategic products, in this case, is food. All cities face this phenomenon. Apparently, every city is competing to turn agricultural land into commercial land. Because there is a view that says that cities have non-agricultural economic activities. The city's economic activities are supported by trade and industrial activities. This view finally gave effect to the city's development policy which prioritized land use for trade and industry and marginalized the function of land for agricultural activities. Then gradually, agricultural land has diminished, and the land has changed into commercial land in the form of trade, residential or industrial areas. Again, the existence of agricultural land should be protected by the city government. Through various kinds of policies, they must be able to maintain the amount of agricultural land they have. In fact, they should increase agricultural land. And their agricultural land production can also increase.

6.8.3 Pasture area growth

For changes in land use with pasture functions occur two types, namely positive and negative growth. Positive growth occurred in the addition of pasture land as an effect of clearing forest land into pasture land. This is the initial phase to change function again into residential or other land. Four cities that have additional pasture land, namely Pontianak, Manado, Banjarmasin and Samarinda. The three are on the island which is known as an island with very extensive forest land, namely Kalimantan and Sulawesi. Meanwhile, changes in pasture land to land with other functions (especially agricultural land) occurred in Serang, Bandar Lampung and Bogor.

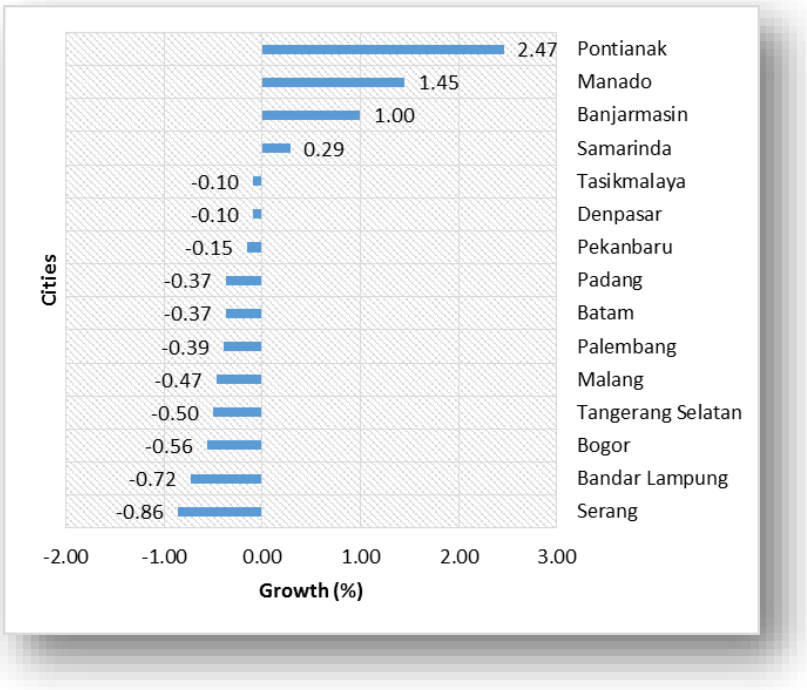


Fig 89 Land use growth: pasture area in 1980 to 2010

Source: author

The emergence of pasture land is an implication of opening new land. Initially, the land was forest or agricultural land. The forest was opened for timber and the land was left alone so it became pasture land. While for agricultural land, it is usually stockpiled and left for a long time so it becomes pasture. Four cities that have increased pasture land are cities in Kalimantan and Sulawesi. They are indeed

known as a city that still has vast forest land. So, they are dealing with land clearing by the community for timber extraction and the land is used for other functions.

But because the land change process is still going on for a long time, Han's paper is the pasture field. Meanwhile, other cities show that they are dealing with a reduction in pasture land. The pasture land they have had has changed into new residential areas, commercial land, and other buildings, including infrastructure buildings built by the government and other parties. Pasture land changes will indeed occur in cities that have the desire to make maximum use of the land they have so that the existing land can be productive and contribute to the city's economic progress. Therefore, in the pasture land, the function was changed to commercial land and so on. And when the city is able to reduce pasture land, it shows that the government has been able to use land that has been unproductive. For this context, the reduction of pasture land that occurs in cities must get appreciation. If there is additional pasture land, there must be a policy to reduce growth. Because pasture land is land that must be avoided in the city area.

6.8.4 Forest area growth

Changes in the function of land use for forests occur in all cities. Forests turn into land with various functions. Some cities change this land directly in the form of buildings, but in other cities the change in land is processed into a pasture and agricultural or plantation land, and then changes into residential land or other buildings. All cities face land changes with forest functions being another function. The city is indeed faced with an uncertain situation because of an increase in the need for land for settlements and other supporting activities. While on the other hand forest land is needed as a healthy source of air for the city. As previously thought, forest land will decline on a certain scale in the city of Sumba which is the object of research. Forests are considered as land that has no function for the city. They will use forest land as land with other functions.

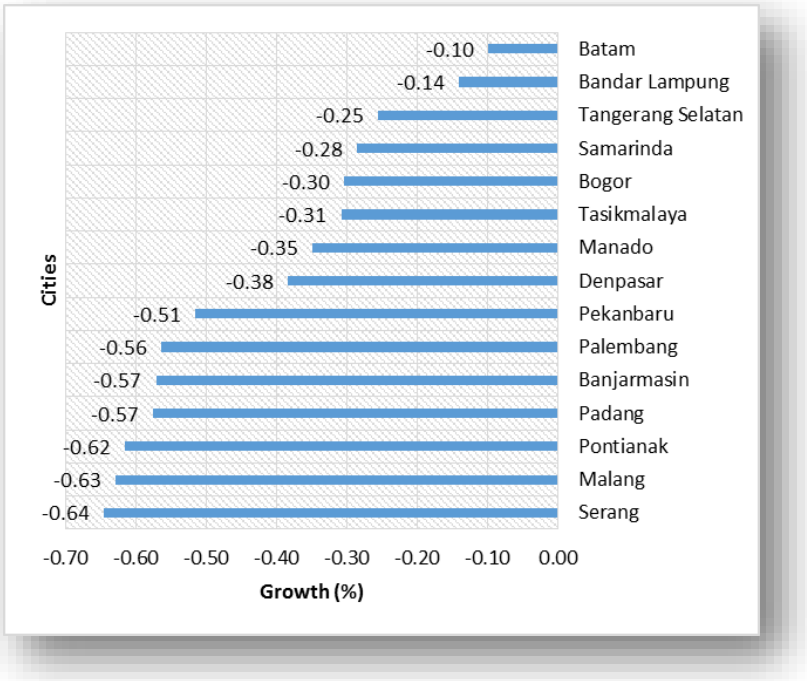


Fig 90 Land use growth: forest area in 1980 to 2010

Source: author

They use forest land for the sake of the future. And as long as that future still hasn't materialized, the land is left damaged and eventually becomes pasture. But there are also cities that use their forest land to become agricultural land, or new residential land, or also new industrial land to support the city's economic activities. Forest damage within the new city area will be realized by the government when several disasters arise such as floods, droughts, hot temperatures, and disease attacks. And the government always experiences delays in identifying efforts to destroy forests carried out by many parties. Cities are the object of this research to show such a situation. They are faced with efforts to destroy the forest on the grounds that forests are part of unproductive land. Thus, the choice to change the function of forests to land with other functions becomes realistic. Especially if it is associated with a very expensive land tax imposed on landowners. So the choice to become a commercial land is justified. However, in the future, the existence of forests is very important. For this reason, a policy must be written in the city development planning document so that the remaining forest can be maintained. Meanwhile, if there is no existing forest land, there needs to be a budget allocation to form new forests within the city.

6.8.5 Others area growth

There are two cities that have land that is not clearly identified, namely Padang and Pontianak. Meanwhile, for other cities, unidentified land has declined. This indicates that the function of each land use in each city is increasingly clear. Land use functions that will clearly help the government to understand the land use situation in their city. That way, the government can make policies that are appropriate and in accordance with needs by referring to data on land use functions. Even though at present, land use data shows inequality between land uses but this provides guidance to the government to take policies that are right on target in order to improve balance in land use utilization.

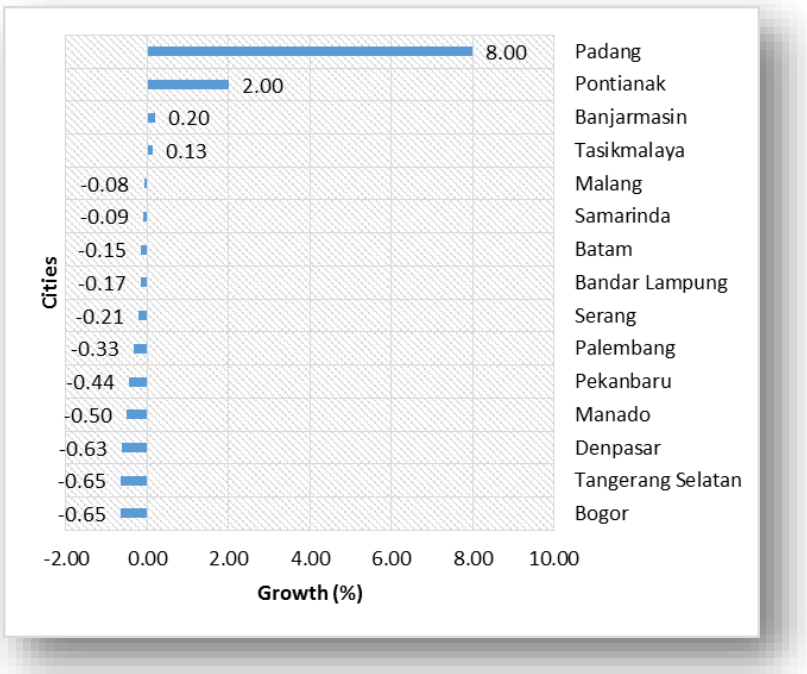


Fig 91 Land use growth: others area in 1980 to 2010

Source: author

Decreasing unidentified land is something that should have happened. Because all the land in the city must be readable technically. But it must be admitted that whatever efforts are made will still have imperfect results. Research conducted in this section shows that there are several cities whose land functions are not identified. But this does not mean that the quality of this analysis is low. And the data related to this unidentified land must be included in this report to make the analysis of land use complete. Indeed, the existence of this data has finally become controversial. But the authors hope the readers can understand it about the need for the author to enter the results of this calculation so that all analysis of urban land use can be more complete. Whatever the results obtained from this study.

6.9 Interaction between population growth & land use change

In simple terms, we can make estimates about the relationship of population growth with changes in land use. Because, the population increases all the time so that it can affect changes in land use. Population growth will always have an impact on increasing housing needs. If the house is built vertically, the land use will be suppressed. But if the construction of a house with a flat model then this will have an impact on increasing land requirements. Every house can need around 100m2 of land. Land use for settlements will reduce land use for other things.

6.9.1 Built area

If we pay attention, population growth does not show a very strong correlation with this landuse change. Changes in land use continue to occur as something that must indeed occur and do not have a direct correlation with population changes. This indicates that land use consumption carried out by the population has a huge impact on land use change.

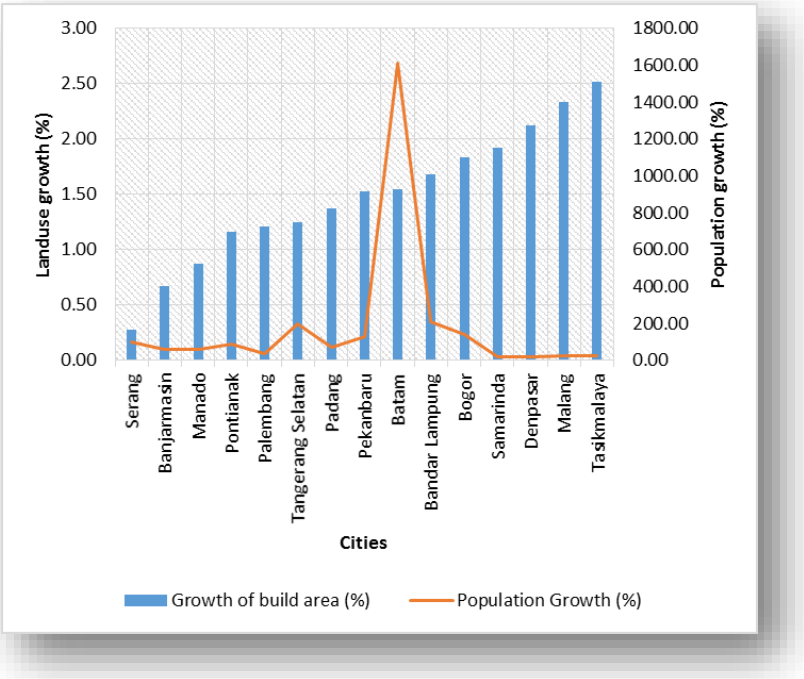


Fig 92 Relationship between population growth and changes in land use: building

Source: author

With a population that continues to grow organically as it is today, consumption of land use for buildings is very large. This happens as a result of the development of the city which positions itself as a city that can meet the needs of its citizens. So far, the city is unable to provide residential land and people's income is still low. Gradually, community welfare increased and this prompted the government to open licenses to the community to meet their needs for settlements as a result of the government's inability to provide settlements for the community. So, this land use change is an effect of the city's efforts to meet the internal needs of its people.

6.9.2 Agriculture area

In any city, agricultural land is always faced with population growth. This actually shows an anomalous condition. Supposedly, when the population increases, the availability of agricultural land also increases because the production of agricultural land must be high to meet the needs of city residents. But in reality it's not like that. Agricultural land in the city does not increase, even what happens is a decline in agricultural land growth. Indeed, in the city government there is the view that as a city the economy no longer needs to depend on agricultural activities but must shift to trade and service activities. Therefore, agricultural land in the city has decreased because there is a change in the function of land into residential areas or factories because there is a belief that the productivity of agricultural land is lower than the productivity of industrial land and trade. So that there are major changes in agricultural land as an impact of rising urban populations..

