I   INTRODUCTION

1.1.Background

Infrastructure is the basic aspect of development for any country (Patra and Acharya, 2011). The role of infrastructure development has been well recognized in many countries as the foundation of the economic growth as studied by (Aschauer 1980; Sahoo et al 2009; Sembanyang 2011). The relationship between infrastructure and regional development is one of the most intricate problems in regional policy, especially for the less prosperous areas such as rural areas (Nijkamp 1986). Improvement in infrastructural services is essential for enhancing efficacy of the productive process and for raising productivity of any economic entity (Patra and Acharya 2011).

In the relation with the economic growth, the availability of infrastructure supports the economy by providing more new works for unemployment and ultimately lowering the unemployment rate (Muslikhah 2008; Prasetyo 2009; Maryaningsih et al 2014;), increases the productivity level then rises per-capita income for its people, and ultimately reduces the poverty level and highly affect the welfare in the region (Iqbal M et al 2019; Maryaningsih et al 2014; Démurger S 2001).
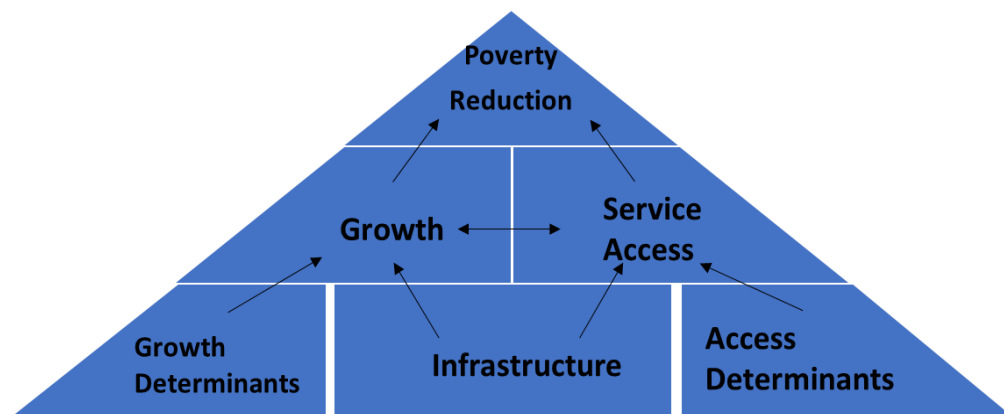

Figure 1 The link between infrastructure, poverty reduction and growth
(*Source: IBRD and ADB, (2005)*)

In general, the central government or regional area has the priority in supporting the economic growth by infrastructural development. However, the equal improvement is vital for every sector, so that it can reduce the inequality in the economic growth. for instance, the development of vital facilities such as, road, electricity and public transportations for the mobility and access. Those facilities and services are the main engine for the long-lasting economic growth (Cahyono et al 2011; Iqbal M et al 2019). Therefore, the establishment is not only needed by the big cities but also in the villages so that the equal growth can be achieved by all the people in the whole areas of the country. Take a simple illustration from the physical infrastructure such as road, availability of

road access will ease the product distribution and benefits both producers and consumers.

As the real condition, Aceh Province economic growth is still under 5%, in comparison with national growth. It becomes the third lowest growth among another Province in Sumatra Island (BPS 2019). Further, at the level of poverty and unemployment, Aceh's poverty rate is almost two times higher than the rate of national level, eventhough it slowly decreases until the last period. In fact, the poverty is still an issue in this Province. Moreover, the unemployment rate is also a vital issue for this Province, where the rate is still above 5% in comparison with the national level which is under 5%.
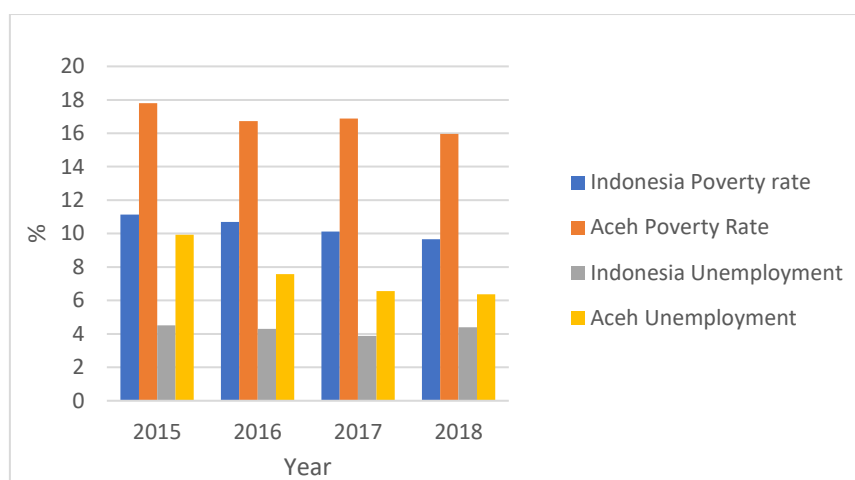

Figure 2 Percentage of Unemployment and Poverty rate for Aceh Province and National (2015-2018) *BPS (2015-2018), Calculated)*

It is true that more funding is allocated by Aceh's government in order to create sustainable infrastructure for every region. In details, Aceh's government expenditure is relatively higher each year as shown in Table 1. This funding is allocated to the establishment of infrastructure. Based on RPJP Aceh (Rencana Pembangunan Jangka Panjang) for 2005-2025, infrastructure sector is the second priority of Aceh's development after the commodities sector. However, the level of poverty is still high and the economic growth of this province is still below the other provinces in Sumatra and even national level.

Table 1 Amount of Special autonomy fund and the Government Expenditure of Aceh Province 2015-2019

Year	Special autonomy fund (Trillion Rupiahs)	Government Expenditure (Trillion Rupiahs)
2015	7.057	6.505
2016	7.707	6.091
2017	7.971	6.667
2018	8.029	8.384
2019	8.357	10.491

Source: BPS Aceh (Aceh Dalam Angka 2015-2019)

Another noticeable issue in this province is disparity. As a case, studies observed that Indonesia is a country that has a relatively low standard of infrastructure. According to International Institute of Management Development (2014), Indonesia was ranked 37th out of 59 countries in terms of low standard of infrastructure. At the national level, Aceh is one of the less developed provinces in Indonesia which was reported by *Bappenas* in 2017. Further, this province was in the 22nd position of 34 provinces in Indonesia in terms of development. The disparities among infrastructural facilities is still the main issue to be solved by the government in Aceh Province. The negative impacts of disparity can influence many aspects including social and economy aspect (Katamso S.A and Amir 2018). Furthermore, the worst problem is highly possible to happen in Aceh if the action is not directly taken.

1.2.Problem Formulation

To begin with, the main aim of the regional economic development is to increase the growth of the economy (Iqbal 2017). As the matter of fact, the equal level of growth in each area is needed in order to have the same economy level or at least to avoid the big gap among the regions. It is true that, the regional disparity among infrastructure is the consequences of the development. However, the infrastructure and facilities also have the role to reduce the inequal growth of economy in the regions.

Aceh is a province that is rich in resource. Moreover, this province also receives special funds which was addressed by the central government by granting special autonomy to the enactment of Law no. 18 in 2002. Thus, the Province of Aceh Special Region turned into a Province of Nanggroe Aceh Darussalam (BPS 2019). Furthermore, after receiving a high significant number of funding from the central government, there should be no imbalance between regions in Aceh. However, in fact, there is still a disparity in Aceh that is seen from income disparities between regions and also economic growth for each city.

As a special region which was given by the central government of Indonesia, Aceh province has its speciality, by receiving more funding from the central that is called *special autonomy fund*. As its named, this special autonomy fund is used to support the establishment of the province. Based on the national report of BPKDPD, one of the main aims of the fund is to finance the development and maintenance of infrastructure and facilities in the province. The effectivity of this special autonomy fund in supporting the development of infrastructure has become a big question for a long time due to the fact that this funding is not allocated effectively to establish the region.
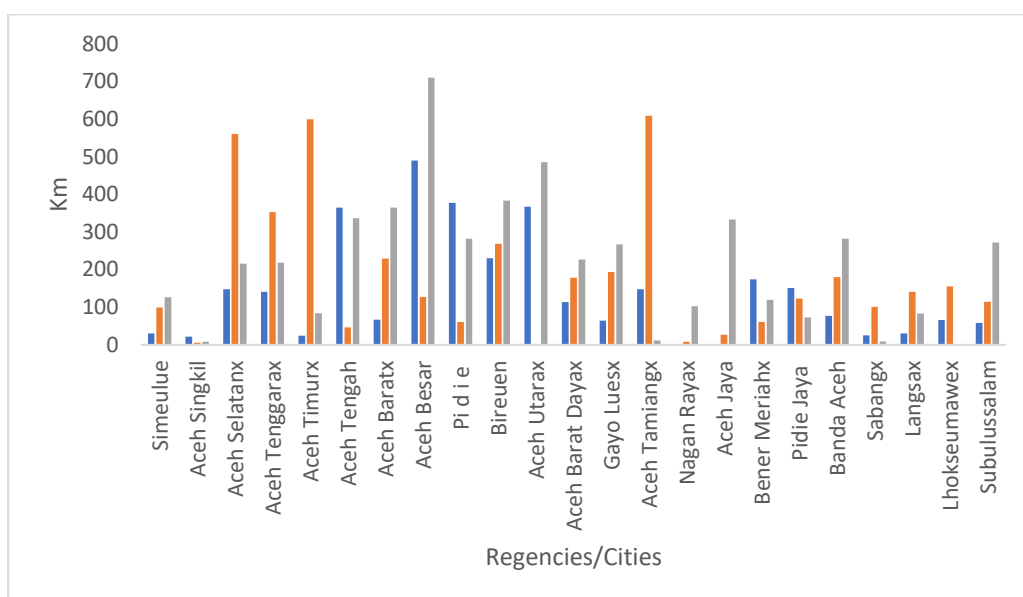

Figure 3 The length of Regency/City roads by conditions in 2011 (*Statistics Indonesia 2011*)

The Figure 3 portrays the city roads owned by every cities/municipalities in Aceh province. There are big differences in the road condition in 23 regions. Overall, the moderate condition and the road with damage condition are predominantly available in Aceh Province. Aceh Besar has the longest city road with the worst condition compared to the good road condition. On the other hand, some regions show the bad condition of the roads such as Nagan Raya, Simelue, Aceh Jaya, Aceh Barat and Banda Aceh.