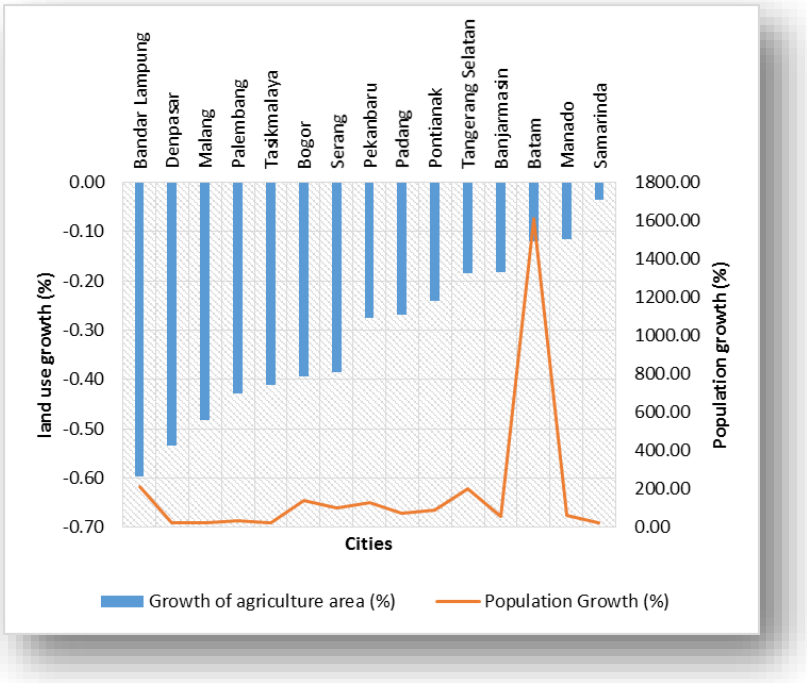


Fig 93 Relationship between population growth and land use change: agriculture

Source: author

No matter how much population growth influences changes in agricultural land. Because agricultural land will be the most sought-after land by many property developers, to become new residential land or new industrial land. And indeed there is a correlation between changes in agricultural land and population growth when population growth occurs it will increase the demand for new residential land. And that means there will be new land clearing for settlements and the most suitable land to be

used as residential land is ex-agricultural land. As mentioned earlier, agricultural land is indeed no longer feasible to maintain because there is a tax policy made by the government that makes the existence of agricultural land reduced. If the land tax for agriculture can be eliminated then the existence of agricultural land will continue. For this reason, the government needs to make special policies related to agricultural land even though there is a population growth that requires the opening of agricultural land to become new residential land, agricultural land must be maintained because there are many functions and benefits of the existence of this agricultural land. Again, any population growth will suppress the existence and extent of agricultural land. This is what happened in the cities in this study, their agricultural land experienced a drastic reduction due to population growth. There should be compensation given by the government to the owners of agricultural land. They could be exempt from land taxes and get assistance in managing agricultural land.

6.9.3 Pasture area

Increased population puts pressure on land clearing. Opening of agricultural land or forest creates new pasture land. Some cities show there is a change in pasture land to land with other functions, especially land with settlement functions. But there are several cities that show different conditions, this condition is an increase in pasture land in the city. The increase in pasture land is the impact of clearing forest land and agricultural land which is in the process of changing functions. This has an effect on the amount of land in the city.

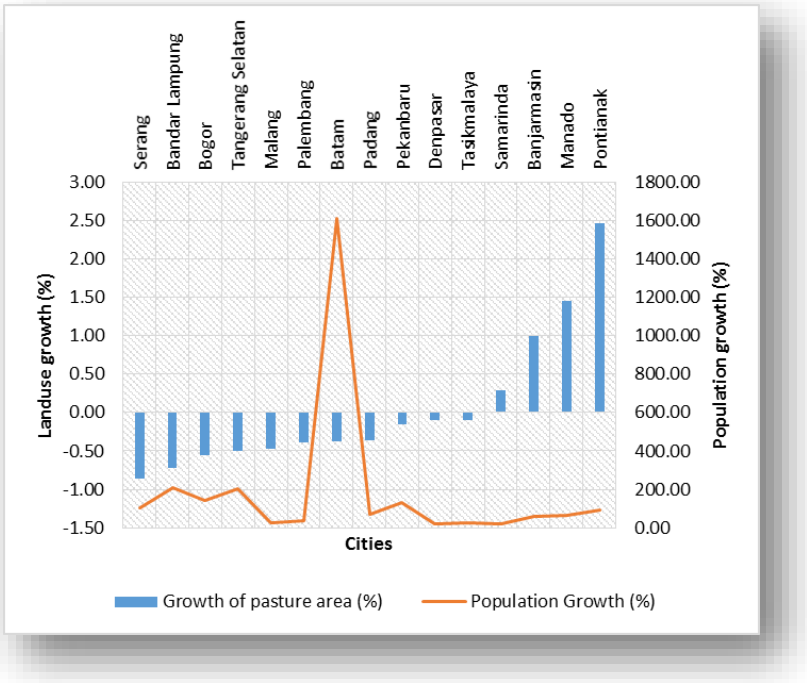


Fig 94 Relationship between population growth and changes in land use: pasture

Source: author

The same thing happened in the pasture field. Regardless of population growth that occurs in the city, changes in pasture land will increase and some will decrease. Pasture land increase which is the phase of previous land change in the form of forest or agricultural land is being prepared to become land with other functions, especially for commercial functions. Meanwhile, the reduction in pasture land is the impact of city government policies to increase the productivity of land in their cities. The

government wants all the land they have in the city, in this case, the land owned by the community as well, can be produced to contribute to the economic progress of the city. Therefore, there must be a reduction in pasture land and the land has changed its function to become residential land, commercial land, or industrial land. Reducing pasture land must be encouraged because pasture land is highly unproductive land. If this kind of land is very large in a city it will cause economic and environmental problems. When the urban environment becomes worse because of the presence of pasture land which is a connecting phase from the previous land function to more productive land functions, it will have a negative impact on the city's progress.

6.9.4 Forest area

Forest land will tend to fall within the city area. Forests are no longer considered an important land for the city. Cities tend to encourage land use for trade economic activities. Agricultural land and forest land are converted into residential, trading and factory land. This is the reason for the decline in forest land area when the population continues to increase. And actually, even though the population does not increase high, changes in land with forest functions will continue to occur. Forest land will be left to function because the wood is taken. Forest land has changed the function of preserving pasture and this will happen for years. Pasture land changes will occur when new land settlements are opened as a result of improving the economy of the community so that they need new, more quality residential areas that can also occur because of the large-scale urban population growth.

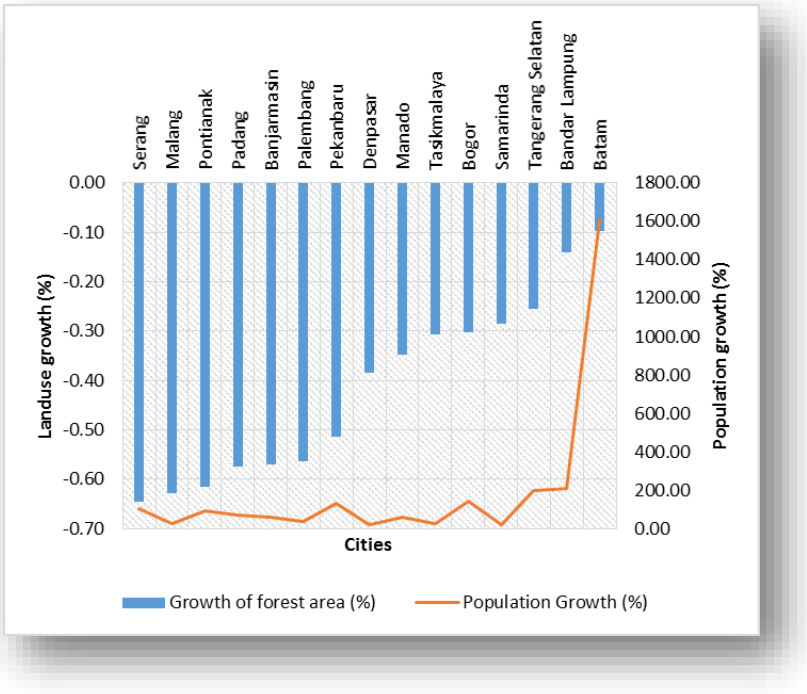


Fig 95 Relationship between population growth and changes in land use: forest

Source: author

The same thing happened to forest land. Forest land will decline when population growth occurs. When population growth is increasing and the population is also getting bigger, there will be changes in forest land into new residential land or agricultural land, also there is some land that functions as pasture land. This condition has caused pressure on the existence of the forest. Forests that actually have a significant contribution to urban environmental progress are considered to have no

contribution. The contribution given by the forest is indeed not visible but can still be calculated. Environmental balance is the biggest contribution given by forests. Ecosystems can be maintained and no catastrophic floods or droughts occur as an effect of the existence of forests. When forests are damaged, there will be problems with flooding and drought, new diseases will also arise due to damage to forest ecosystems. Therefore, the decline in forest area is a very alarming condition. Because this means the emergence of potential new problems within the city. The cities of this study show that all the forests they have experienced negative growth. Unfortunately, there is no attempt to prevent a decline in forest land in their city.

Even in some cities, there have been problems regarding forest loss from their territory. Some cities are even trying to make the Kota Baru forest as an impact of the awareness that arises after problems arise due to lost forests. This condition requires special handling from the Government at all levels, not just the city government. Because the existence of forests must be protected and protected. The size of the remaining forest that is still present must be utilized and maintained properly by the community and the local government. The community must also be able to use the remaining land they have to plant crops to make it green and beautiful. And the government must find new land that can be used to plant long-aged forest trees in order to maintain environmental balance within the city.

6.9.5 Others area

High population growth further clarifies the function of land use in each city. Indeed, there are several cities that show unclear land use conditions (excluding the categories mentioned earlier). Population growth contributes to land use and land change as defined in four other land use types.

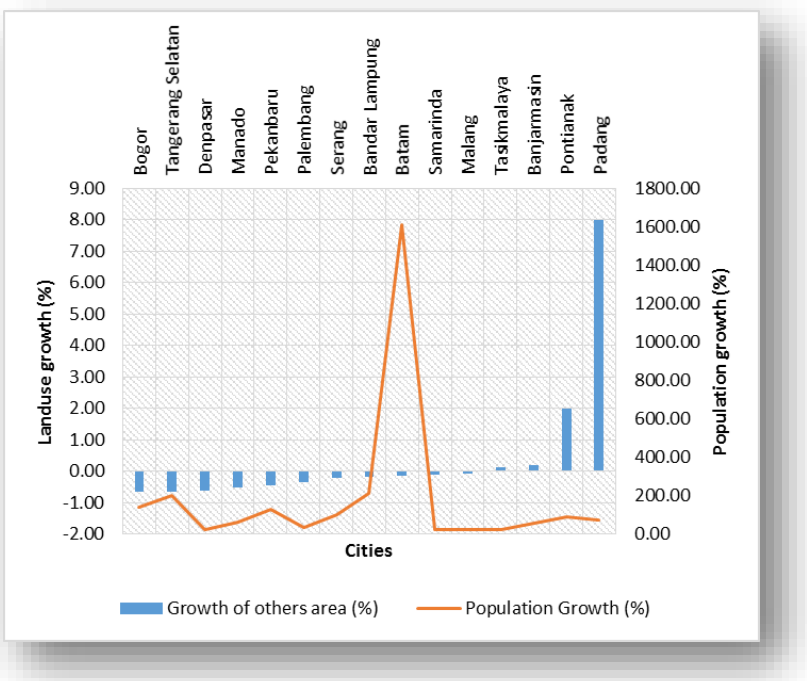


Fig 96 Relationship between population growth and land use change: others

Source: author

As the author stated earlier that the decline in the land that was not identified as fairly good progress from the data collected by the government. Because unidentified land raises problems in the analysis

of land use policies. But when the number of unidentified lands can decrease, more appropriate policy can be taken regarding the development program and urban planning. The author will not discuss this further because the decrease or increase in unidentified land is the remainder of the analysis that will be carried out by the author related to changes in land use in the city.

6.10 City size and land use change interactions

The question that also needs to be answered is whether the size of the city has an influence on changes in land use in the city. This question needs to be answered by showing data on changes in each land use and size of the city. In this section, we will see the relationship between the two factors, namely changes in land use and size of the city. For the size of the city, it will still use units of the city area, namely km2 and for land-use changes using units of percent. In this section, the author chooses to compare the two with their respective units.

6.10.1 Building area

The size of the city does not have a significant effect on land use changes in each city. This picture shows the interaction and position of each component that does not show the same trend. In fact, the trend that arises is an irregular trend. And we can say that in the context of the relationship between city size and land use change for buildings there is no real correlation. But indeed we can make additional hypotheses that every change in population additions will tend to and almost certainly influence the change in land use mainly because of the increasing need for settlements and other supporting buildings.

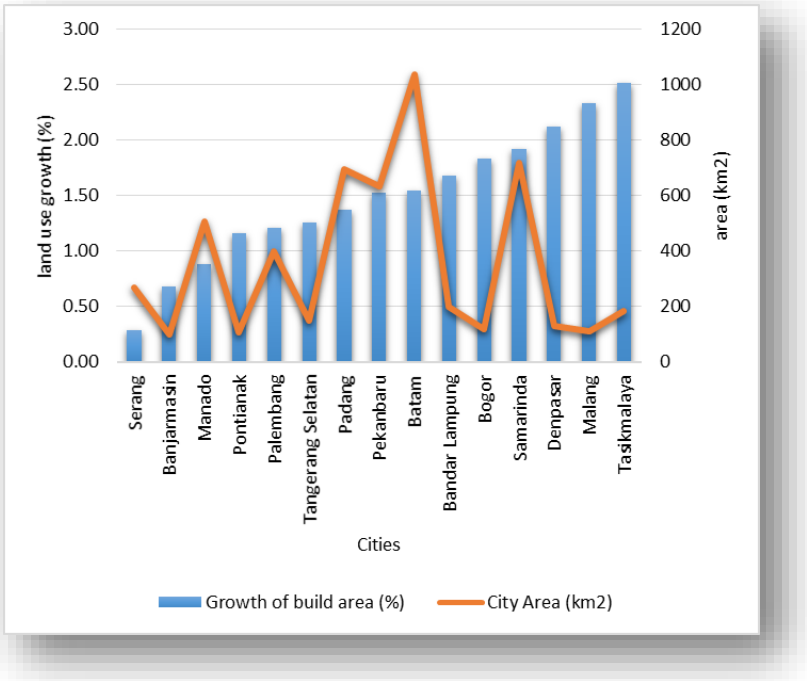


Fig 97 Interraction of city size and land use change: building in 1980 to 2010

Source: author

6.10.2 Agriculture area

Even though it is not clearly seen through this picture, we can see you tend to the relationship between the size of the city and changes in land use for agriculture. There is a tendency to say that the wider the size of the city, the smaller the change in land use for agriculture will be.

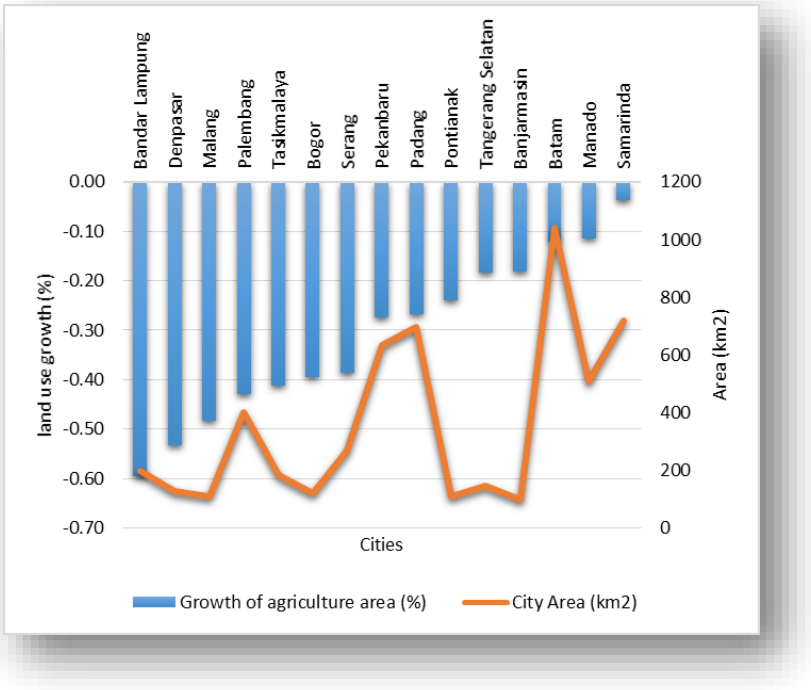


Fig 98 Interraction of city size and land use change: agriculture in 1980 to 2010

Source: author

This is quite acceptable because indeed the size of the big city will make land use changes for agriculture look not big. Because it is influenced by the size of a very large city earlier. But we can say that in this comparison of data there is a tendency for the relationship between city size and land use change, which is a relationship that affects each other.

6.10.3 Pasture area

The same thing happened to land use pasture. There is a tendency that when the size of the city is large, there will be steady growth in land use pasture. And there is a tendency if the size of the city is small then land use pasture will increase. And, if the size of the city is small, the land use pasture will grow big. This phenomenon is a phenomenon that is quite interesting to note because land use pasture is often seen as a land that is not productive for the municipal government. If there is a change in land from other functions into a pasture function, we can estimate that this happens as a result of other land use changes, for example, the change of forest land into the pasture and also agricultural land that becomes a pasture. Land with pasture functions can indeed occur by a variety of things. It could be that this increase in pasture land is the result of changes in the function of forest land. The forest is cut down by the community and then the wood is taken, and finally, the land is left alone and falls into the category of pasture land type. But it can also occur as a result of land changes in agriculture. Because the agricultural sector is no longer considered attractive to the community, eventually the land they made as agricultural land has been converted into the land that is not used, and finally, it is included in the pasture land category.

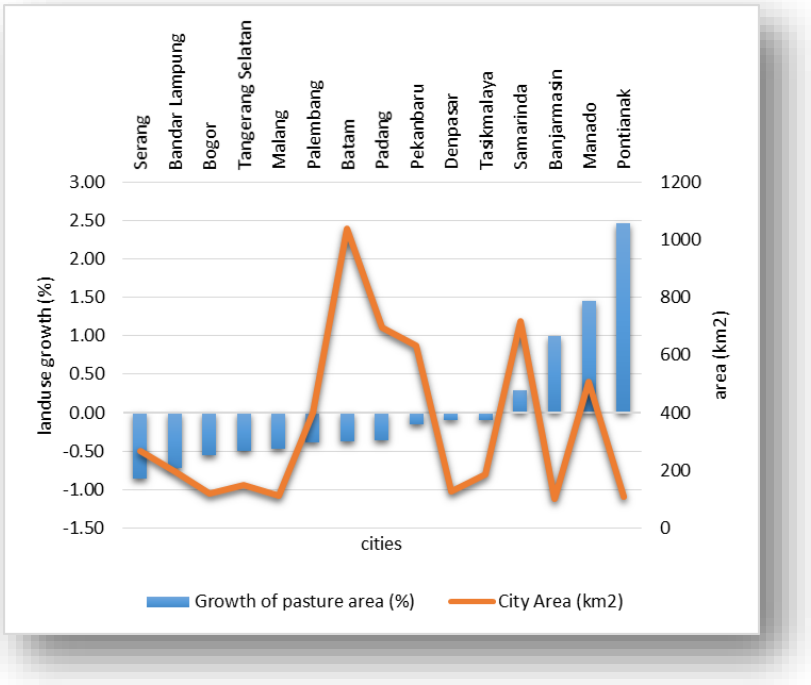


Fig 99 Interraction of city size and land use change: pasture in 1980 to 2010

Source: author

6.10.4 Forest area

If we make an exponential line related to the size of the city, then we will see an interplay between the size of the city and the growth of the land use forest.

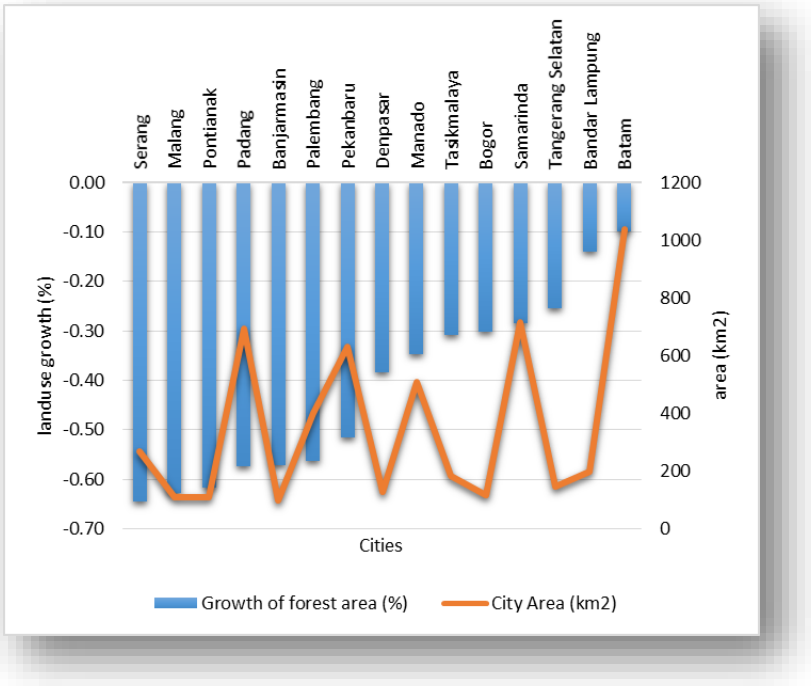


Fig 100 Interraction of city size and land use change: forest in 1980 to 2010

Source: author

The relationship that the author intends is that if the size of the city is large then the change in land use forest will be small in terms of percentage. The opposite thing happens is when the size of the city is small then the change in land use forest will be large. This is related to the percentage of the size of the city which then affects growth in percentage on changes in land use. And this shows also that there is a change in land use forest in all cities. The existence of a land use forest is a challenge for the city government to reduce it to be replaced with land with other functions that are considered more productive and provide economic contributions directly to the city. Of course, this view of the flow can be changed, because the existence of urban forests is a very important existence for the future of the city. But this problem will certainly be discussed in other issues, not in this study.

6.10.5 Others area

For other land use changes it does not indicate a relationship with the size of the city. We can see this from the tendency shown by the graph below. And as the author stated earlier that the decrease or increase in unidentified land is a complement to the data analysis related to other land functions. This data remains the author's input as an effort to complete all existing land uses in the city. Although, the authors must admit that no specific analysis was carried out related to this unidentified land. Because this data is a residue from the total data carried out on the function of urban land.

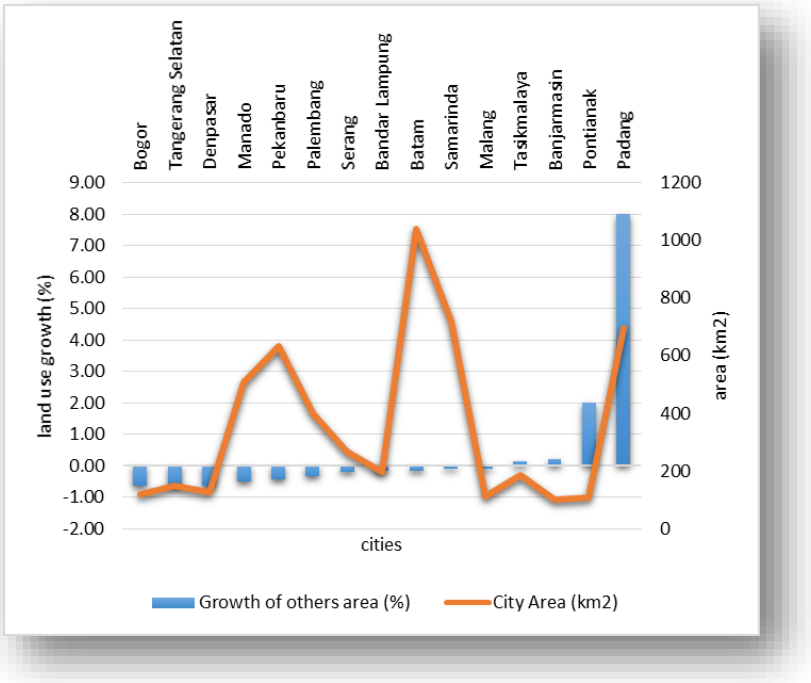


Fig 101 Interraction of city size and land use change: others in 1980 to 2010

Source: author

6.11 Data set population growth and land use change

The data below shows quantitative data on the relationship between population growth and land use change. The analysis results show that there is a correlation between growth and change in land use. Because land use is strongly influenced by population changes. If the population is high, it will require extensive land as a place to move. All land changes when populations experience growth. Therefore we can say that population growth has a major influence on changes in urban land. Indeed there are

changes that are directly related to population growth, but there are also changes in the land that are not directly related.

Table 63 Data set population growth and land use change in 1980 to 2010

Landuse		Palembang		Tangerang Selatan		Bogor	
		1980	2010	1980	2010	1980	2010
Population		1073384	1455284	428818	1290322	393423	950334
Building	%	28.3	62.5	24.1	54.3	17.4	49.3
Agriculture	%	35.2	20.1	22.3	18.2	45.6	27.6
Pasture	%	6.9	4.2	45.4	22.6	7.3	3.2
Forest	%	28.4	12.4	5.1	3.8	27.4	19.1
Others	%	1.2	0.8	3.1	1.1	2.3	0.8

Landuse		Batam		Pekanbaru		Bandar Lampung	
		1980	2010	1980	2010	1980	2010
Population		55241	944285	389732	897767	284275	881801
Building	%	12.7	32.3	19.6	49.5	18.9	50.6
Agriculture	%	17.4	15.3	18.2	13.2	33.4	13.5
Pasture	%	38.5	24.2	19.4	16.4	8.7	2.4
Forest	%	29.4	26.5	41.2	20	37.2	32
Others	%	2	1.7	1.6	0.9	1.8	1.5

Landuse		Padang		Malang		Denpasar	
		1980	2010	1980	2010	1980	2010
Population		484253	833562	653123	820243	648769	788589
Building	%	22.6	53.7	18.7	62.3	17.4	54.3
Agriculture	%	37.6	27.5	43.3	22.4	36.2	16.9
Pasture	%	4.9	3.1	3.2	1.7	2.1	1.9
Forest	%	34.8	14.8	33.6	12.5	42.7	26.3
Others	%	0.1	0.9	1.2	1.1	1.6	0.6

Landuse		Samarinda		Tasikmalaya		Banjarmasin	
		1980	2010	1980	2010	1980	2010
Population		597331	727500	500389	635464	394667	625481
Building	%	9.7	28.3	12.4	43.6	31.1	52.1
Agriculture	%	24.6	23.7	48.3	28.4	28.6	23.4
Pasture	%	1.4	1.8	2.1	1.9	4.1	8.2
Forest	%	63.2	45.2	36.4	25.2	35.2	15.1
Others	%	1.1	1	0.8	0.9	1	1.2

Landuse		Serang		Manado		Pontianak	
		1980	2010	1980	2010	1980	2010
Population		284464	577785	344715	557579	290594	554764
Building	%	64.3	82.4	21.2	39.8	23.1	49.9
Agriculture	%	18.4	11.3	31.2	27.6	39.6	30.1
Pasture	%	2.1	0.3	1.1	2.7	1.5	5.2
Forest	%	13.8	4.9	43.7	28.5	35.4	13.6
Others	%	1.4	1.1	2.8	1.4	0.4	1.2

Source; author

Changes in land for buildings are land changes that are directly related to population growth. While other land changes have changed due to changes in the other fields.

6.12 Data set city size and land use change

The same thing will happen to the relationship between city size and land use change. The size of the city also influences changes in the land. Especially in the proportion of land change. The wider the size

of the city, the smaller the proportion of changes in each land except for changes that are very large. We can see about this in the table below

Table 64 Data set city size and land use change

Landuse		Palembang		Tangerang Selatan		Bogor	
		1980	2010	1980	2010	1980	2010
city size		400.61		147.19		118.5	
Building	%	28.3	62.5	24.1	54.3	17.4	49.3
Agriculture	%	35.2	20.1	22.3	18.2	45.6	27.6
Pasture	%	6.9	4.2	45.4	22.6	7.3	3.2
Forest	%	28.4	12.4	5.1	3.8	27.4	19.1
Others	%	1.2	0.8	3.1	1.1	2.3	0.8

Landuse		Batam		Pekanbaru		Bandar Lampung	
		1980	2010	1980	2010	1980	2010
city size		1038.84		632.26		197.22	
Building	%	12.7	32.3	19.6	49.5	18.9	50.6
Agriculture	%	17.4	15.3	18.2	13.2	33.4	13.5
Pasture	%	38.5	24.2	19.4	16.4	8.7	2.4
Forest	%	29.4	26.5	41.2	20	37.2	32
Others	%	2	1.7	1.6	0.9	1.8	1.5

Landuse		Padang		Malang		Denpasar	
		1980	2010	1980	2010	1980	2010
city size		694.93		110.06		127.78	
Building	%	22.6	53.7	18.7	62.3	17.4	54.3
Agriculture	%	37.6	27.5	43.3	22.4	36.2	16.9
Pasture	%	4.9	3.1	3.2	1.7	2.1	1.9
Forest	%	34.8	14.8	33.6	12.5	42.7	26.3
Others	%	0.1	0.9	1.2	1.1	1.6	0.6

Landuse		Samarinda		Tasikmalaya		Banjarmasin	
		1980	2010	1980	2010	1980	2010
city size		717.11		183.85		98.46	
Building	%	9.7	28.3	12.4	43.6	31.1	52.1
Agriculture	%	24.6	23.7	48.3	28.4	28.6	23.4
Pasture	%	1.4	1.8	2.1	1.9	4.1	8.2
Forest	%	63.2	45.2	36.4	25.2	35.2	15.1
Others	%	1.1	1	0.8	0.9	1	1.2

Landuse		Serang		Manado		Pontianak	
		1980	2010	1980	2010	1980	2010
city size		266.74		508.39		107.82	
Building	%	64.3	82.4	21.2	39.8	23.1	49.9
Agriculture	%	18.4	11.3	31.2	27.6	39.6	30.1
Pasture	%	2.1	0.3	1.1	2.7	1.5	5.2
Forest	%	13.8	4.9	43.7	28.5	35.4	13.6
Others	%	1.4	1.1	2.8	1.4	0.4	1.2

Source; author

If we look at changes in land use from cities that have the highest population growth and also cities that have the lowest population growth, we will see that changes in the proportion of land with various functions tend to be the same between high and low population growth. This indicates that population growth has an influence on land function changes, especially for buildings because each population growth means increasing population needs for settlements. Then all types of land that exist will tend to change function into residential land.