Table 2 GDP for each cities/municipality in Aceh Province for 2017-2019 (in Million Rupiahs)

Cities	Year		
	2017	2018	2019
Simeulue	507.676,20	522.281,57	541.292,08
Aceh,Singkil	451.871,84	464.996,25	482.950,32
Aceh,Selatan	951.998,58	989.612,11	1.036.026,45
Aceh,Tenggara	1.346.378,75	1.364.941,02	1.404.174,56
Aceh,Timur	3.293.931,32	3.376.360,10	3.481.753,21
Aceh,Tengah	2.356.131,44	2.430.451,72	2.458.179,50
Aceh,Barat	1.765.476,37	1.840.727,42	1.919.960,65
Aceh,Besar	2.025.217,59	2.076.673,55	2.145.668.72
Pidie	2.837.157,60	2.919.822,27	3.012.886,97
Bireun	2.840.759,02	2.917.977,13	3.048.425,28
Aceh,Utara	4.522.903,06	4.702.786,45	4.894.404,45
Aceh,Barat,Daya	792.179,26	825.947,16	860.024,23
Gayo,Lues	793.378,53	765.083,47	750.388,33
Aceh,Tamiang	2.185.896,74	2.286.395,70	2.402.553,70
Nagan,Raya	2.529.284,74	2.623.389,03	2.773.003,48
Aceh,Jaya	556.623,45	577.806,25	590.224,91
Bener,Meriah	1.647.711,20	1.730.399,20	1.817.117,79
Pidie,Jaya	1.092.432,70	1.125.657,71	1.168.560,01
Banda,Aceh	138.368,42	154.509,89	168.470,76
Sabang	70.525,38	72.647,38	75.814,61
Langsa	300.646,10	308.774,24	319.870,74
Lhokseumawe	542.572,70	567.783,32	599.904,67
Subulussalam	298.515,50	303.600,09	310.315,24

Source: Statistics Indonesia (BPS) 2019

One of the significant indicators to determine the economic conditions in a country in a certain period is through the Gross Domestic Product (GDP) data, both at current prices and at constant prices (BPS 2019). The Table above shows the big differences in the amount of Growth Domestic Product owned by every city/municipalities in Aceh Province. The Table depicts that Aceh Utara has the biggest growth of Domestic product in 3 periods. On the other hand, Sabang city has the lowest amount of GDP in all the given period (from 2017 to 2019). Thus, this Table clearly reveals that there is a significant level of inequality between these two cities, Aceh Utara and Sabang.

Over the period shown, the total amount of GRDP for both categories increase steadily and the infrastructure establishment is still one of the largest sectors. However, the implementation of the development does not show significant impact on the growth. For example, *BPS* in 2019 reported that the

growth of economy in Aceh Province is slowing down. Having compared to the previous period, it shows that 2019 is slower than 2018.

However, there are some other aspects that is needed to be considered regarding the high level of inequality in Aceh Province. For example, Sabang is a small island which is separated from Aceh Province, yet it is still part of this province. In detail, regarding the development of infrastructure. it is clear that, Sabang has lower level of infrastructural development due to the geographical condition of the island.

Administratively in 2011, Aceh has 23 districts/cities consisting of 18 districts and 5 cities, 284 sub-districts, 755 settlements and 6,451 villages *(*Bappeda 2017). Domestic product is all the services and goods which are the results of all the economic activities operating in regional or certain area (BPS, 2019). Thus, domestic product is determined by the area where the products are obtained from the economic activities in that area. From the total of Rp126,824,491.42 in 2018, the construction of Infrastructure and facilities contribute to the third biggest in Aceh Province as the agricultural sector still becomes the largest contribution among all the sectors in GRDP.

In the level of disparity, using the Williamson index, Hadi (2013) reported that the level of inequality coefficient in Aceh Province experienced the increasing, based on data for per capita income from 2015-2019. On the other hand, variety level of infrastructural services which are available in the specific area, can be used to measure the regional disparities in the development of economic (Patra and Acharya 2011). Therefore, establishment for these infrastructural facilities are essential to raise the productivity for any economic activity and for the needs of people.
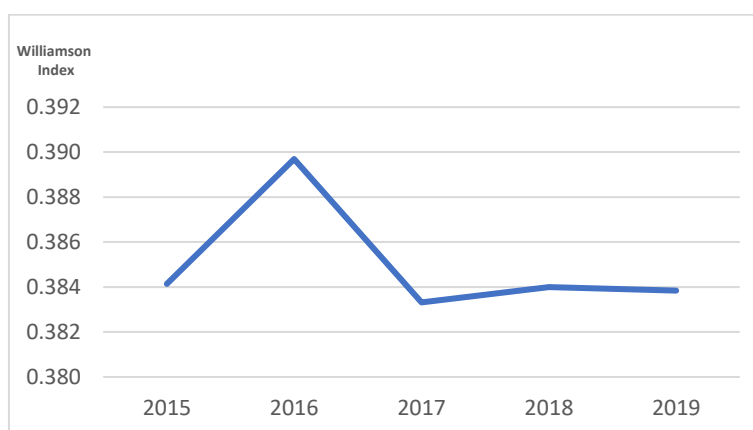

Figure 4 Aceh Province, Williamson Index (2015-2019). *Statistics Indonesia (analysed)*

This research will try to analyse the disparity in infrastructural facilities in 23 regencies/municipalities in Aceh Province Indonesia and the impact of regional disparity on the economic growth. Section 2 will discuss the research questions, and the theory of infrastructure development, economic growth and

regional disparities will be explained in literature review in section 3. Section 4 deals with the data and methodology. Section 5 will provide the result and data discussion followed by the conclusion in section 6.

The disparities among infrastructural facilities is still the main issue to be solved by the government in Aceh Province. The negative impacts of disparity can influence many aspects including social and economy aspect (Katamso S.A and Amir 2018). Furthermore, the worst problem is highly possible to happen in Aceh if the action is not directly taken. Based on the explanation above, the following problems can be formulated:

1. Are there any regional disparities in infrastructural facilities in 23 cities/municipalities in Aceh Province?
2. What is the development of infrastructure and its impact on GDP, poverty and unemployment?

1.3. Research Objective

Based on the background and existing problems, this research aims to analyze/examine:

1. The regional disparities in infrastructure facilities in 23 cities/municipalities in Aceh Province.
2. Describe the spatial condition of economy (rdgppc, poverty and unemployment)
3. The impacts of the regional disparities in infrastructure facilities on RGDPPC, Unemployment and Poverty.

1.4. Benefits of Research

Following the background and objectives of this study, it is expected that the output and discussion carried out in this study could provide a new insight related to the regional disparities in infrastructure facilities and the impacts of regional disparities in infrastructure facilities on economic griwth in Aceh. The final information to be obtained from this research is:

1. For the author, it is expexted to increase insight and understanding of regional disparities in infrastructure facilities in several cities in Aceh Province, as well as the impact of the regional disparities on the economic growth
2. For the reader, it is expected to have an additional knowledge and receive a broader horizon regarding regional disparities issues, particularly in Aceh Province.

1.5. Research Scope and Limitations

This research focus on examining the regional disparities among infrastructure in Aceh Province. IDI (Infrastructure Development Index) will be used to measure the level of disparities in infrastructural facilities in provincial level. IDI will be formed using infrastructural data from 23 cities/municipalities in Aceh. Further, there are nine indicators chosen to formulate IDI. They are percentage of village electrified, per capita consumption of electricity, length of road, the number of hotel, percentage of villages connected by road, number of post office, the number of bank, number of mobile consumers (bts), and Number of Markets. In addition, the impact of Infrastructure facilities on Unemployment, Gdp/capita and the rate of poverty will be the dependent variables.

II   LITERATURE REVIEW

1.1. Infrastructure

Infrastructure is the main requirement for other economic sectors to grow. In many developing countries, physical infrastructure is likely to alter economic activities, thus benefit the economy. Therefore, the development of infrastructure will have a direct impact or indirect impact on economic growth. Further, according to Warsilan and Noor (2015), infrastructure also has a substantial impact on poverty reduction as well as on economic growth. In details, the presence of infrastructure is considered to be a significant part of economic development for any levels (Abiad et al, 2017). Thus, infrastructure is not only a crucial part of economic development for low-income countries but also for upper-income countries.