This condition then made the proportion of land for settlements increase, while for other land functions are decreased. But this condition must indeed be seen in detail. What we see in the picture above shows that a condition occurs in a city that has the highest and also the lowest population growth. But what about the condition of the other cities that have not high population growth and are also not low? We will discuss this in another section because it deals with the formulation of conditions involving various data that must be processed in such a way as to get a discussion and then become a conclusion.

6.13 Closing remarks

We have discussed the issue of population growth related to urban fabric and land use. The results of the analysis the authors did show that population growth has an impact on changes in the two parameters of the city. Control over population growth is an important agenda for city managers. The intended control is controlling the construction of supporting facilities from the existence of the population. City managers must build supporting infrastructure by paying attention to the existence of certain land uses. The balance in city development will guarantee the sustainability of city activities in the future. The form of urban fabric and also the conditions of land use change are a reflection of the high population consumption of ecosystems in various forms.

Through this study, we can say that population growth has an influence on changes in the shape of urban space, which is represented by the form of the urban fabric, also has an influence on changes in the function of land in the city. Cities are what changes in form and changes in land functions and almost no policies are found that show that the government has a strategy to control population growth or a strategy to shape urban space and maintain the proportion of land when population growth occurs. The absence of a policy that leads to this has implications for changes in the shape of space and functions of land that continue to occur over time. On the one hand, the Beru material in the form of space and also changes in the function of land is a natural thing and can be supported. But on the other hand, problems will arise that can have negative implications for the city. The form of space that is increasingly crowded by buildings in all categories of space can cause environmental problems and also possibly economic and social problems. Likewise, with the land change in terms of proportions and also functions, it can have negative implications for the future of the city. If the city becomes more crowded with buildings and there is an imbalance between the functions of certain land and other functions of the land, environmental problems and economic and social problems will arise which can have a negative impact on the future of the city.

This phenomenon should get serious attention from the government. But the search done by the author shows that development policies in each city do not lead to efforts to safeguard the future of the city and create a better future for the city. Urban development planning, as well as urban spatial planning that has been compiled by each city government, does not indicate a policy that leads to a better concept of the future of the city. Especially related to the shape of city space and also the balance in the proportion of urban land use. In fact, all cities show ignorance about the implications of imbalance in urban land use. The shape of the city space they also consider increasingly solid will be better. If there are many buildings that fill the entire city space, then this is considered a good thing economically because it will increase taxes and increase city government revenues. Even though they did not see the pattern of population density associated with the shape of urban space and the function of urban land. If population density is in the right position and shape then that means the city is in the process of being a compact city.

CHAPTER 7 –ANALYSIS OF THE RESULT

This section will briefly explain the results of the research discussed in another chapter. Research on population growth related to several things has been discussed in detail. Some of the things discussed related to population growth are population dneisty, population structure, urban fabric and land use. Population growth does have an impact on various sectors and this research tries to conduct an assessment of the issues that have been determined and have been discussed previously. At the stage of data collection, this process is quite difficult to do because of the distribution of data owned by each city. Data distribution must be collected in confirmation one by one to get confidence that the data that the author has can be accounted for. Research on population growth and its effects from the side of city space is still not widely done. Although there is research on this matter, the discussion tends to be partial and not united between one city and issues with the city and other issues. The results obtained from this study will provide an understanding of the influence of population growth on various aspects of the city. And this result can be used by the government in making city development policies. Whatever development policies are taken by the government will have an impact on the population of the city and the physical form of the city. Therefore research on population growth is very important to be able to understand how the impact of growth on city space. Because the population is needed by the city to be utilized properly. But managing populations is also very important so that it does not cause problems in the future. Therefore, about how it impacts, it is very important to be studied in order to gain understanding and later be able to know how to manage it.

7.1 Population growth

The picture shows about population growth. Each city has a different population growth from each other. There are cities that have a population growth above 1000 percent. This number is an extraordinary number. But in Batam, as one of the cities that became the object of this study, Batam did have high population growth and this was estimated because Batam was visited by many residents from outside the city. Since Batam became a city built to match Singapore, there are many human resources who come to this city and become residents of the city. Meanwhile, other cities have grown varied because population growth has mixed and is relatively balanced between birth and migration.This population growth is compared to the size of the city. The results show that there is a trend towards the same trend between population growth and city size. The size of the city has an influence on the capacity of the city. If migration is high and they live in any place, but they will be included in the city population status because the city land is administratively very large. Therefore, the results of the analysis show that there is an influence on the size of the city with population growth. Hypothetically this condition is acceptable. A city will have a high population if it has an administrative side of the city. And conversely, the population will be low if the size of the city is low. Because the pattern of city settlement development in developing countries tends to be flat. The city will wake up in a flat shape. And this is in line with the influence of city size on population and population growth.

So population growth does occur in every city with very diverse factors. Population growth can be caused by growth drawn by the city because there are so many facilities for the community available in the city and there is also the potential for improving people's welfare when people choose to live

in the city. And this urban population growth has been predicted for a long time and by many parties because the majority of the population in the whole world will tend or the majority live in cities. They left the village because the village could not meet the increasing needs of the population in various ways. Villages do have the advantage of being beautiful and calm, but humans also need new challenges to maintain their existence. And they also need the best service from the government, and that is in the city, not in the village. That is why the majority of the world's population lives in urban areas with all kinds of consequences that follow.

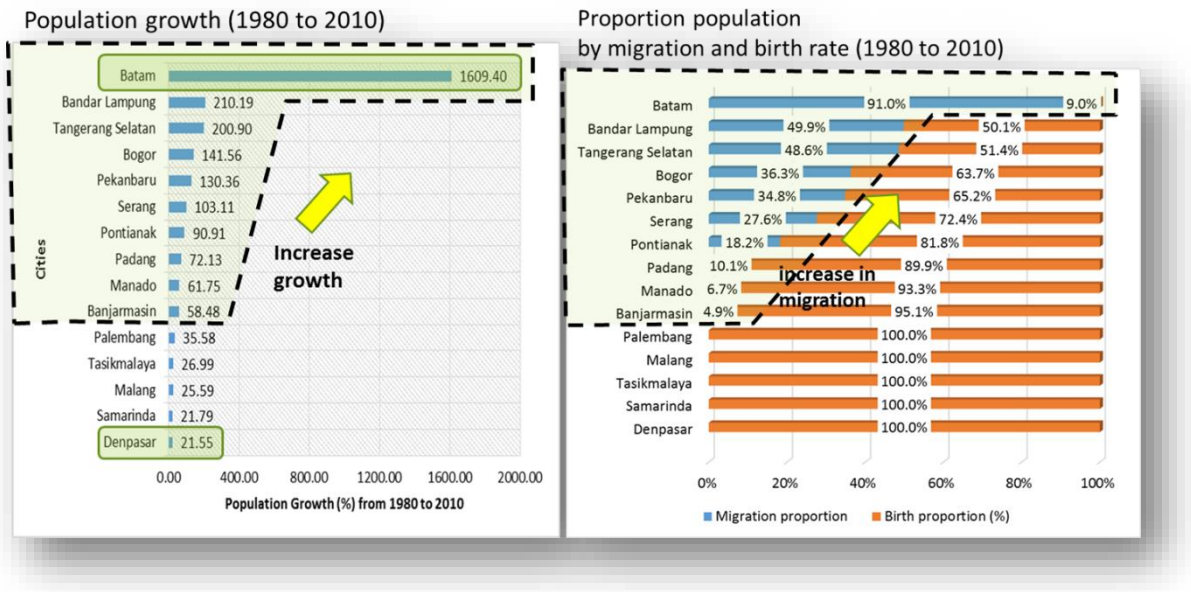


Fig 102 The population growth and migration proportion
Source: author

And this situation will continue to occur all the time and from year to year. Therefore, the size of the city greatly affects the growth of the city population. Because this is related to the capacity of the city. If the city has a high capacity for the population, regardless of the urban population entering from various directions will be able to be accommodated by the city and become residents of the city. They will be recorded as city dwellers because they live in land that falls within the boundaries of the city administration. That is why there is a relationship between the size of the city and the growth of the city population. If the size of a big city, the population growth will also be large or at least will increase rapidly. This is the background of the emergence of the term megapolitan when cities grow and expand beyond the limits of city administration so that 1 city will not be able to deal with itself without involving other city governments or other local governments around it.

Because the city has spread in all directions physically, then administratively a new approach is needed to overcome it or deal with it. The concept is agglomeration or megapolitan and this city must also be managed by a special institution or managed by a larger institution, not managed by a city government institution or a regional government, but by a provincial government or an Authority body. So, the writer can say that there is a correlation between the size of the city and the growth of the urban population. This phenomenon is a common phenomenon and occurs in many cities throughout the world. Indonesia as a developing country will face this phenomenon more expansively because the population will grow high and occur without control, and this has implications for the development of the city. In this section, we will talk about the size of the city, where the size of the city has an influence on the growth of the city population.The author sees that the government's attention regarding this

condition is still very low. The size of the city and population growth are not considered as interrelated phenomena. If the Government has concerns regarding this matter, then the concept of developing the city will be juster. Distribution of residential areas will not occur as extreme as it is today. Development policy will focus more on the city center while its suburban area will continue to be maintained as a buffer zone. Peripheral regional functions maintain an urban environment, can also be agricultural land, urban forests, and rainwater catchment areas. Unfortunately, city development policies are not like that. The suburban area seems to be increasingly full by the population as well as residential buildings and supporting activities. Developments in suburban areas are often seen as the success of the city government in advancing its city. Even though the distribution of economic activities is too wide and everywhere is going to make it difficult for the government to provide supporting infrastructure. Especially related to urban transportation problems. If the government has reliable urban transportation then the distribution of such economic activities does not cause problems. Unfortunately, all cities that are the object of this research do not have the urban transportation development policy as needed by the city.

If we calculate the birth rate based on the average birth rate that occurs in Indonesia, we will get the population that should be in that city. The author analyzes the population addition based on population in 1980. Then from the results of the multiplication of the average birth rate in Indonesia, the authors get the population figure that should be in 2010. But in fact the population census by the government shows that there are some cities that have the population is below the population figure based on the average birth rate. And there are some cities that have populations above the population based on the average birth rate. This shows that there is a possibility that the population inside the city chooses to live outside the city limits and there are some other populations from outside who choose to stay in the city area. This phenomenon, with reference to population growth based on the average birth rate, can be said to occur inward migration and out-migration from each city. Incoming migration is called in-migration (immigration) and out-migration is called out-migration (emmigration). This term refers to the analysis of migration issued by the UN. So there are some cities that have populations in 2010 that are above the population results of the average birth rate analysis that occurred in that city. Some are below the population results of the analysis of the average birth rate. That is, there are several cities that are faced with a population growth that does not originate within the city itself. However, the city accepts the population from outside or accommodates the population from outside so that it increases the real population as already recorded by the population census carried out by the government in 2010. This condition usually occurs in cities that have a size that is large enough to accommodate populations from outside the city to live in the city, as I have said before. Some other cities have a population below the population resulting from the birth rate of the average population. This usually occurs in cities that have a relatively small size so that population growth that occurs in cities, in fact, is not accommodated by the city. The population will shift out of town following the physical form of the city naturally. But administratively their position finally falls outside the boundaries of the city administration.

Many cities are experiencing this condition. They will need a population from outside the city because the population in the city is unable to meet the human resource needs to work in various sectors. In addition, residents from outside the city also saw that the city provided an opportunity for them to improve their economic lives. So they left their area before and chose to live in the city with various consequences. This phenomenon of urbanization is a common phenomenon and usually occurs in cities in developing countries. Cities in developing countries often face the globalization process that

cannot be controlled optimally. The reason is the limited human and financial resources. Because to control urbanization special handling is needed. And that means that human resources and sufficient funding are needed.

On the other hand, cities also often face conditions of limited land for settlements. This has prompted many investors to build Housing Outside the City Administration. The reason proposed by the housing developer is that the price of land outside the city is much cheaper than land in the city. In addition, licensing and tax policies for the home within the city are far more complicated than the permits and taxes outside the city. Because usually, areas outside the city are parts of districts that have developed policies that tend to be rural. Village and city development policies are of course different. District government policies and city government are also different. They have special and distinct characteristics, their policies will not be the same because the vision of development they have is also different. Managing cities by managing villages is a different matter. This is used by developers to build Housing Outside the City administration. But still physically connected with the city. This is what causes the shape of the city to become increasingly wide to the limits of the city administration. This phenomenon is called physical city agglomeration. Administratively, the government has also tried to make policies at a higher level, namely at the provincial government level to create a concept of integrated development between the Regency and the city. Because the main quota is growing rapidly to the limits of the city administration, up to the district, which has led to the emergence of a new megapolitan. So that development policy is needed that is more targeted and more in line with needs.

If we note that there are several cities included in the category that have residents resulting from in-migration and some cities tend to face the phenomenon of out-migration. This condition has an influence on the growth of the urban population. And we realize that urban population growth is indeed very dynamic. Because there are many factors that influence population growth in each city. In this study alone the authors found that there are several cities that have populations because the population enters the city, but there are also cities that are faced with population reduction as a result of the city population being released outside the city limits. This is the implication of our analysis of population growth based on the average birth rate, which we then compare with the population counted by the government through the population census. And when we compare, we find that there are some cities that have population growth above the average birth rate, and there are some cities where the population is under a count analysis based on the average birth rate.

Batam City is a city that gets a population or has a large population originating from high migration rates, because if we calculate the population that should be in Batam City by referring to the population in 1080 which we multiply by the average birth rate, then it should the population in Batam is not as large as it is today. But it turns out the population in Batam City is very much. Then we can estimate that this very large population comes from residents outside Batam City who enter the City of Batam and then live in Batam City. From the calculation, we did show that there are 91% of the population of Batam City that comes from outside the city of Batam. But for the case of Denpasar City shows that the current population is actually lower than the population that should be when we multiply by the average birth rate. The figure reaches minus 25%. The author estimates that this happened because the size of the city of Denpasar is relatively small so that residents of Denpasar City chose to live outside the limits of the city of Denpasar because the capacity of the city of Denpasar is no longer possible.

The capacity that author mean here is related to the ability of people to buy land that is already very expensive in the city of Denpasar, which then makes people choose to live outside the boundaries of Denpasar City which has a relatively low land price. So that housing prices can still be affordable. So, the phenomenon of population numbers that we combine between birth rates and migration rates shows quite interesting conditions that it turns out that not all cities have populations based on their own birth rates, but there are many cities that grow and develop in terms of population from outside the city, who came and entered the city and then lived in the city thus contributing to the population growth in the city

7.2 Population growth and population density

The author found that high density will occur in cities that have small city sizes. But for cities with large sizes, the density will be low. This can be accepted by the fact that the dividing factor (city size) will have an effect on density. Because the formula is density equal to a population divided by city size. If the size of the city is large, the density will be small and if the divider is small, the density will be high. The author found this condition in the city which was the object of research. The author sees that small cities will always have high density. This gives an indication to city managers that they can pay attention to the population they have. High density often creates environmental, social and economic problems. If it is not managed properly, it will cause problems in the future.

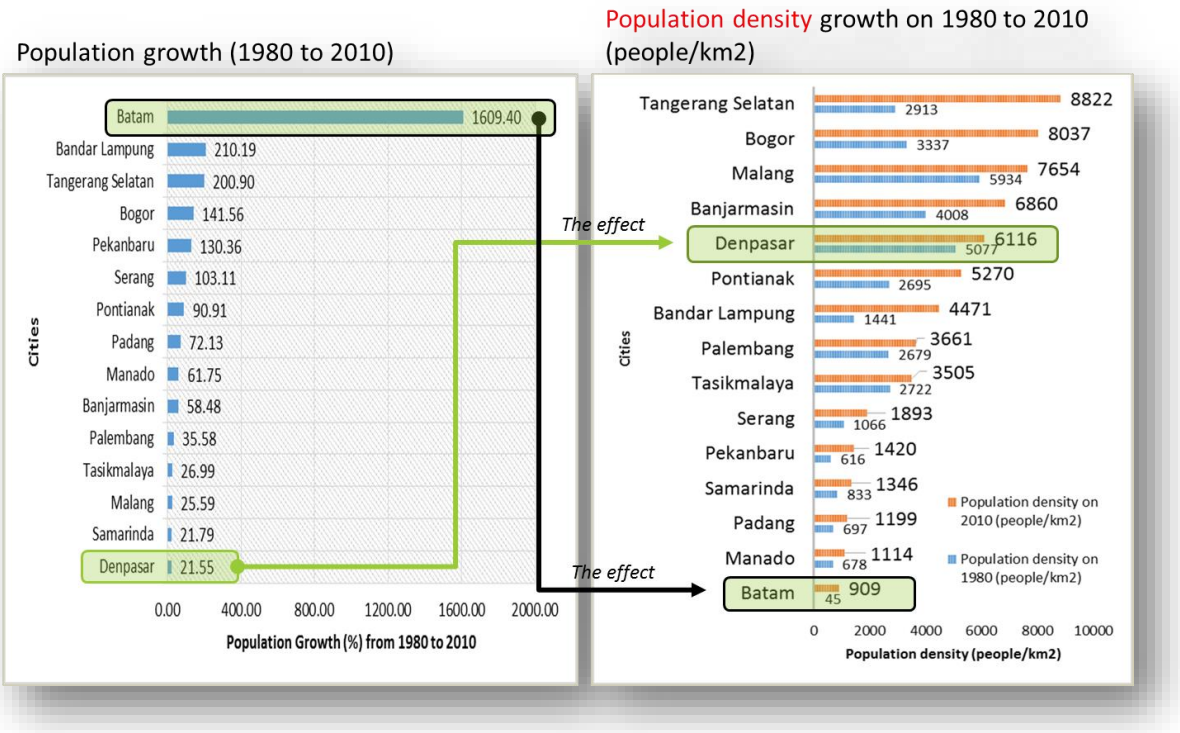


Fig 103 The effected of population to population density
Source: author

The government must be able to manage the population well. They must be able to think about distributing the population fairly. There is space that cannot be densely populated and there is space that can be densely populated. city managers must be able to see and identify areas that are allowed to have high populations and which populations are low. Because all of this will have implications for the concept of sustainable development. If the environment becomes unbalanced, this will have a

negative impact on the city and the people themselves. This will harm themselves and harm others. Each land will have the ability to accommodate different populations with another land. Density will cause problems if it is on land that cannot accommodate large populations. But large populations and high densities will have a positive impact if they are on land that does require high populations and is ready to accommodate populations and high population densities.

The size of the city influences various things. Not only in population density but also in terms of economic activities. If economic activity is high, the population will come and try to settle in areas close to new economic sources. In this regard, we can see in the picture that shows another dimension about population density. If at this initial stage we see population density from the size of the city, in another part we will see population density based on the distance from the city center. Of course with special provisions, this distance is defined as the distance of the city center to the center of the district. The reason for the density that the authors calculated in this study are the density of districts per district area itself. The results show a link between size and population density. Districts will face an increasing population. Every district manager can see this population increase as a potential and must be managed so that it can provide benefits to the welfare of the community. Do not let what happens at this time, an increase in the district population affects the population of the city and becomes a new problem for all parties, both for city and district managers and for the community itself. In another section, the author also found an analysis that population density is high if the district is close to the city center. The closer the district is to the center, the higher the population density of the district. This phenomenon shows that district managers near the city center must have high skills and abilities in managing district developments related to the increase in population in the district. The ability of the district manager to manage the district will have an influence on the condition of the city as a whole. Because a district close to the city center will become an icon for the city. If the district is well-designed and organized, the city will be considered a neat and organized city. Population density close to the city center is a common phenomenon throughout the city. Although there is a tendency to shift populations from the city center to other regions. This is related to the distribution of economic activities. The closer the district is to the location of the city's economic activity, the more the population density will spread. Because the population, once again, is indeed approaching the center of economic activity. That's where locations can ensure that they can survive in all city activities. Conception was initially so when the population chose to live close to the city center.

But on the other hand, the authors also found the fact that the growth of population density in the city center was lower than the population growth in the suburbs. This indicates that there are symptoms of a high-density transition from the city center to the suburbs. There is such potential. But indeed at this time, density in the city center is still the highest compared to the density in the suburbs. It's just that, the author sees very high growth in the suburbs. If this continues, there will be a graph of population density. The population will be crowded near the city center and on the edge of the city. And there will be a density basin in the section between the city center and the suburbs. In terms of people / km2, it is still low compared to the density in the city center.

But very high growth can have an impact on the distribution pattern of population density. The policy of city managers about the economic center of the city has an impact on the development of city areas in rural areas. Because cities will get bigger and increasingly need a lot of economic activities to be able to provide services and to meet the needs of an increasingly high population. therefore, the distribution of new economic centers can have an impact on population distribution. Thus, subcity areas that were originally far from the economic center of the city became areas close to the new

economic center. This policy is indeed on one side but on the other hand, creates problems. When subcity areas become more densely populated, peri-city areas outside the city administrative boundaries will become areas that are also full of population. In fact, areas outside the city are not prepared to become cities physically and infrastructure. As a result, there will be a new problem, namely the emergence of slums which will cause social, health and economic problems for the city and this will become a new problem for city managers. city managers must be able to provide decent settlements for their citizens.

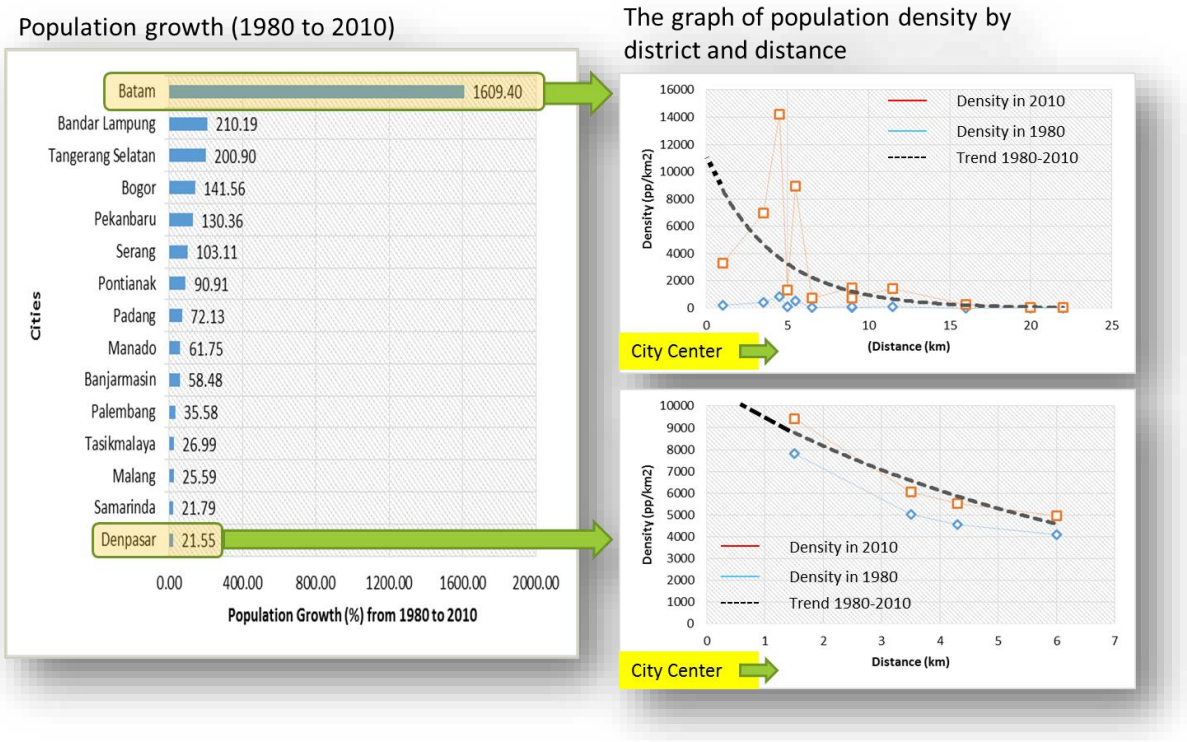


Fig 104 The effected population growth to density by distance
Source: author

If the population gets higher then this will further increase the need for shelter. So the design of residential buildings must be adapted to the needs. Vertical buildings are chosen because the land will be narrower as a result of the increasing land demand for various types of community activities. The ability of city managers to read the needs of the city will affect the quality of life of the city. If we pay attention to the following picture, we can read the situation of district population density seen from the distance of the district to the city center. Density remains high in the city center but there is a phenomenon of higher density on the edge of the city compared to growth in the city center. Interventions in vertical residential development will have an effect on population density patterns.

At present, there is a tendency for city managers to build several centers of economic activity. This has an impact on the distribution of the population. If the population distribution is still in accordance with the carrying capacity of the city and the district, it will not cause problems in the future.

7.3 Population growth and population structure

Next, the author will explain the effect of population growth on changes in population structure. The author found that there was a shift in population structure in three large groups of population

structures namely pre-productive, productive, and post-productive. The authors found that the post-productive group had a very drastic proportion compared between 1980 and 2010. The proportion that places cities in Indonesia as cities that have a dependency population group And this will greatly help grow the city's economic activities because other population structures will utilize the resources they have for activities that have more impact on the city's economic activities.In another section, the authors found that the growth rates of pre-productive and productive populations increased almost the same.

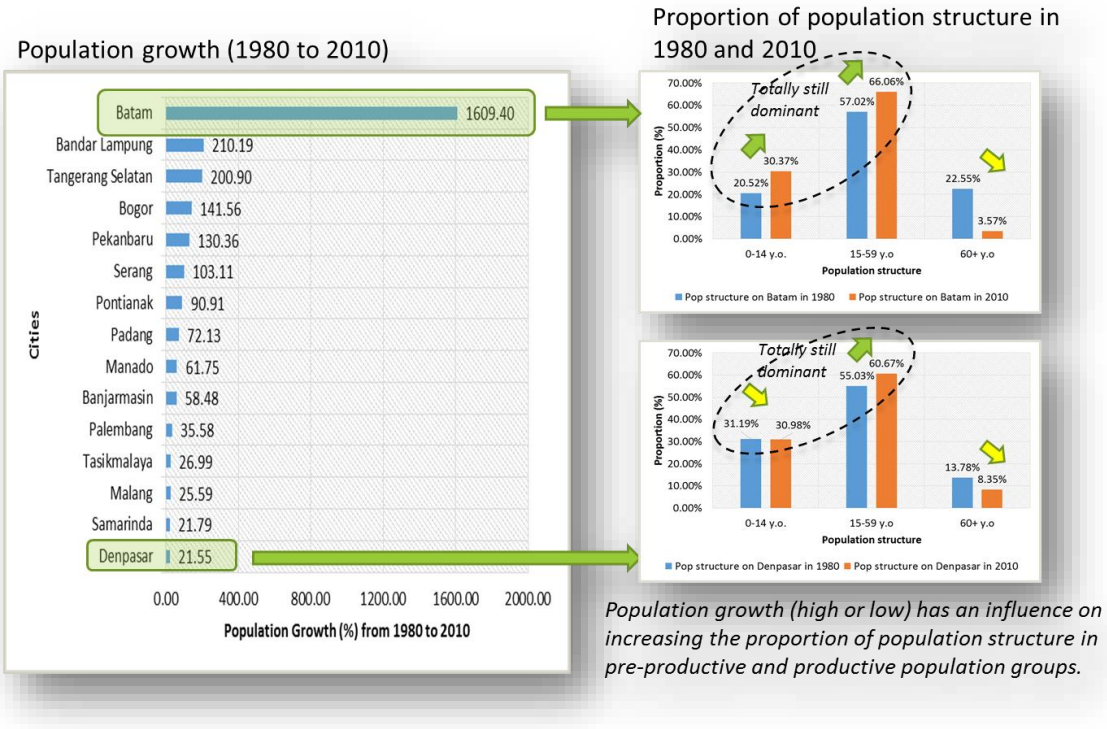


Fig 105 The effected of population growth to population structure
Source: author

Pre-productive population increased by 3 points and the increase rate for productive people was 4 points. Changes in the proportion of the population reflect the power of the city in various ways. All of this will have an impact on the city structure and function of city space. The pressure on city space will be even greater if the economic activity gets bigger. One of the sources of economic activity is labor. If we pay attention, from the population structure based on productivity, we will get a productive population structure to have a very high proportion when compared with other population structures. This indicates that population growth that occurs in cities has an influence on increasing the proportion of the productive population which will become capital for cities to grow and develop more advanced and modern. Because high economic activities will become the basis for better city development in the future. Population growth before productive and productive population shows a positive trend. This will have implications for the development of the city in the future. Simultaneously, the productive structure of the productive period has decreased. If the population structure is decreasing, it means that the government's obligation to provide a friendly city for parents also decreases. That is if we look at the data currently available. But some analysis shows that the population of the productive period in the future will be even bigger. This is related to the longer life span. So the government must prepare regulations and also the concept of development that is

friendly to parents. So the development of the city that we know so far must be friendly to children and also must be friendly to parents.