Additionally, the development of infrastructure is one of the most vital aspects in a country's pursuit of economic growth. For that reason, such a proper infrastructure may promote efficiency by improving the mobility of goods and services. An adequate infrastructure will also increase economic added value and will support regional productivity. Thus, physical infrastructure plays a substantial role in economic growth and acts as an endowment to increase productivity in many sectors (Démurger, 2001).

Generally, there are two kinds of infrastructure which are social infrastructure and economic infrastructure. According to World Bank (1994), infrastructure is a set of structures that join one another and compose a single frame that supports a given structure. For example, transport infrastructure includes railroads, highways, airports, ports and other elements that are still associated with transportation. Furthermore, public utility property that includes power generation, telecommunications, air supply pipe, sanitation/waste disposal, solid waste ads, garbage and piped gas. Infrastructure is divided into three categories by the World Bank (1994) which are:

1. Economic infrastructure is a physical infrastructure needed to support economic activities, including public utilities, public works (roads, dams, canals, irrigation, and drainage) and the transportation sector (roads, railways, ports, airports).
2. Social infrastructure, including education, health, housing, and recreation.
3. Infrastructure administration, including law enforcement, administrative control, and coordination.

Patra and Acharya (2011) use IDI to measure the regional disparity in the development of infrastructure in India by using inter-states data analysis. On the other hand, this study has not been conducted in Indonesia, particularly in Aceh Province by using inter-provincial data analysis. Thus, as this province has 23 cities and municipalities, IDI is used to analyse the regional disparities of infrastructure through all cities in Aceh.

Infrastructure index might be different in each country, depending on the most potential facilities and services that are available. For instance, AFDB conducted a study in 2018 in Africa by computing different components and indicators for the platform for data collection. Further, the data is used to analyse the progress and status of infrastructural development in that country. However, both aspects, physical and non-physical indicators, are still included in the components. In this case, Africa has AIDI (Africa Infrastructure Development Index) as reported in the AFDB Statistics Department (2018). Another study is conducted by Donaubauer et al. (2014) which computed the global Index of Infrastructure and rank each sector, particularly the economic infrastructure. By combining the data from several relevant sources. The finding of this study is used to estimate the probability gaps of infrastructure development in several developing countries.

In the case of supporting the growth of the economy, many studies stated that there is a positive correlation of infrastructure to economic growth. According to Ghosh and De (1998), physical infrastructure such as railways, irrigation, and telephone density play a significant role in the improvement of many vital sectors in India. Furthermore, the physical infrastructure is also essential to household life as well as to economic activity. Further, Ahmad et al. (2016) found that the links between the development of infrastructure which are through the employment opportunity directly for the generation. Additionally, the other connections are the indirect enhancement of the growth by the economy in the productivity sector.

Mitra et al. (1998) revealed that the development of infrastructural sector is capable of being the main booster for industrial mobility and productivity. Sibarani in 2002 conducted research in Indonesia and found that physical infrastructure such as electricity and education affect income per capita significantly. The most crucial issue for Indonesia today is in maximizing the development of infrastructure massively, due to the main concern for the current

president and its cabinet. Furthermore, the complex problems facing by the country such as social issues can be the thick barrier for development.

Furthermore, infrastructural development and regulatory reform will, therefore, continue as the priority of the development in Indonesia in 2019-2023. World Economic Forum (WEF) in 2014 reported that one of the crucial obstacles faced by Indonesia is Infrastructural sector which can obstruct the better achievement of economic growth and the quality. In detail, most of the state budget is allocated to the infrastructure sector in many regions in Indonesia, including Aceh. In turn, infrastructure will assist all the economic activities in the province, such as improvement in the production capacity for the industries. Therefore, the better capacity of production will finally affect the growth in the region.

Moreover, sustainability will also be obtained in the social sectors among the people due to the better connection to essential services and employment. Bappenas (2010) reports that the impact of infrastructure development has a broad spectrum, such as raising productivity, encouraging connectivity and lowering costs. Further, it increases the diversification of production, trade development, equitable development, poverty alleviation, and improved quality of life. In detail, infrastructure is vital in promoting economic growth and continually will reduce inequality in the country (Srinivasu and Rao, 2013).

It might be true that infrastructure, whether physical or non-physical has a linkage with the economic growth and it can be very complicated, because it has a direct impact on the consumption and creates many indirect externalities, according to Ghosh and De (2004, pp. 4645-4657). Another significant empirical evidence from the study in 1993 by Cutanda and Paricio that found the same result, which is the infrastructure such as highways, water, and energy supply has a positive impact on the growth especially on private sector (pp. 69-77).

1.2. Regional Disparities

Disparity or inequality is different from poverty, but it is related to it. Disparity covers all the variations of the standards of living in a whole population even all the aspects among the people (McKay, 2002). As the general idea, disparity is the global issue for any countries and the main obstacles for reaching the prosper economic growth. On the other hand, regional disparities or inequalities among regions happen due to the concentration of development and other aspects of economic activities (Zali et al, 2013). Further, there are two main fields of the regional disparity's existence. The first is economical plan and policy makers decision and second is the natural resource conditions.

Inequality is not a new issue in Aceh, the stakeholders and the government are still working hard to find the root of the problem. Therefore,

the next step can be prepared to reduce the issue by the government. Hadi, et al (2016), in their research about Regency and City in Aceh Province, explains if the rate of coefficient of inequality of economic development in Aceh Province fluctuates and the coefficient is still high. A study by (McKay,2002) reported that inequality happens in many aspects of development particularly the infrastructure development. Further, the disparity not only occurs in social aspects but also the other aspects such as financial and infrastructure.

Iqbal et al (2019) used Scalogram Index and Williamson index to analyse effect of infrastructures to disparity of economic development in Aceh. The results found that there are some indicators that cause the disparity in economic growth. For instance, health facilities, amount of electricity and the availability of schools. In details, Syafrizal (2008) explains there are several factors that determine inequality between regions which are: the difference of natural resource, the difference of demographic conditions, substandard mobility of goods and services, Regional economic activity concentration and allocation of development funds between region.

The inequal level of standards mobility may represent the infrastructure and services development. It is true that Aceh economic growth increases and leads to significant growth supported by the development project by the government. In fact, the lack of management in allocating special funds can strengthen the issue of inequality in this province and yet, the development is only concentrated in some particular areas or particular infrastructures. This particular condition is also the main factor that cause the high level of poverty and leads this province as one of the highest percentage of people living below the poverty line.
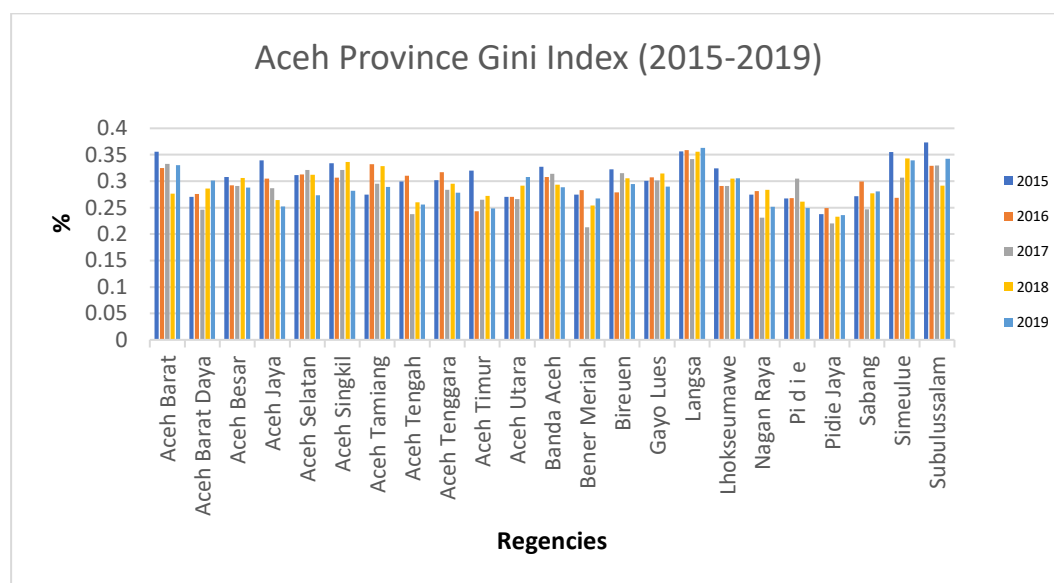

Figure 5 Gini Index for Inequality growth in Aceh Province. (*Statistics Indonesia (BPS) 2015- 2019*)

The Gini index is one of the simplest ways to spot the level of inequality in a country. The blue line in Figure 5 represents the inequality in the city, the red line represents the inequality in the village and the combination between city and village is represented by the green graph. At the provincial level, the Gini index for Aceh province portrays the level of index where in 2018 the level of index was about 0,32 and the level of disparity in the city is higher than in the village. Statistics Indonesia (2019) reported that the safe level of inequality is below 0,30 for the provincial level. It means that Aceh province was still stuck with inequality issues in terms of economic growth and development.

However, in terms of infrastructure development, the level of disparity is still high among the infrastructures. If a country or the region has high ratio for Index Gini, meaning that, the level of inequality among the people is very clear and in return, it will reduce the long-term ability to grow for the country. Regional inequalities are likely to happen due to the unequal level of growth. For instance, when the population growth is more significant than economic growth (Aidar and Syahputra, 2015). In detail, the level of economic growth is closely linked with the standard of infrastructure and services that are available in the regions. When the population grow faster in the country, it has to be balanced by the availability of infrastructural facility that can sustain the growth. Thus, the level of sustainability of income can be achieved.

1.3. Economic Growth

Economic growth is a process that brings the standard level of income and national output. As time goes by, the growth is expected to assist the improvement of the economy in a country as explained by Todaro and Smith (2006) cited by Iqbal et al. (2017). Further, the positivity of economic growth is the requirement to reach a better standard of life for the people. However, growth cannot be the only goal of the development of the infrastructure in the country because it can lead to inequality in the social aspects (Sukwika, 2018).

The sustainability of development is one of the factors that can lead to equality, and the imbalance of the development will lead to inequality in economic growth (Chotia and Rao, 2017). Thus, the development might be necessary for the country. However, the sustainability of the development as the main goal to achieve better growth is frequently obstructed by the inequal level of establishment. For instance, Indonesia is a country where the development is only concentrated in java island where the capital city located. This fact may be the negative impact for the sustainability in the whole country. Particularly, the establishment of infrastructure which can assist the economic activity and boost the productivity.

Higgins (1968), cited by Patunru and Tarsidin (2012) addressed the economic issues in Indonesia and included the country as the first economic failure among other underdeveloped countries in 1966 due to the hyperinflation

and the total deficit which was experienced in that period. This condition was known as the worst crisis in the country and totally affected the growth of several sectors in the regions. It is followed by the rise of inequality level in the economic sector in 2000.

Further, Statistics Indonesia (2019) reveals that Aceh's economic growth is under 5% of the regional domestic growth. It means that the economic growth in Aceh is on the third lowest among nine other provinces on Sumatra island and at the national level; it is far below the national growth, which is 5,07 %. This condition may be one of the clearest evidences that inequality does exist in this province. By considering this evidence, in the policy perspective, greater emphasis is required to achieve high sustainability of economic growth (Sahoo and dash, 2009).

Indonesian economic growth is purely determined by the economic activity and the equality in all aspects, such as social aspect even income and consumption. Moreover, investment in case of development also plays significant role in the better level of economic growth (Fitri, 2016). For instance, each country requires sufficient growth in economic sector. Hence, increasing the investment in the sector of infrastructure might be the most possible way to support the growth. The establishment of infrastructure contributes to increase productivity and it is aimed to support long term and better economic growth in this country.

1.4. Empirical Studies

Many studies had been conducted by many researchers related to the regional disparities among infrastructure and its relationship with the growth. However, there are some significant differences and similarities between the previous studies and this study. Patra A and Acharya A (2011) conducted a research in India, analysing the regional Disparity, Infrastructure Development and Economic Growth using Simple Multivariate Method, Correlation Matrix and Path Diagram. It shows that there are some of well-developed states and some are less developed. Moreover, empirical evidence suggests that there is a positive relationship between Infrastructure Development Index & Per Capita Net State Domestic Product and negative relationship between Infrastructure Development Index & Poverty.

P Nijkamp (1986) used multidimensional typological analysis to find the relationship between infrastructure and regional development of Netherlands. The result shows that extent to which infrastructure contributes to regional developments *varies* over time and depends also on the regional level of analysis and on the overall level of economic welfare. Further, the statistical results demonstrate a high degree of *correlation* among successive infrastructure indicators. This justifies the aggregate level of analysis, based on major infrastructure clusters. At the same result is a study from Iqbal in 2017

that used scalogram and Williamson index to analyze effect of infrastructures to disparity of economic development. He clearly found that there are some indicators that cause the disparity in economic growth such as health facilities and amount of electricity.

Prasetyo, et al (2013) Using static panel data regression and panel two stage least square (2SLS) estimation methods about Infrastructure, Economic Growth and Inequality in Indonesia Land Borders, state that Infrastructure has a positive impact on the growth of per capita income. Furthermore, Ahmad I et al in 2016 studied about Rural Infrastructural Development and Its role in Poverty Reduction. Researchers found that the variables of gas and electricity are proved to be comparatively more important for poverty reduction of rural areas of Pakistan. Additionally, the results relating to health and education infrastructure are also unexpected because infrastructural variables of electricity and gas are proved more beneficial for poverty reduction in comparison to health and education infrastructures.

A study conducted by Cutanda A and Paricio J in 1992 about the relationship between Infrastructure and Regional Economic Growth resulted that the least developed regions have low infrastructure indicators. Moreover, the conflict between growth and equity can be reduced by establishing differentiated strategies regarding public investment policies aimed towards stimulating growth and towards lessening regional income imbalances. Thus, it would not be effective to give priority to economic capital in the less privileged regions over others with more favorable development conditions and could also hinder an efficient regional allocation of resources.

On the other hand, there was a specific study of infrastructure conducted by Holtz-Eakin D and Schwartz A E in 1995 which was about the benefits productivity of highway as public infrastructure. The researchers found an opposite result with spillovers among states do not appear to be at the heart of recent findings of a large productivity impact from public capital. However, it seems that the notion that a state's effective stock of highways depends on the provision of highways still has an intuitive appeal. On the other words, the infrastructure still has impact on the productivity spillovers, even though it does not show the high impact.

B Srinivasu B and Srinivasa R (2013) stated that Infrastructure sector may not always be an engine of growth directly, but they act as the essential rails on which the wheels of economic progress can proceed with sustained speed. Without a strong and viable infrastructure, it is difficult to achieve rapid and sustained growth of the order of 7 to 8 percent, which is necessary for progressively eradicating poverty. Therefore, Infrastructure services are exactly essential to achieve development targets in any economy some of its major dimensions include the level of economic growth and to reduce the poverty level in the region.

Sahoo P and Dash R K (2009), conducted a research in India regarding the infrastructure development and the economic growth. They found that infrastructure development in India has a significant positive contribution toward growth than both private and public investments. Further, causality analysis shows that there is unidirectional causality from infrastructure development to output growth. From a policy perspective, there should be greater emphasis on infrastructure development to sustain the high economic growth. This result is supported by the study from Ghosh B and De P in 2019 which reported the similar result of the role of Infrastructure in regional development. The researchers found that the impact of public investment and physical infrastructure on both private investment behavior and regional economic development has been found to be highly significant and positive.

Another kind of infrastructure such as transport facilities are a key differentiating factor in explaining the growth gap and point to the role of telecommunication in reducing the burden of isolation as reported by Demurger S in 2001 in his study of Infrastructure Development and Economic Growth. The role of infrastructure also can be seen when it comes to address the regional disparity problem in China. Therefore, expanding and upgrading the network of transportation, storage, and distribution services, as well as developing the telecommunication network, would be particularly useful in rural areas, to allow for the development of efficient, competitive markets and for the diffusion of economic growth.

1.5. Conceptual Framework

Basically, development is a core for a region and to be able to support it, needed proper establishment of infrastructure as well as its sustainability. However, in the matter of economic development, the acceleration might be the most ignorable issue. Different pace of establishment and the progress of growth perhaps vary in every region. Some cities might have focus on the infrastructure and others consider the people and other economic activities. Further, a big difference in resources is also can be included as the main economy factors for every region to develop. As a result, some places might be left in case of development and they need to improve so that they can catch up on growth economies of developed regions.

Disparity in economy is caused by the unequal accumulation of wealth (Francis, 2020). social inequality exists because the lack of wealth in certain areas prohibits these people from obtaining the same housing, health care. On the other hand, in the economy development, disparity is caused by many factors such as inequal level of establishment, infrastructure or facilities and further, affected the growth of economy in the regions (Iqbal et al, 2017). In details, due to the difference in level the availability of different infrastructure

between regions results in differences the rate of economic growth causes the economic growth point to be not evenly distributed so that the imbalance of regional economic development cannot be avoided. Therefore, to examine the disparity of infrastructure development in Aceh Province and analyse the impact of infrastructure index on GDP/capita, unemployment rate and poverty can be seen on the figure above.
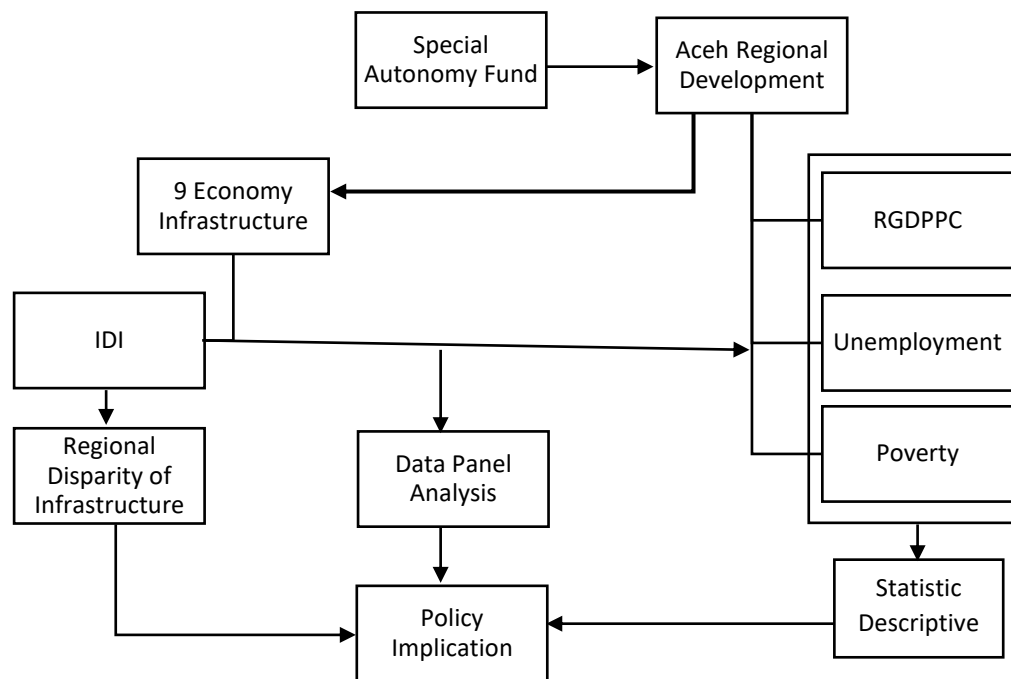