Behind it all, the government also has an obligation to provide the infrastructure that can guarantee the activities of the population included in the category of productive and productive people. If they cannot be facilitated properly by the government, they will become a new burden to the government. But if their existence can be used as a resource to work in the commercial and industrial sectors, this population structure can become a city asset. And indeed in managing a population structure that has a fairly high diversity as it is currently needed a strategy that is not easy. On the one hand, the increase in population structure towards productive and productive population structure is an advantage for the city, but simultaneously it increases the burden on the city. Development management must consider the population growth, population structure, and future of the city that the community wants to achieve.

7.4 Population growth and urban fabric

The author found the influence of population growth on changes in the shape of the urban fabric. The analysis is carried out quantitatively by paying attention to changes in the shape of each area block. The results show that each category of urban fabric has a different effect on each other. The population will indeed live in a place that still has extensive land because property prices are more affordable. And in general, these locations are in the suburbs.

But the high change in the central part of the city also shows that the population is trying to accumulate in certain areas because the design of the building is indeed dense. Usually, housing developers will build houses of small size because the selling price of buildings and land must be affordable for the buying community. Therefore, changes in shape are strongly influenced by settlements. Settlement development policies have not yet led to vertical buildings. As a result, residents will live in non-vertical houses. Uniquely, vertical buildings are still considered as elite residences. That is, vertical housing for rich people while non-vertical occupancy for the poor. In fact, in other countries, this phenomenon is reversed. This is due to vertical housing prices being very expensive. The reason is that the residential culture has not shifted from land culture to vertical buildings. If this culture shifts, the community will get more vertical housing if compared to non-vertical houses. This residential building design has an impact on the construction of other infrastructure.

Population growth influences changes in the shape of space. And this happens in all categories of space forms as explained in the previous chapter. There are two cities that show extreme changes to certain categories as shown in the picture above. This usually occurs because there is a change from vacant land to land with a high category. This extreme change occurs because of massive land use for residential or industrial activities. Simultaneously population growth also does occur and it supports or encourages each other to change the shape of urban space in each category. Each of me also gives an indirect picture of the suburbs and also the city center. Category 1 usually occurs in suburban areas physically but still remains within the limits of the city administration. Likewise, category 5 occurs a lot in the city center or the center of government and they are the center of economic activity for the city. But the author did not design it from the start.

The author found that it turns out that building density influences the shape of urban space and this category can be made. This is what gave birth to five categories such as those used in this study. Of

course, there are many discussions that can be presented when we discuss this category. But the authors use this category system to be used in this study. Whereas in other studies or future studies using other methods to determine the shape of space represented by urban fabric, this is permissible and even must be done by future researchers. But once again the author wants to say that population growth has an influence on the shape of urban fabric space in all predetermined categories.

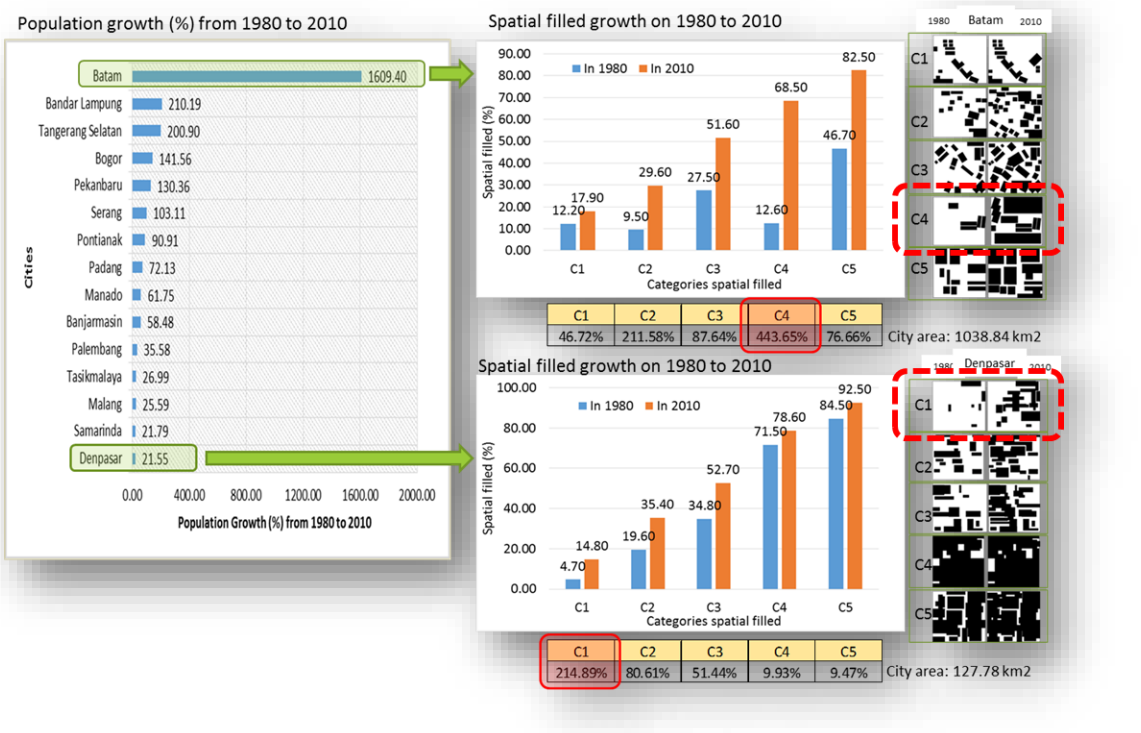


Fig 106 The difference in the impact of urban fabric for high and low population growth

Source: author

The picture above shows us about the impact of population growth on high population growth and low population growth against changes in the shape of space that occurs in the city. The results show that cities with high population growth will have changes in spatial shape in category 4. While for the lowest population growth, the city will have the highest change in spatial shape in Category 1. This condition does not represent the entire city as the object of this study but data there shows that changes in the shape of space in cities with the highest population growth with cities that have the lowest population growth will have an impact on changes in the shape of different spaces between each other.

7.5 Population growth and land use

The author also finds the influence of population growth on land use changes. The highest land use change occurs in land use buildings. This is in line with the changes in the urban fabric that we discussed earlier. Land use change is a reflection of the direction of policy and the development of the city. Every city must be able to control land use changes that occur in the city. The administration of land use change can be controlled by the city manager by setting the proportion of land use within the region. The author found a very strong correlation between population change and land use change. Overall population changes show a value of 0.633 for changes in all types of land use. A small

part of the city shows a different change from other cities. But this does not reduce the author's belief about the impact of population changes on each type of land use. Because city capital does have two, namely population and land use. They will interact with each other on an ongoing basis. If this interaction can be managed properly, it can be managed well, it will create a favorable and environmentally friendly space condition. Adapting problems with this environment is a matter that must be realized by city managers because in the future environmental balance can be achieved if city managers can control the proportion of land use and wherever high populations are allowed. In addition, the authors also found the influence of the size of the city on land use changes. The results show that the size of the city influences the change in land use. Land size is considered by the population to live in a place.

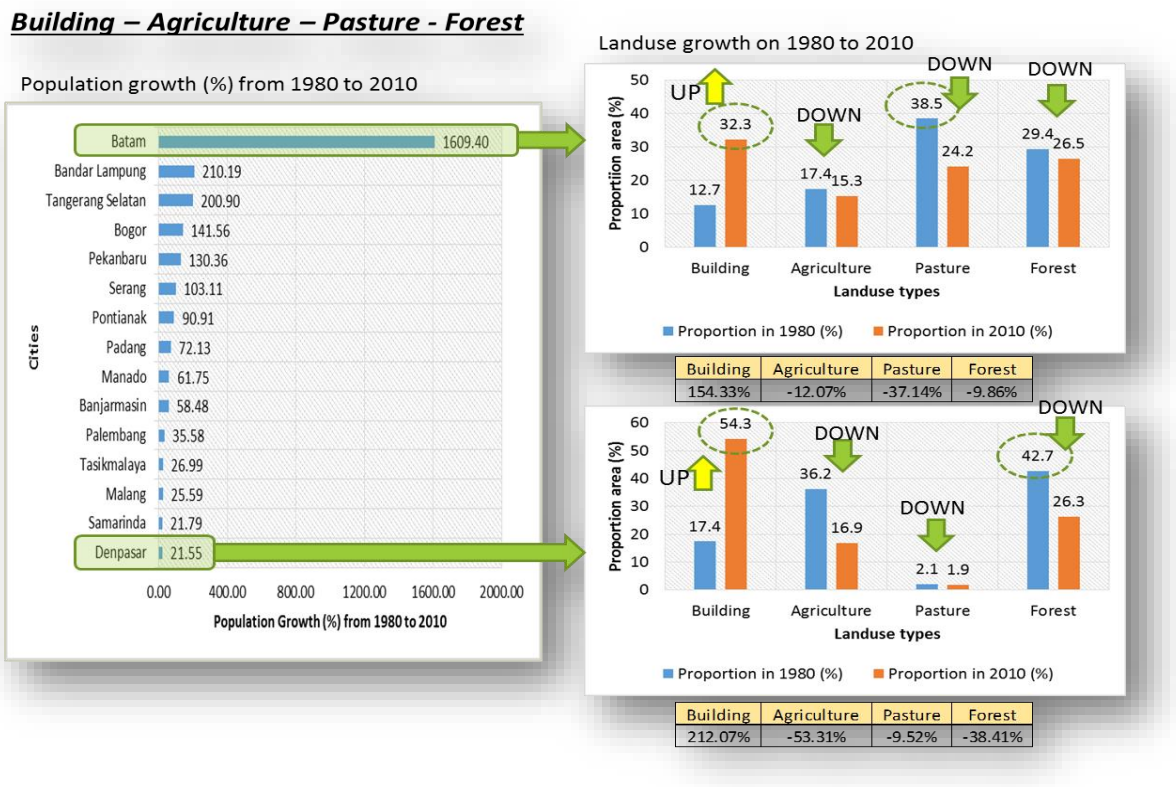


Fig 107 The effected of population growth to land use

Source: author

The city will have a high land use change if the city size is large and the population grows high. because everything will be recorded as part of land use changes within the city administration limits. This research indeed suppresses research at administrative boundaries that have been set by city managers. Because the author wants to connect directly to research with city space policies owned by the government. Because any population change will be felt by city managers within the administrative boundary. For changes in land outside the city administrative boundaries, city managers cannot intervene.

District managers must intervene side by side with the city. Unfortunately, the coordination of development between the city and surrounding regencies is not going well so that the identification of land use changes will only be effective if the study sees city space based on the limits of city administration. Of course, there will be advantages and disadvantages in this study but the output of

this study shows that population changes are occurring in cities in Indonesia and this population change has an impact on changes in city space.

Thus the discussion that the author can give is related to the research that the author has done. Research relating to population growth and its impact on urban areas in Indonesia shows that population growth has an influence on all conditions in the city. The influence given by population growth is on urban population density, population structure, the shape of space, and also changes in land function. The results of this study contribute to the field of urban planning, especially those related to developing countries, namely Indonesia. The role shown by the results of this study which analyzes population growth and its impact on urban areas is very large for the advancement of the field of urban and regional planning. But of course, there are still many things that must be further investigated and must be refined. Therefore, the authors hope that many researchers in the future will carry out deeper investigations related to what the authors did in this study.

7.6 Summary of discussion

All existing data relating to population growth and its impact on population density, population structure, urban space or urban fabric, as well as land use, are processed using statistical programs to obtain factors or values that influence each other from one factor to another. The results can be seen in the table below which is the similarity of the impact of population growth.

Table 65 The analysis of influence of population growth

Dependent	Independent	Prob>ChiSq
Population growth	Influence factors of population growth (migration)	0.2418
	Density	0.2344
	Population structure	0.2665
	Urban fabric	0.2418
	Land-use	0.2344

Source: author

The results of the analysis state that population growth caused by migration factors has an impact on the urban fabric. So, what happens in urban fabric is the impact of population growth caused by migration factors. Meanwhile, for population density factors have a correlation or similarity with changes in land use. Population density will indeed tend to develop like ice which is melting to various sides, which allows development to occur, especially for the construction of residential areas that cause changes in land functions in all types of land functions.

The results of this study indicate that between one factor and another factor, which appears as an impact of population growth has similarities, and it shows the influence of one another, between one factor that is another factor, which we can physically see, and also statistically can be rated on all types of factors that arise as a result of population growth.

CHAPTER 8 – CONCLUSION AND RECOMMENDATION

8.1 Chapter 1 : Background

Chapter 1 discusses the background of the study of the influence of population growth on urban development. Indonesia's population increased from 60.7 million (1930) to 345 million (2030). The majority of population will live in cities (64%). They will have an impact on density, population structure, urban fabric and land use. This condition will influence the development of each city because the city will be faced with a high population, which is within the administrative boundaries of the city. If there is no identification since the beginning related to the population problem and the impacts that arise due to an increase in population, then this will make the city manager deal with problems. This problem will be increasingly complex when some effects of population growth remain unclear so that there are no urban development policies that are relevant to the problems or challenges that arise, as a result of increasing population growth in urban areas. Therefore, research on population growth and some of its effects are very important to do, especially related to the influence of population growth on population density, population structure, the form of urban space, and land use. These issues will be the research material in this study.