Figure 6 Framework of the study

The presence of Special Autonomy Fund (Dana Otsus) should be a main capital for Aceh Province in order to establish the economy. Rise the growth, improve the establishment of infrastructure and finally lower the rate of poverty and unemployment are the focus why this funding is allocated. In detail, the existence of infrastructure might be a new focus when it comes to the inequality of establishment, as the result, the disparity might increasingly be felt. Panel data analysis and statistic descriptive are also used to formulate the right policy as the consideration for policy makers.

1.6. Hypotheses

Based on Previous studies and supporting theories:

1. There are regional disparities between regions in terms of Index Infrastructure in Aceh Province.

2. There is relationship between infrastructure facilities and Regional Growth of Domestic Product, poverty and the rate of unemployment.

III   RESEARCH METHOD

1.1. Data Types, Sources, and the Collection method

The data used in this research consists of secondary data. The required data is collected from various sources such as: Statistics Aceh Province BPS 2015-2019 and *BPK Aceh Province* (Regional Financial Management Agency). To be specific, 9 development indicators are used in this study. According to Patra and Acharya (2011), there are ten indicators of physical infrastructure or facilities that are included in the Infrastructure Development Index (IDI) where these indicators can be used to measure the disparity by its availabilities.

Table 3 Indicators of Infrastructure

id	Indicators	measurement	sources
1	Village electrified	units	Aceh Dalam Angka
2	Consumption of electricity	%	Aceh Dalam Angka
3	Length of road	Km	Aceh dalam Angka
4	Availability of hotels (accommodations)	units	BPS Aceh
5	Percentage of villages connected by road	per sq. km.	Aceh Dalam Angka
6	Number of post office	units	Aceh Dalam Angka
7	The number of Bank	units	Indonesian Banks
8	Number of mobile consumers (BTS)	units	Aceh Dalam Angka
9	Number of Markets (Traditional)	units	RPJMA,Podes

Source: Patra and Acharya (2011)

Indicator's Definition

- Village electrified (PVE) indicator is defined as number of villages that have electricity facility in 2018 in 23 regencies or municipalities.
- Per capita consumption of electricity (PCONE) is total amount of electricity consumed by villagers in each region.
- Length of road (RLT) indicator is the length of provincial road (Km) for each regency and municipality.
- Availability of hotels (accommodations) (HTL) number of hotels (accommodations) available in each city/municipality.
- Percentage of villages connected by road (VCRL) is defined as total wide of road divided by the total number of villages.

- Post office (PPL) is a service provider facility of communication or mailing facility that are available.
- Bank (BANPL), is defined as number of bank available (operating) in each cities/Municipalities.
- Number of mobile consumers (MOBL) is defined as the availability of BTS (Base Transceiver Station) in each cities/Municipalities in Aceh Province. BTS is a tool (tower) that serves as the sender and receiver (transceiver) of cellular communication signals.
- Number of Markets (Traditional) (PSAR) are all the number of traditional markets available in each region.

Table 4 Dependent Variables

No	Variables	Source
1	Poverty (POV)	BPS Aceh
2	Unemployment (UNEM)	BPS Aceh
3	Regional growth domestic product per-capita (RGDPPC)	BPS Aceh

Furthermore, as the dependent variables, the rate of poverty (POV), percentage of unemployment (UNEM) and Regional growth domestic product per-capita (RGDPPC) are also used to compare the economic growth and the indicators that have the biggest impact. All these data are collected from statistics Indonesia 2015-2019 such as PODES data and *Aceh Dalam Angka* data.

1.2. Data Analysis and Processing Method

The index is used to examine the regional disparities in infrastructural facilities in Aceh Province so that it can be used to analyse its impact on the growth and the gap. The Infrastructure Development Index is computed by combining several kinds of infrastructure and services that are available in Aceh Province. The detailed methodology for this research is proposed by (Patra and Acharya, 2011) which are:

Forming the Infrastructural Index

Regional disparities of infrastructure among infrastructure can be examined by several ways. One of the ways is to form the index. By referring to the procedure proposed by Morris and Liser (1977), infrastructure development index is computed as a weighted average of various components of infrastructure services from a multivariate data set where the weights vary inversely to the variation of the components. The detailed methodology runs as follow:

To begin with, X ij will represent as the value of the ith infrastructural development indicator in jth cities/municipalities, (i = 1, 2, 3, ……., 9; j = 1, 2, 3, ………, 23). The basic formula for the model is:

$$Y_{ij} = \frac{X_{ij} - Min_j\, X_{ij}}{Max_j\, X_{ij} - Min_j\, X_{ij}}$$ …………………………..……......(1)

Where, $Min_j X_{ij}$ and $Max_j X_{ij}$ are the minimum and maximum of X_{ij} Respectively. On the other hand, if X_{ij} is associated with the status of infrastructural development in negative way, so that it is written as:

$$Y_{ij} = \frac{Max_j\, X_{ij} - X_{ij}}{Max_j\, X_{ij} - Min_j\, X_{ij}}$$ …………………………………….… (2)

The scaled values of Y_{ij} is vary from 0 to 1. From the matrix scaled values, Y= {(Y_{ij})}, the construction of the infrastructure development index of different regions as:

$$Y_j = \quad W_1\, Y_{1j} + \ W_2\, Y_{2j} + \ W_3\, Y_{3j} + \cdots + W_m\, Y_{mj} \,…\,…\,…\,…\,…\,(3)$$

Where the weights W_i Vary inversely as the variation in the respective indicator of infrastructure services subject to the condition:

$0 < \ W_1 < 1$ and $\ W_1 + W_2 + \ W_3 + \cdots + \ W_m = 1$

Such that,

$$W_1 = \frac{K}{\sqrt{Variance\ Y_1}}$$ ………………………………………….... (4)

Where, K = $[\sum_{t=1}^{m} \frac{1}{\sqrt{Variance\ Y_1}}]^{-1}$ …………..……………..(5)

The overall cities/municipalities index of infrastructural development, Y_j, also varies from zero to one. The weights are chosen in this study as the tool that ensures the large variation of indicators will not dominate the contribution of the rest infrastructure indicators and distort the inter-Provincial comparison (Patra and Acharya, 2011).

1. **The level of regional Disparities**

Coefficient of Variation

Hadi (2016) analysed inequality using Aceh's GRDP data and found that the number of coefficients increased each year. So that, Coefficient of variation number is used to explain the regional disparity for each year of the IDI (Infrastructure Development Index) for 2015-2019 period.

2. **The effect of Infrastructure variables on Unemployment, Poverty and RGDPPC**

Path regression analysis

Further, path regression will be conducted to see the correlation between 3 dependent variables and IDI. In details, IDI represents all the 9 indicators of infrastructure for 5 years period. It is used to form 1 composite variable. In this case, all the dependent variables are used to define the correlation with each infrastructure indicators.

$$Pov_{it} = \beta_0 + \beta_1 pve_{it} + \beta_2 pcone_{it} + \beta_3 rlt_{it} + \beta_4 htl_{it} + \beta_5 vcrl_{it} + \beta_6 ppl_{it} + \beta_7 banpl_{it} + \beta_8 mobl_{it} + \beta_9 psar_{it} + \beta_{10} unemp_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots(1)$$

$$Unemp_{it} = \beta_0 + \beta_1 pve_{it} + \beta_2 pcone_{it} + \beta_3 rlt_{it} + \beta_4 htl_{it} + \beta_5 vcrl_{it} + \beta_6 ppl_{it} + \beta_7 banpl_{it} + \beta_8 mobl_{it} + \beta_9 psar_{it} + \beta_{10} pov_{it} + \varepsilon_{it} ..(2)$$

$$RGDPPC_{it} = \beta_0 + \beta_1 pve_{it} + \beta_2 pcone_{it} + \beta_3 rlt_{it} + \beta_4 htl_{it} + \beta_5 vcrl_{it} + \beta_6 ppl_{it} + \beta_7 banpl_{it} + \beta_8 mobl_{it} + \beta_9 psar_{it} + \beta_{10} pov_{it} + \varepsilon_{it} \ldots$$
$$(3)$$

Note:

Table 5 Variables definitions

No	Variables	Definitions
1	POV	Percentage of people who live under the poverty line.
2	UNEMP	Percentage of unemployment to total labor force
3	RGDPPC	Per capita gross regional domestic product at constant prices.

Path diagram analysis on figure 7 defines the position for all infrastructure regarding the impact on economy. Based on the hypothesis and related literatures, it seems that all indicators should have every particular impact on the rate of poverty, unemployment rate and the amount of regional GDP/capita in Aceh Province. Structural equation modeling (SEM) is a multivariate statistical analysis technique that is used to analyze structural relationships. Path diagram analysis from (Structural Equation Modelling) describes all the infrastructure index and its relationship with the three dependent variables.
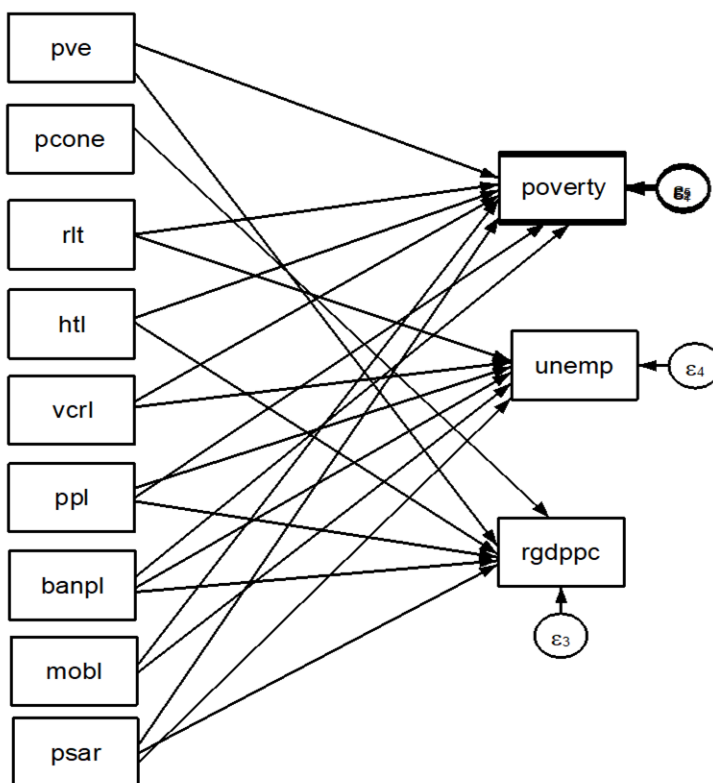
Figure 7 Path diagram analysis

IV   RESULT AND DISCUSSION

4.1. Summary Statistics

Regional development is one important aspect in implementation of development. The aim, among others, is to enhance the development of socioeconomic and reducing disparities in development between inner regions in order to improve the welfare of the community. Further, one of the most important indicators to determine the economic conditions in a country in a given period is the Gross Domestic Product (GDP) data, both at current prices and at constant prices (BPS, 2019). In addition, the size of the number of poor people is greatly influenced by the Line Poverty, because the poor are people who have an average expenditure per capita per month is below the poverty line.

It is true that, the problem of poverty is not just what number and percentage of the poor people. Other dimensions that need to be considered are the level of depth and severity of poverty. Besides having to be able to reduce the number of poor people, poverty reduction policies can also reduce levels at

the same time the depth and severity of poverty. On the other hand, unemployment rate also plays a big role in economy of the regions.

Table 6 Summary Statistics of Each Variable

Variable	Unit	Mean	Std. Dev	Min	Max
Per capita village electrified	%	0,96	0,06	0,77	1,00
Per capita consumption of electricity	IDR/ capita	98,22	2,62	82,37	100,00
Road length	Km	77,46	43,08	2,8	190,50
Number of Hotel	Units	17,76	25,88	0,00	140,00
Villages connected by road	per sq. km.	0,52	0,54	0,01	3,19
Number of Post Office	units	4,57	3,34	1,00	14,00
Number of Bank	units	11,96	8,08	3,00	40,00
Base Transceiver Station	units	56,43	39,37	13,00	181,00
Number of Market	units	20,57	12,13	0,00	46,00
poverty		32,77	24,39	5,43	118,74
unemployment		6,69	2,89	1,02	17,05
GDP/capita		23,04	9,00	12,91	56,12

Table 6 summarises the statistics of each variable using Stata regression. There are 115 of total observations from 2015 to 2019 period measured in this study. Further, the table provide the means, standard deviation, the minimum and the maximum value of each variable which have been observed. Based on the observation, Aceh province has maximum of IDR 56.12 million GDP/capita and the minimum with IDR 12.91 million.

The mean of the number of people living in poverty in Aceh Province is 32.77% people with the minimum are 5.43% people and the maximum is 118.74% poor people. On the other hand, the highest rate of unemployment 17.05% and the minimum rate of unemployment is 1.02% while the mean is 6.69%.

4.2. Regional Disparity of Infrastructure Development

This first step examines the development of infrastructure in each district/ city in Aceh province by using IDI. Based on IDI values, this study measures the level of infrastructure disparity (regional disparity of infrastructure development) between regions by referring to the Coefficient of Variation for each year measured.

Table 7 Infrastructure development index (IDI) of cities/municipalities in Aceh
   Province for 2015-2019

no	City	IDI (Infrastructure development index)				
		2015	2016	2017	2018	2019
1	Aceh Barat	0,652	0,704	0,687	0,704	0,708
2	Aceh Barat Daya	0,376	0,354	0,374	0,388	0,375
3	Aceh Besar	0,745	0,746	0,752	0,793	0,757
4	Aceh Jaya	0,656	0,591	0,608	0,664	0,603
5	Aceh Selatan	0,610	0,575	0,594	0,642	0,598
6	Aceh Singkil	0,559	0,612	0,680	0,616	0,601
7	Aceh Tamiang	0,668	0,662	0,672	0,695	0,678
8	Aceh Tengah	0,478	0,512	0,507	0,540	0,530
9	Aceh Tenggara	0,602	0,581	0,588	0,634	0,611
10	Aceh Timur	0,663	0,655	0,656	0,703	0,674
11	Aceh Utara	0,700	0,696	0,686	0,746	0,703
12	Bener Meriah	0,628	0,672	0,676	0,686	0,674
13	Bireuen	0,661	0,623	0,634	0,688	0,644
14	Gayo Lues	0,188	0,267	0,269	0,233	0,274
15	Kota Banda Aceh	0,797	0,714	0,719	0,762	0,732
16	Kota Langsa	0,108	0,126	0,148	0,141	0,152
17	Kota Lhokseumawe	0,646	0,598	0,619	0,679	0,621
18	Kota Sabang	0,800	0,638	0,653	0,651	0,807
19	Kota Subulussalam	0,385	0,471	0,474	0,474	0,495
20	Nagan Raya	0,698	0,640	0,650	0,715	0,664
21	Pidie	0,711	0,701	0,694	0,747	0,721
22	Pidie Jaya	0,652	0,612	0,636	0,665	0,644
23	Simeulue	0,617	0,787	0,785	0,718	0,806
Average		**0,591**	**0,589**	**0,598**	**0,621**	**0,612**
Regional Disparity		**0,297**	**0,265**	**0,256**	**0,270**	**0,255**

Table 7 shows the change in infrastructure Development Index (IDI)
for 23 cities/municipalities in Aceh province 2015-2019. The index of
infrastructural development (IDI) has a distribution value varies from 0 to 1, if
the Index value is getting closer to zero the lower the availability of facilities
and vice versa if the index value approaches one so availability is very high in
a region regarding the infrastructure. As the matter of fact, the development of
these facilities can support economic activities. Therefore, when the
government carries out properly the infrastructure development in areas that
are far from the center of economic growth, these regions will become new
centers of economic growth. Naturally, by itself, the region can advance and
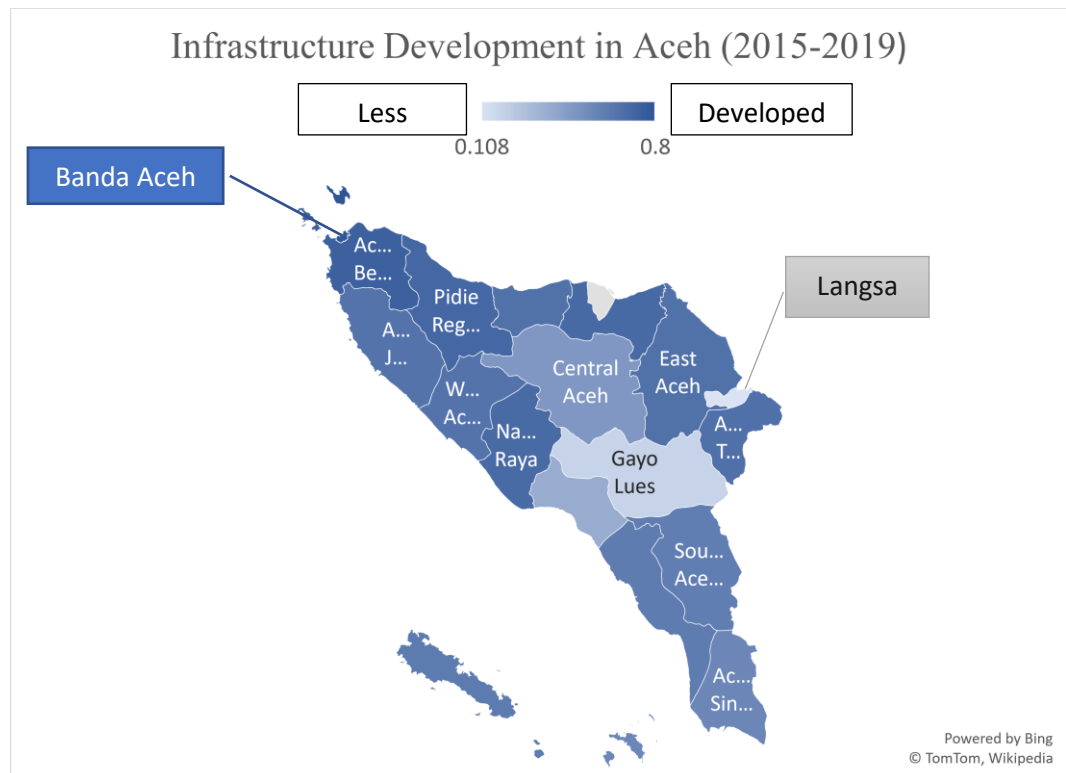develop following all the areas (Iqbal M, 2019).