8.2 Chapter 2 : References

Chapter 2 discusses the references used in this study. References use the description method (50%), hypothesis (41%), and multivariate (9%). The object of their research is the country (29%), city (52%), and rural (19%). References from various journals and other sources provide new insights and knowledge related to population growth. Through research conducted by other scholars, we will be able to understand the dynamics of the development of population growth that can affect many things, both in urban, rural and on a larger scale, namely the state. We can also understand that population development in any location affects the location where the population is developing. And the authors see that population growth turns out to have a positive impact and also a negative impact on the location where the population appears and increases and develops at any time. This condition gives the author confidence that studies related to population growth and some influences that arise due to population growth are very interesting to do, to build an understanding of the influence of population growth in urban areas. Related to the research method, the writer uses hypothesis and descriptive methods.

8.3 Chapter 3 : Method

Chapter 3 discusses how the author conducts research. There are 98 cities in Indonesia, some of the cities have large populations (11.22%), medium population (15.31%), and low populations (73.47%). The author chooses cities with medium populations cities as objects of research. The hypothesis: population growth in each medium city is influenced by population migration factors, and this has an impact on population density, population structure, urban fabric and land use.

8.4 Chapter 4 : Population growth

The author conducted a study of 15 cities in Indonesia. They have a population of 500,000 one and a half million people in 2010. Then the authors conducted a study of the population they had in 1980. The results showed that the population of all cities in 1980 was 6823 177 people. The population in

2010 was 12 540 760 people. This means that there was an increase in the population of nearly 6 million people in 1980 to 2010 in 15 cities that were the object of research. In 1980 there was 1 city that had a population of more than 1000000 people, namely Palembang. In 2010 there were 2 cities which had a population of more than one million, namely Palembang and South Tangerang. The percentage method, the highest population growth occurred in the trunk which reached 1609 percent from 1980 to 2010. Two other cities that had the highest population growth were Bandar Lampung (210 percent) and South Tangerang (200 percent). Meanwhile, there were 3 cities that experienced the lowest population growth, namely Malang (25.59 percent), samarinda (21.79 percent), and Denpasar (21.55 percent).

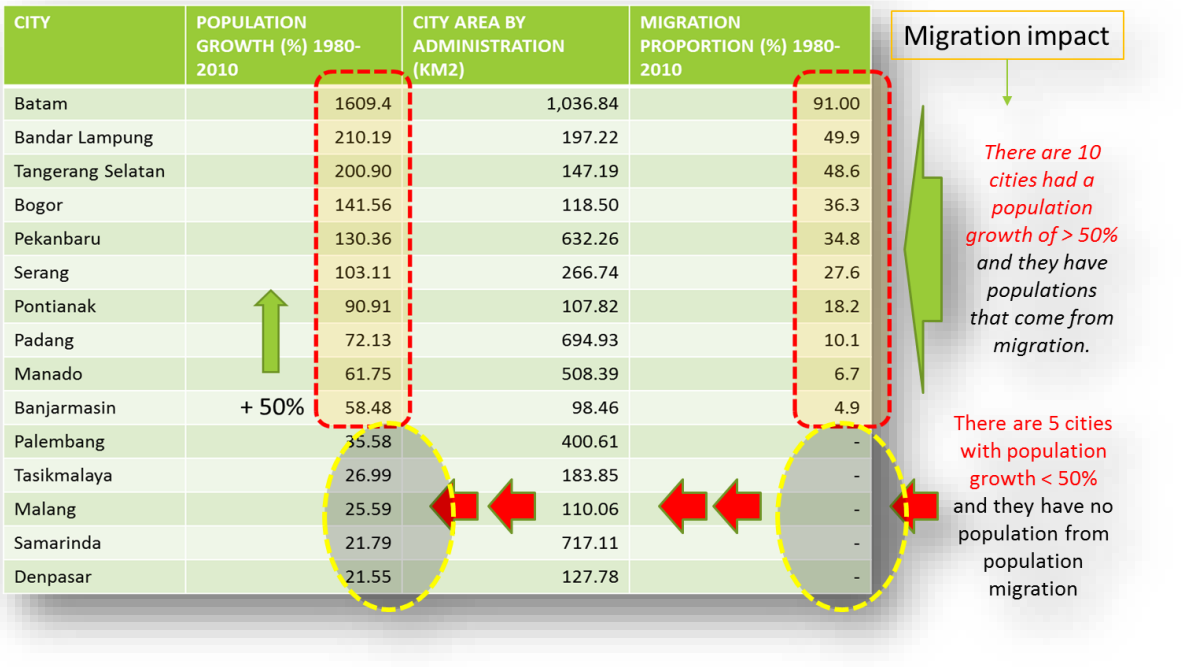


Fig 108 Population growth and the migration effect

The population increase for 30 years (1980-2010) in each city is indeed very high. Batam, South Tangerang, and Bandar Lampung are 3 cities that have the largest population growth or addition followed by other cities. Meanwhile, Denpasar, Tasikmalaya, and Samarinda are cities that receive the lowest population increase compared to other cities. If we make an average population material per year, from 1980 to 2010, then the highest population increase reaches 29 635 people per year, and that happens in the city of Batam. While the lowest addition of population every year on average is in Samarinda, which is 4339 people per year. This population addition continues to be the cause of the high population in each city from 1980 to 2010. The addition of a very high population every year does not have a correlation with the population in the initial year of research, 1980. In 1980, Palembang had a population of 1073 384 and received additions the population amounted to 38,1900 throughout the year 1980 to 2010. That means, on average there was an increase in the population of 12,730 every year. But it turned out that the highest population increase occurred in Batam, which amounted to 889,044 people from 1980 to 2010. Even though in 1980 the population of Batam was only 55,241 people. This means that on average, the population increase in Batam every year is 29,635 people. So, even though the population in 1980 was low it did not mean that in a few years later it could not

change to high. This condition of population addition is strongly influenced by economic development policies carried out by each city.

If we look at the size of the city, Batam, Samarinda, and Padang are cities that have large city sizes, namely 1038.84 km2 (Batam), 717.11 km2 (Samarinda), and 694.93 km2 (Padang). Meanwhile, 3 cities with small sizes are Banjarmasin (98.46 km2), Pontianak (107.82 km2) and Malang (110.06 km2). When the authors make comparisons between the size of the city and the population growth in each city the results of the tendency of the influence of the size of the city on population growth are obtained. The greater the size of the city, the greater the likelihood of population growth. This happens as a result of the carrying capacity of the city and the capacity of the city which has a large size will also increase. There will be many populations that can be accommodated by large cities.

Population growth which has an influence on many things must be seen as an opportunity for every city government to be able to take advantage of high population growth as an opportunity to gather human resources. Every city government needs adequate human resources in quantity and also quality to ensure that all economic activities in urban areas can run well. Several other cities in other countries are faced with the problem of reducing the number of population and this has caused its own problems which are quite difficult to resolve. The three cities in Indonesia currently face an increase in population, so this should be utilized as much as possible so as to provide great benefits for the economic progress of the city and increase the welfare of the community.

So the conclusion that can be drawn by the author on population growth related to this migration is a city with a population growth of more than 50% can occur due to migration factors that occur in the city. Migration into the city administration area which then finally affected population growth of more than 50%. Meanwhile, for cities that do not have a proportion of the population originating from migration will also experience growth, but growth will occur less than 50%. From this phenomenon, we can say that the population growth factor is very much influenced by the migration factor that occurred in the city.

8.5 Chapter 5 : Population density and population stucture

The population density in 15 cities that became the object of research has increased very rapidly. Some cities show a significant increase in population density. There are at least five cities which show a very high increase in population density, namely South Tangerang (from 2913 people / km2 to 8822 people / km2), Bogor (from or3337 people / km2 to 8037 people / km2), Banjarmasin (from 4008 people / km2 being 6860 people / km2), Pontianak (from 2695 people / km2 to 5270 people / km2), and Bandar Lampung (1441 people / km2 to 4471 people / km2). This condition shows that population growth that occurs in each city has an influence on population density. Each response to population growth also varies, there are those who are affected to be denser in population, but there are also those that do not show excessive density addition. Population density is strongly influenced by the size of the city because population density is a comparison between population and city size.

The highest increase in population density occurred in Tangerang Selatan, which reached 5909 people / km2 from 1980 to 2010. The second largest increase occurred in Bogor, reaching 4,700 people / km2. Furthermore, other cities experienced an increase in population density lower than the two cities. 2 Cities that have the lowest increase in population density are Manado, which only increases by 436 people / km2 and Padang which only increased by 503 people / km2 during 1980 to 2010. The addition of very high population density indicates that there is an increase in population and interaction with

the size of cities very dynamic. South Tangerang has a very high population density increase because the city is there and is directly related to Jakarta as one of the most populous megapolitans in the world. This ultimately has implications for Tangerang Selatan which receives a large population overflow which then has implications for population density in the city. Bogor became a city with a very high-density increase as a result of the construction of toll roads connecting Jakarta and Bogor. So that this gives implications for the willingness of people to live in the city of Bogor no longer live in the city of Jakarta. Finally, the population in the city of Bogor has increased and has implications for population density in the city. We talk about increasing population density as a percentage, actually, Batam is a city with the highest percentage of population density which reached 1904.4 percent from 1980 to 2010. But in terms of the number of people / km2, Tangerang Selatan City still has the highest increase in population density.

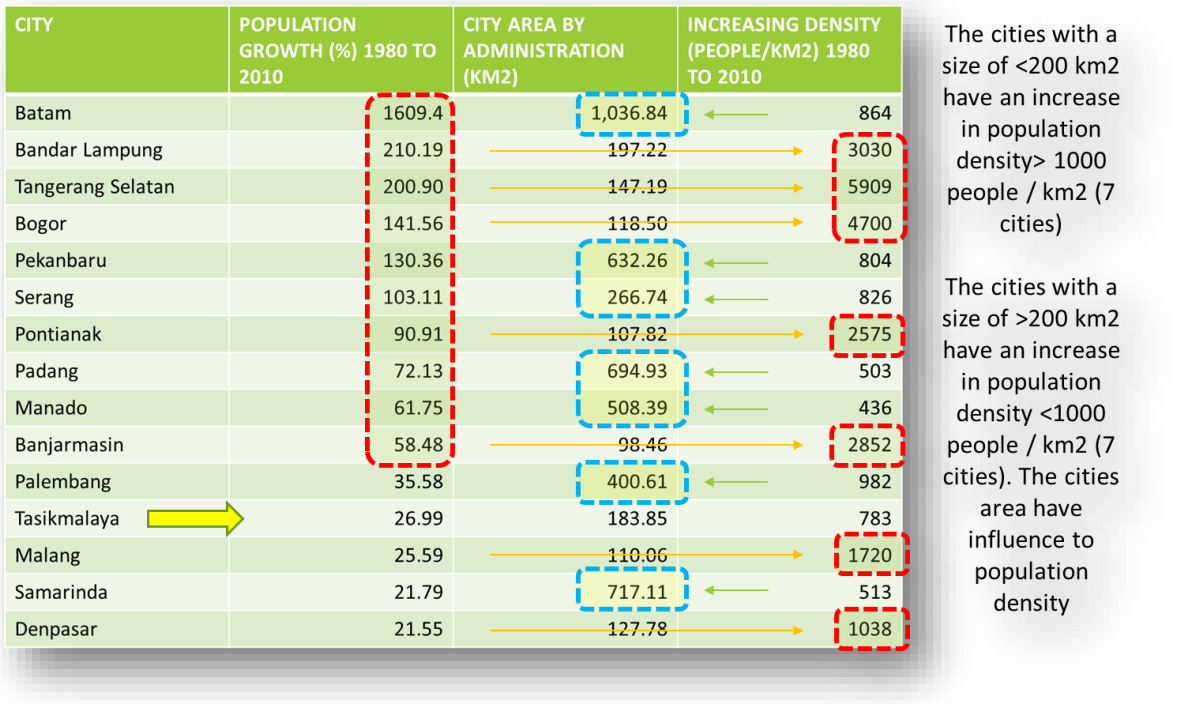


Fig 109 The population growth, city size and population density effected

Addition of population density has a relationship with the size of the city. Cities with small sizes tend to have a high population density increase. As happened in South Tangerang. The city has a size of 147.19 km2 and has an additional population density of 5909 people / km2. The city of Bogor has a size of 118.5 km2 and gets an additional population density of 4,700 people / km2. Meanwhile, Manado has a size of 508.39 km2 and gets an additional population density of 436 people / km2. The same thing happened in Padang which has a size of 694.93 km2 and has an additional population density of 503 people / km2. The same conditions occur in other cities that are the object of this research. Overall shows almost similar conditions. Cities with the highest population density increase occur in cities that have a small size. While for cities that have a very large size get a very low population increase. From this, we can say that the size of the city has an effect on the increase in population density from 1980 to 2010.

In the next section, the authors conducted an analysis related to population density in each district in each city. Palembang is the city with the highest number of districts, namely 16 districts, followed by Bandar Lampung with 13 districts and Pekanbaru with 12 districts. Meanwhile, Denpasar is a city with the smallest number of districts, there are 4 districts. Followed by Banjarmasin and Malang with the number of districts in each of the 5 districts. District population density is calculated to determine the distribution of population density in each city. By using government-owned data for the distance from the city center to the district center, the writer can determine the density of each electricity based on the distance of the electricity center to the city center. Based on the distance the writer can make a graph that shows the distribution of population density in each district based on the distance of the electricity center to the city center. Each city has a distribution pattern of district population density based on the distance from the city center in a very varied form. The shape of the graph is strongly influenced by district density, the distance of the city center to the district center, and also the number of districts. To find out the overall pattern, the authors merged the data of each district in all cities. The results showed a change in the graph pattern of population density in 1980 with a population density graph pattern in 2010. From the merger of these data the authors also found findings of the farthest distance to the center of the city in the range of 12 km. To simplify the form of graphics, the authors merge districts based on the distance of the city center to the district center on a certain scale. In this study, the authors used a distance group of 0-3.999 km, a distance of 4-7.999 km, and a distance of 8-12 km. Each district included in this distance group is combined in the same group. The results show a graphic form that is very interesting to observe. The results show that the district population density closest to the city center is higher than the density of electricity far from the city center.