Figure 8 The Development of Infrastructure based on the IDI (Infrastructure development Index)

The figure 8 shows the availability of infrastructure development in 23 cities/municipalities in Aceh Province based on the IDI (Infrastructure Development Index). In fact, Langsa city has the lowest Infrastructure index which posited this city as the less developed region in terms of infrastructure availability. Langsa city is a city with the fourth small population in Aceh Province. Further, the city owns the second smallest number of village and covers only 262,41 km^2 of area that lead this city as the fourth smallest city in Aceh Province. On the other hand, the highest index owned by Banda Aceh. This city is the capital city of Aceh Province where all the developments are concentrated and has the high availability of infrastructure in comparison with another regions.

Based on the data computation using Stata, the index value for every period measured for cities/municipalities are obtained. Overall, the average index for five years slightly increases before it drops in the last year period measured. Further, most cities/municipalities have high value of index and slightly increased until the last years. The Table 5 also shows some variations among these regencies in terms of regional development of infrastructure. We may divide the regions based on the value of IDI into two groups which are: (i) developed regions and (ii) backward regions as shown in Figure 8. In this condition, developed regions mean that the regions are well developed in respects of availability of infrastructure. On the other hand, backward regions mean that the regions are lack of Infrastructure availability.

The "well developed regions" category has IDI value higher than the the average of Total Index of Infrastructure Development (IDI >0,597) and the "backward regions (less developed regions)" category has IDI value lower than the average Infrastructure Development index (IDI < 0,597) as seen in Table 5. In details, Aceh Besar, Banda Aceh and Simelue city are the cities/regencies which have highest score of IDI in all periods which represent as the highly developed regency in terms of infrastructural facilities. On the other hand, Langsa City, Gayo Lues and Aceh Barat Daya have the lowest index, meaning that these cities/regencies are less developed. The difference between two IDI index scores of two extreme regions is 0,692.

From this fact, a conclusion can be obtained that the development of infrastructure is still concentrated in some regions. For example, the central province and other big cities in Aceh. On the one hand, it is good that the central undergoes the major development because it sustains all the vital economic activities which are intensively run in the central. On the other hand, when the process of development and the demand for investment lead to increasing concentration of capital then it will lead to concentration of wealth. As a result, it will increase division between the poor or middle-classes and the wealthy investment class (Kaldor, 1957; Zali et Al, 2013).

In detail, the highest values of IDI have range between 0,745 until 0,807 while the lowest only vary between 0,108 until 0,376 The mean index score of IDI for all the regions is 0,597 and the standard deviation is 0,1620. Meanwhile, the coefficient of variations decreases until the last year period meaning that the regional disparities experience small decreases in 5 years studies. To be specific, it varies between 0,297 and slowly decreases in 2019 with about 0,255.

Table 8 List of Cities/Municipalities and GDP/capita in Aceh Province.

no	city	GDP/capita (million Rupiahs)				
		2015	2016	2017	2018	2019
1	Aceh Barat	26.627	26.832	29.796	31.977	33.212
2	Aceh Barat Daya	17.836	18.308	18.808	19.372	19.968
3	Aceh Besar	21.685	22.086	22.508	22.962	23.527
4	Aceh Jaya	19.800	20.295	20.691	21.108	21.468
5	Aceh Selatan	15.894	16.362	16.763	17.306	17.799
6	Aceh Singkil	12.916	13.200	13.406	13.681	13.977
7	Aceh Tamiang	18.448	18.647	19.118	19.677	20.286
8	Aceh Tengah	25.356	25.946	26.494	27.023	27.380
9	Aceh Tenggara	14.605	14.926	15.345	15.519	15.901
10	Aceh Timur	18.016	17.472	17.831	18.280	18.706
11	Aceh Utara	26.006	25.601	25.896	26.751	27.321
12	Bener Meriah	22.442	22.929	23.418	23.964	24.479

13	Bireuen	19.485	19.899	20.275	20.753	21.364
14	Gayo Lues	19.541	19.959	20.611	20.857	20.536
15	Kota Banda Aceh	50.838	53.076	53.635	54.930	56.122
16	Kota Langsa	19.559	20.089	20.649	21.235	21.862
17	Kota Lhokseumawe	34.221	33.099	33.136	33.634	34.344
18	Kota Sabang	27.487	28.472	29.885	31.093	32.615
19	Kota Subulussalam	15.087	15.461	15.920	16.302	16.688
20	Nagan Raya	34.965	35.657	36.371	37.207	38.774
21	Pidie	15.742	16.085	16.535	16.987	17.498
22	Pidie Jaya	14.653	14.919	15.445	15.830	16.156
23	Simeulue	15.089	15.570	16.057	16.600	17.212
	Average	**22.013**	**22.387**	**22.982**	**23.611**	**24.226**

Source: Statistics Indonesia (BPS)

Table 8 shows the GDP/capita for each city and municipality in Aceh Province. The Table 6 also shows some variations among these regencies in terms of GDP/capita owned. It can be divided that the regions based on the amount of GDP/capita into two groups which are: the average of GDP/capita under the average and above the average. In this condition, the average of GDP/capita is 22.344 IDR million for each year. It clearly can be seen that only several regions resulted in average of this amount of GDP/capita while the others own less than the average.

In details, Banda Aceh City and Nagan Raya have the highest amount of GDP/capita while Aceh Singkil and Aceh Tenggara produced the lowest GDP/capita among other regencies. Interestingly, in relation with the value of IDI as seen in table 5. It seems that the infrastructure variables that formed as composite index have high correlation with GDP/capita. To be details, some regions which have high value of IDI also result in high amount of GDP/capita. For example, Banda Aceh City, Lhokseumawe City and Nagan Raya. So that the cities/municipalities which have low value of IDI, these regions also resulted low amount of GDP/capita. For example, Gayo Lues, Langsa City and Aceh Barat Daya.

4.3. The impact of IDI on the Economy of Aceh Province

Table 9 shows the results of path analysis (path coefficients and R^2 values). Empirical computed data shows that infrastructure variables (IDI) which are potential to influence growth, unemployment rate and the level of poverty are slightly different. Therefore, some Infrastructure indicators are highly potential to influent the growth of regional domestic product per capita, which in turn, the infrastructure variables are able to reduce poverty and slightly potential to affect the unemployment rate.

The results of regression analysis defines that poverty is directly affected by per capita village electrified, per capita consumption of electricity, length of road, number of hotels, villages connected by roads, number of banks, base transceiver station and number of markets. The R^2 value from Poverty model is 0,617, meaning that the independent variables simultaneously explain 61,7% of the variance of poverty rate. Meanwhile, poverty rate and regional GDP per capita are directly affected by per capita village electrified, per capita consumption of electricity, length of road, number of hotels, villages connected by roads, number of banks, base transceiver station, and number of markets. However, the R^2 value from Unemployment model is 0,227 while the R^2 value from Rgdppc model is 0,611. That is, the independent variables simultaneously explained 22,7% of the variance of Unemployment rate and 61,1% of the variance of regional GDP per capita.

Table 9 the estimation results of the impact of infrastructure availability on regional denominations

Variables	Poverty (%)		Unemployment (%)		Rgdppc (Rupiahs)	
	coefficient	elasticity	coefficient	elasticity	coefficient	elasticity
Per capita village electrified (pve)	16,783	0,492	2,678	0,384	23,574***	0,982
Per capita consumption of electricity (pcon)	-1,143**	-3,426	0,005	0,073	-0,031	-0,132
Road length (rlt)	-0,150***	-0,45	-0,015**	-0,22	0,014	0,047
Number of Hotel (htl)	-0,074**	-0,175	-0,011	-0,127	0,076***	0,059
Villages connected by road (vcrl)	1,886	0,03	0,536	1,423	-0,184	-0,004
Number of Bank (banpl)	0,099	0,036	0,100***	0,008	0,796***	0,413
Base Transceiver Station (mobl)	0,281***	0,484	0,012	0,008	-0,036	-0,088
The number of market (psar)	0,878***	0,551	-0,004	-0,007	-0,138*	-0,123
Unemployment (unemp)	0,72					
Poverty (pov)			0,02		-0,025	
_cons	99,637**		1,866		-2,455	
N	115		115		115	
R-sq	0,617		0,227		0,611	
adj. R-sq	0,584		0,161		0,578	
* p<0,10. ** p<0,05. *** p<0,01						

From the estimated indicators, it might be true that some infrastructure variables shown the significant level in affecting the economy (Poverty, unemployment and GDP/capita). However, the units of measurement that are used for each infrastructure indicators are far different. Therefore, elasticity method is used to find the elasticity value for each coefficient measured. In amazement, in terms of poverty, per-capita consumption of electricity indicator has the smallest level of significancy both coefficient and elasticity, followed by road indicator in regard of unemployment which has almost the same impact in elasticity. In addition, from the GDP/capita variable, the number of hotels has the smallest coefficient and outstandingly has almost the same level of elasticity.