Density conditions in 1980 and 2010 showed almost the same form of high population density in districts close to the city center compared to districts far from the city center. The addition of population density in the city center from 1980 to 2010 reached 1736 people / km2. Meanwhile, additional population density for districts in the suburbs reached 1052 people / km2. For districts that are located between the city center and the suburbs, the population density is 913 people / km2. From this data, we can see that there is a high increase in population density in districts close to the city center and districts in the suburbs. This shows the phenomenon that there are many populations who choose to live in the city center or on the edge of the city. But not many choose to live between the city center and the suburbs. If we look at the growth of population density, the growth of population density in the city center reaches 76.78 percent. For the suburbs to reach 176.78 percent. And for districts that are between the city center and the suburbs, 96.16 percent. From this data, we can see that there is an increase in population density on the edge of the city compared to the location of the districts that are close to the city center or among them. This further confirms that there are an increase and growth of the population in the suburbs. This also further clarifies the direction of the development of the city which tends to sprawl. Such conditions are typical of cities in developing countries everywhere. Indonesia as one of the developing countries is faced with such population distribution.

Population growth factors to increase population density can be seen from an increase in population density of more than 1000 people / km2 or less than 1000 people per km2. Population growth of more than 50% indicates that population density has increased by more than 1000 people / km2. However, some cities have high population growth ie more than 50% also have population growth of fewer than 1000 people / km2. If we look at the size of the city, we find that cities with a size of fewer than 200 km2 will tend to have an increase in population density increase of more than 1000 people / km2.

Meanwhile, cities with a size of more than 200 km2 will have an increase in population density of fewer than 1000 people / km2.

In the form of population proportions based on population structure, the authors find a phenomenon that is quite interesting to be responded to. The authors find that there is an increase in the number of populations for pre-productive population structures and productive population structures. So in this study, the authors used three categories of population structures namely pre-productive (0-14 years), productive (15-59 years) and post-productive (60+ years). The author divides the population structure into these three groups on the grounds that in general three groups of population structures that will later be able to influence the development of the city. The authors find that population growth causes segregation of population structures in all three categories. And indeed the authors find that birth rates are very high, the workforce of cities is also a large number of research objects, while the elderly population tends to experience a decline. The authors find that this condition occurs in all cities. The pattern will be the same in every city.

CITY	POP GROWTH (%)	INCREASING BY AGE GROUPS		
		0-14	15-59	MORE 60
Batam	1609.40%	0.10	0.09	-0.19
Bandar Lampung	210.19%	0.03	0.04	-0.07
Tangerang Selatan	200.90%	-0.05	0.05	0.01
Bogor	141.56%	0.02	0.05	-0.08
Pekanbaru	130.36%	0.07	0.07	-0.14
Serang	103.11%	0.11	-0.01	-0.10
Pontianak	90.91%	0.03	0.00	-0.03
Padang	72.13%	0.01	0.02	-0.03
Manado	61.75%	0.06	0.04	-0.10
Banjarmasin	58.48%	0.03	0.05	-0.08
Palembang	35.58%	-0.05	0.05	0.00
Tasikmalaya	26.99%	0.00	0.04	-0.05
Malang	25.59%	-0.01	-0.06	0.07
Samarinda	21.79%	0.08	0.06	-0.13
Denpasar	21.55%	0.00	0.06	-0.05

Fig 110 The population effected to proportion of population structure

The productive population structure will rise, the productive population structure will rise, and the post-productive population structure will decline, in all that is adjusted to the trends in each. The author also compared population growth and population structure changes in 1980 and 2010. The results showed that there was a change in the proportion for the pre-productive population structure from 24.61% to 27.54%, for the productive population structure from 61.46% to 65.05 %, and the post-productive population structure changed from 13.93% to 7.41%. The biggest changes occurred in the structure of the productive market population which experienced a very large decline. When the authors make comparisons between population growth and changes in the proportion of

population structure, the authors find that each population increase has implications for the increasing population structure for pre-productive groups and product groups.

That is, from 1980 to 2010, every increase in population in each city will produce populations with population structures that are dominant in pre-productive groups and productive groups. The same thing also happened when the authors conducted a comparison between the proportion of growth in population structure with an increase in population per km2 in each city. The results show the same thing, namely an increase in the proportion of population structure for pre-productive groups and productive groups. The size of the city also shows things that are not much different. Every city that has a large size will receive a population that is growing too, which then has an impact on increasing population density, which ultimately has an influence on the proportion of the population structure. And the largest population structure remains in the same position, namely pre-productive groups and productive groups.

These results show us about the strength of the resources possessed by all cities that are the object of research. They have human resources that can be involved or used to develop economic activities in the form of trade and industrial activities. If they can be used for such economic activities, cities become the object of this research can develop into an advanced and modern city. Because they have populations, population densities and population structures that allow them to become big cities and also progress in many ways. The authors find results that are quite clear showing us all that increasing population growth has an effect on population density in each city and it also has an effect on increasing population structure in pre-productive and productive groups that can be used to develop a better future for the city.

8.6 Chapter 6 : Urban fabric and land use

Research on population growth and city size is very interesting to do in future studies. The author recommends that other researchers consider conducting an investigation related to the carrying capacity and capacity of the city to population growth that is carried out specifically in several cities to see a tendency for relations between these two components. And it is hoped that researchers can focus on just 1 of these issues in order to produce deeper research results. The impact of population growth on changes in the shape of urban space is the object of further research by the author. The author analyzes the urban space at a size of 500 m x 500 m after previously classifying the shape of city space in 5 categories namely 0-20%, categories 21-40%, categories 41-60%, categories 61-80%, and categories 81-100 %. This category refers to the occupancy of space by a building. Because buildings that are inside a block of space will form space. Therefore, to identify the impact of population growth on changes in the shape of space, the authors make groupings of spatial forms based on these 5 categories. The results show very interesting conditions for further analysis. The shape of the space certainly varies greatly. Therefore, the writer will do a quantitative analysis, not only doing visual analysis which is indicated by the form of space that becomes the basis for the analysis of urban fabric. And the authors found that changes in the shape of space varied greatly across categories. There are some cities that have changed in 1-2 categories, but there have been changes in all categories on a large scale. Every change in all categories is an implication of the population growth that occurs in the city. If there is population growth there will be changes in the shape of space. The higher the population growth, the higher the change in space. And this happens in all categories. Not only in several categories but in all categories. Likewise with the influence of population density on changes in shape in all categories. The authors find that population density has a far greater influence

on changes in spatial forms than other factors. Because population density has implications for filling spaces in the city. Population density will lead to high building needs. And when the building is established in a location, it will change the shape of the space. Changes in the shape of this space will have an impact on grouping blocks of space in each category.

CITY	POPULATION GROWTH	CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4	CATEGORY 5
Batam	1609.40	0.47	2.12	0.88	4.44	0.77
Bandar Lampung	210.19	0.84	0.67	0.80	0.39	1.82
Tangerang Selatan	200.90	2.19	0.86	2.11	2.25	1.51
Bogor	141.56	0.36	22.40	1.60	1.31	1.95
Pekanbaru	130.36	0.25	1.59	0.60	1.91	1.10
Serang	103.11	0.70	0.46	1.46	0.85	0.98
Pontianak	90.91	0.66	0.14	1.01	0.11	0.24
Padang	72.13	0.59	0.50	1.00	0.50	0.80
Manado	61.75	1.70	3.44	4.39	3.46	9.55
Banjarmasin	58.48	4.27	26.50	3.74	9.40	1.65
Palembang	35.58	1.41	3.00	0.80	1.80	0.22
Tasikmalaya	26.99	0.47	1.02	0.22	1.34	0.82
Malang	25.59	12.36	2.85	0.16	1.39	0.37
Samarinda	21.79	1.38	2.47	8.35	2.41	0.65
Denpasar	21.55	2.15	0.81	0.51	0.10	0.09

Fig 111 The population growth and the proportion change of urban fabric by category

In the study of Land use, the author uses 5 types of land use with reference to existing references. The land use is building, agriculture, forest, pasture, and others. Changes in land function in 1980 to 2010 using data owned by the city government, which was later confirmed through maps issued by big data. The proportion of land functions generated from this study comes from processed data and collecting data from these sources. The quantitative results will be used by the author to carry out further analysis. The author found that all cities experienced an increase in the function of land for buildings. The proportion of land with building functions increases very rapidly. But for land with agricultural functions experienced a very drastic decline. then, the land with pasture functions, there are cities that have an increase in the amount of pasture land but there are also those that have a decrease in the amount of land with pasture functions.

For the function of forest land, all cities experienced a very drastic decline. While for other land functions it is not discussed because this data is a residue from other data. Tasikmalaya has become the city that has the largest land growth with building functions, reaching 2.52 times than before. Followed by Malang (2.33 times) and Denpasar (2.12 times). Meanwhile, Serang became the city that experienced the smallest growth in the land with building functions of 0.28 times, followed by Banjarmasin (0.68 times) and Manado (0.88 times). For the function of agricultural land, Samarinda has become the city with the smallest decrease (-0.04 times). Bandar Lampung is a city with the largest reduction in agricultural land, reaching (-0.60 times). For the function of pasture land, Serang is the city with the largest reduction, namely (-0.86 times) and Tasikmalaya has the smallest reduction (-0.10 times). But there are also those that have positive growth, namely Pontianak (2.47 times) and the

smallest positive growth is Samarinda (0.29 times). For the function of forest land, all cities have decreased. Batam has the smallest decrease (-0.10 times). While Serang has the largest decrease, reaching (-0.64 times).

CITY	POPULATION	BUILDING	AGRICULTURE	PASTURE	FOREST
Batam	1609.40%	1.54	-0.12	-0.37	-0.10
Bandar Lampung	210.19%	1.68	-0.60	-0.72	-0.14
Tangerang Selatan	200.90%	1.25	-0.18	-0.50	-0.25
Bogor	141.56%	1.83	-0.39	-0.56	-0.30
Pekanbaru	130.36%	1.53	-0.27	-0.15	-0.51
Serang	103.11%	0.28	-0.39	-0.86	-0.64
Pontianak	90.91%	1.16	-0.24	2.47	-0.62
Padang	72.13%	1.38	-0.27	-0.37	-0.57
Manado	61.75%	0.88	-0.12	1.45	-0.35
Banjarmasin	58.48%	0.68	-0.18	1.00	-0.57
Palembang	35.58%	1.21	-0.43	-0.39	-0.56
Tasikmalaya	26.99%	2.52	-0.41	-0.10	-0.31
Malang	25.59%	2.33	-0.48	-0.47	-0.63
Samarinda	21.79%	1.92	-0.04	0.29	-0.28
Denpasar	21.55%	2.12	-0.53	-0.10	-0.38

Fig 112 The population and land use effected

Population growth influences changes in the land. Land with building functions increases very dramatically when population growth occurs. Meanwhile agricultural land has decreased. The relationship between population growth and the reduction of agricultural land is very close. When the population grows high, the reduction in agricultural land also becomes high. Though the needs of high populations for food availability are also very high. When agricultural land is reduced to residential land, the production of agricultural land and food production decreases. This condition creates an anomaly. Likewise with land with a pasture function. Increased population causes a reduction in the land with a pasture function because this land is used by many parties as new settlements. Pasture land is land that is ready to be used as a location for the construction of settlements. For the function of forest land, it has a difference with other land functions. When the population experiences an increase or population growth increases, there is a tendency to reduce land for forests to decline. But this phenomenon must be studied more deeply because changes in the function of forest land are caused by the increase in other land function requirements. And indeed it is not directly related to population growth. Although existing data shows that increasing population growth will reduce the number of reduction in the understanding of forest functions. The size of the city also shows the same model of interaction with changes in land functions.

8.7 Chapter 7 : Analysis of the result

The relationship between one factor and other factors that are influenced by population growth can be seen in the picture below. The figure below shows that between migration factors that result in

population growth with changes in the shape of city space have a relationship that is indicated by the existence of the same value between the two factors.

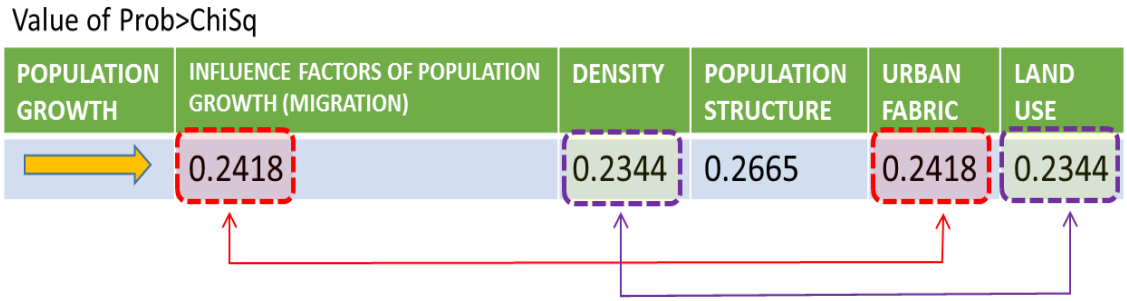


Fig 113 The relationship of all factors

Meanwhile for population density factors with changes in land use also shows there is a relationship between the two, which is indicated by the same value. The same value condition is caused by the closeness of the value of changes in the raw data, which then becomes the basis of the release of statistical values as shown in the figure. These results indicate that the relationship between factors can influence each other, and can be the basis for policymakers to make judgments, and even justification of the situation that occurs in a city, which is seen from the factor of population growth to other factors, namely density, population structure, changes in shape space, and land use.

8.8 Recommendation for future research

Related to this discussion, the author strongly recommends that deeper research be carried out related to land use and population growth, as well as changes in spatial shape and population growth in cities of other countries, not only in Indonesia. This needs to be done to find out whether there is a similar trend between changes that occur in Indonesia due to population growth in urban areas or not in other countries. This comparison needs to be done to find out trends in conditions that occur in developing countries or countries that are in the process of becoming developed countries. Changes in the shape of urban space and all its implications caused by population growth require a very deep study. Moreover, there are predictions related to the distribution of the population that will be increasingly living in cities compared to rural areas. This will cause pressure on land use in cities. If there is no anticipation and identification at the outset related to the impact that can be raised by population growth on urban space, it is feared that new problems will emerge in the future, especially related to environmental problems.

1) Further research needs to be done in cities with a proportion of small populations or large populations because the research that the authors conducted this time was done for cities with middle populations.
2) This research was conducted in Indonesia which has the fourth largest population in the world. Therefore it is necessary to do similar research in countries with smaller populations to see patterns of population impacts occurring within cities.
3) In this study, population growth is seen from the factors of migration and birth rates. There needs to be a similar study by looking at other factors that can influence population growth such as economic, cultural and social factors, as well as environmental factors, to find out whether these factors have an effect on the migration of populations from outside the city that have an impact on the growth of the city

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