In details, there are 5 infrastructure indicators that have impact on poverty. However, it is noticeable that there are only 3 infrastructure which fit the hypothesis in this research. Such as per-capita consumption of electricity, the road length and the number of hotels. It can be seen that 1% consumption of electricity increase will directly decrease 3,42% of poverty rate in Aceh. Moreover, 1% of the road length rise will decrease 0,45% poverty rate. Lastly, it also depicts that 1% of number of hotel increase will reduce the rate of poverty at about 0,175%.

In terms of Unemployment, it is true that there are two infrastructure which have significant impact on unemployment rate, such as road length and the number of banks. Yet only road has impact on unemployment according to hypothesis. When the length of road increase 1% then it will decrease 0,22% of unemployment rate in Aceh Province. On the other hand, in terms of GDP per capita for regional, there are four infrastructure which are significant to affect the growth of regional domestic product per capita. For instance, per capita village electrified, number of hotel, number of banks and the number of markets. However, the evidence shows that only three facilities fit the hypothesis. Circumstantially, if per capita village electrified rise at 1%, it will also boost regional GDP/capita about 0,98% and if the number of banks increase at 1% then GDP/capita will rise around 0,41%. Finally, at the smallest rate, when number of hotels escalates up 1% will also level up the regional growth of domestic product at about 0,06%.

Surprisingly, the coefficient result also shows that the unit number of unit banks (banpl) is infrastructure that has small impact on rising the rate of unemployment which is about 0.10%. the number of banks significantly correlates with increasing unemployment rate and also correlates with rising poverty rate, despite not significant statistically. The presence of banks can improve the transaction efficiency and mediate the member of the society with extra fund with those needing the fund through its savings and loans facilities hence enhance economic growth in general (Devi 2016; Abdurohman 2003;

Agung & Ford 1998). However, the result also shows that the provision of credit and other financial access will not by itself creating employment, without strengthening the financial literacy of the society (Arias 2015; Mugo & Kilonzo 2017; Erlando, Riyanto & Masakazu 2020). Firstly, the financial sectors may have limitations in expanding its financial program outreach to people in remote rural areas. Evidence suggests that the main reasons people in rural areas do not start saving at and borrowing from the bank are due to higher transaction costs, higher risks, and more unfavourable contracting environment that makes it more difficult for financial institutions to achieve and maintain sustainability in rural compared to urban areas (Lopez & Winkler 2018; Dupas et al. 2012). Second, some people in the community may have low financial literacy (Kesa 2019). Low financial literacy may hamper the welfare improvement effect of bank loans, especially because the poor loans management by households may lead to the debts burden (Gathergood 2012).

In addition, the presence of base transceiver station (BTS)significantly correlates with higher poverty rate. It also correlates with lower regional GDP/capita and higher unemployment rate, albeit with no statistical significance. The result shows that the BTS running as facilities to provide wireless communication and internet access in an area will not by itself improve economic performance of a region, reduce the poverty, and create jobs. One of the necessary conditions to transform the telecommunication access into household productive activities is the level of education (Chevalier et al. 2004) and internet literacy (Boothby, Dufour & Tang 2010). Otherwise, the improving communication access will increase communication activity, hereby household spending on communication, without necessarily transform into additional income (Nasution 2016).

Finally, the number of traditional markets surprisingly has significant and negative correlation with regional GDP/capita. It surprisingly also has significant correlation with higher poverty rate of Aceh Province. A market is supposed to be a medium where most economic transactions occur. However, the market often cannot be accessed by some members of societies because of the long distance of the villages to the market which are mostly located in the center of sub-districts. In addition, traditional markets have gradually lost its traditional function due to the internet penetration in the rural areas, growing online media and markets, and increasing number of consumers who prefer online shopping (Do, Nguyen & Nguyen 2019). Furthermore, the internet access allows people to arrange a meeting in a closer location to perform business transaction without having to visit the market (Frick & Matthies 2020). Hence, the traditional market currently may not serve as the best indicator of economic performance of an area.

For sure, electricity infrastructure is one of the vital facilities in maintaining all the economy activities run well. In a study conducted by Maqin (2011) states that electricity infrastructure, labor, and development spending have a positive and significant impact on economic growth and are factors that can affect the economic growth of districts and cities. In addition, Traditional Market (Arnita et Al, 2019), as well as the tourism sector, in this case the development of accommodation, with path analysis, Widiastuty (2013) found that this sector has a significant effect on regional financial performance and community welfare. On the other words, it will increase the economy of the regions. All in all, all of these infrastructures are vital aspects to have better access for the regions. Further, it will lead to better equality if the availability is equal to all the areas. Ultimately, it will bring the equal growth to the economy and reduce the level of inequality in the whole regions.

V CONCLUSION AND IMPLICATIONS

5.1. Conclusion

The results of the analysis based on the IDI show that in the 2015-2019 period, in general the level of infrastructure availability in each district / city was relatively varies with the average IDI value tending to increase from 0,591 in 2015 to 0,612 in 2019. In the last period measured, the highest IDI score is at 0,807 (Sabang City) and the lowest value is at 0,152 (Langsa City). However, based on the analysis of the coefficient of variation in the disparity in the level of infrastructure availability between relatively small areas, it is less than 0,3 and tends to decline.

Spatial economy condition describes that, based on the IDI (Infrastructure Development Index), Aceh Besar, Simelue city and Banda Aceh are three cities/regency with the highest development index. It means that these three cities have the proper utilization of the various infrastructural facilities. The lowest value of IDI (Infrastructure Development Index) also defines Langsa City Gayo Lues and Aceh barat Daya as the less developed regions, meaning that these three cities have poor utilization of infrastructure.

Based on the results of the regression analysis, it shows that the level of infrastructure availability, IDI in general affects the economic conditions of Aceh Province and specifically there are different types of infrastructure that affect each economic condition (economic growth, unemployment and poverty). Of the nine infrastructure variables, only three variables can reduce poverty, namely electricity, roads and hotels infrastructure; only one variable can reduce unemployment, namely road infrastructure and there are three particular variables that increase economic growth, namely rural electricity infrastructure, hotels and banks. The value of Infrastructure Development Index (IDI) also determines the position of each districts/municipalities. As a detail, the number of electricity, the number of hotels, road length, and the number of

banks are highly potential to increase the growth of regional domestic product per capita and reduce the unemployment rate in the Province.

5.2. Policy Implication

Therefore, to raise regional domestic product per capita and reduce the level of poverty, the government should take the actions to focus on creating better infrastructural facilities that can generate the economic growth and standard of living for people. Moreover, to reduce the level of unemployment in Aceh, the better policy is needed due to correlation of the infrastructure to the 3 dependent variables.

Focus of regional development

To begin with, it is true that some regions have astonishingly high of infrastructural index while others show minimum value of index. Therefore, it is better to prioritise the regencies/cities which have low level of IDI (Infrastructural Development Index) such as Langsa, Gayo Lues and Aceh Barat Daya, in this case is the development of infrastructures. In order to stabilise the economic growth in each regency and reduce the gap among the cities/municipality in Aceh Province.

Focus of infrastructural facilities

From the results obtained, it is recommended to the government that it is better to prioritise the development of infrastructure or facilities which have high level of significant whether to the reduction of poverty, unemployment rate and the improvement of regional growth of domestic product per-capita based on the result obtained in this research. For example, by opening the investment in road, hotels or accommodations, financial institutions such as banks, as well as the electricity due to the high potency of these facilities in assisting the rise of economic growth and lowering the unemployment and poverty.

Study Implication

The result of this study implies that the infrastructure does have a big role in the regions. Particularly supporting the economy activities and finally level up the economic growth as found in other related studies. Therefore, to raise regional domestic product per capita and reduce the level of poverty, the government should take necessary actions to create better infrastructural facilities to improve the economic growth and standard of living for people.

However, it is true that this study only focuses only on Economy Infrastructure. Thus, further studies needed on other focused infrastructure such as Infrastructure for education, Health Infrastructure as well as Social Infrastructure. So that, various results will be obtained as the purpose of

economic growth and therefore it will finally reduce the inequality in the Province.

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BIOGRAPHY

The author named Mutiara Fahmi who was born in Sampoiniet on 13th September 1992 as the second child of Mrs. Nurbaiti and Mr. Nasron. The author graduated from MAN Lhokseumawe Aceh in 2010. In the same year, the author began his undergraduate study in Economics Sharia Studies focusing on Islamic Finance and graduated in 2015. The Author worked in several field of work, including Banking Industry and also as language Instructure. Currently, he is working as Academic manager at PT Medina Digital Inspira. In 2017, the author was granted in a double degree program in Master of Science in Economics, IPB University and Master of Applied Economics, The University of Adelaide, Australia funded by Aceh's Government and the Australia Awards Scholarship.