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## Collection of Abstracts

Faculty of Economics and Business, Sam Ratulangi University
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# HOW INFRASTRUCTURE DEVELOPMENT CAN CREATE A BETTER HUMAN DEVELOPMENT INDEX

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**Abstract**
*Based on data from Ministry of Public Work and Housing in Indonesia, the government has been allocating more than half of the state budget for infrastructure development all over the country. Regarding this matter, this research tries to find out what types of infrastructures that influence the human development index and which are not. This research also try to find out the relationship of those infrastructures development with the human development index. The methodology used in this research is panel data approach with fixed effect model because it can combine time series data and cross section data. The variables used in this research are Human Development Index, electricity, banking credit, gini ratio and economy growth. The data are taken in 2011-2015 in 33 provinces in Indonesia which covers Java, Sumatra, Sulawesi, Kalimantan and Papua islands and some small islands such Bali, Maluku and Nusa Tenggara. This research has come up with some findings; 1) The infrastructures that influence the human development index are physical (electricity) and non-physical infrastructure (banking credit) whereas the economic growth does not have any influence on the human development index. 2) The relationship of those infrastructure with the human development index are having positive and significant relationship to human development index, which means if there are some raises in electricity development and banking credit, it is expected that there will be also a raise in the human development index.3) Gini ratio has a negative and significant relationship to human development index.*

*Keywords: infrastructure, electricity, banking credit, gini ratio, economic growth, human development index*

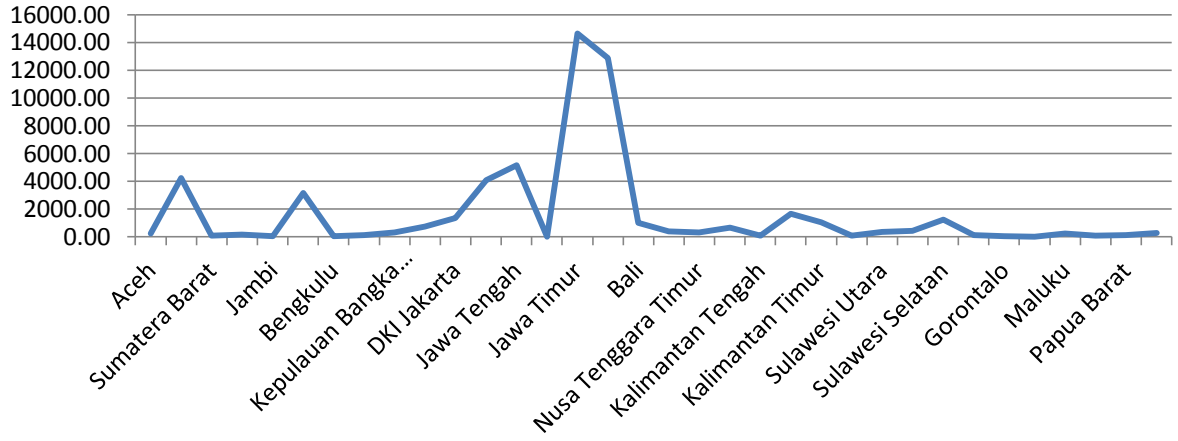
## 1. INTRODUCTION

### Background

The government's aggregate and massive economic development will require good support in finance and other supporting facilities. The main and most important physical infrastructure in supporting economic activities is the availability of roads and the electricity. Road availability is required as a distribution channel for goods, services and other development results, meanwhile, the availability of electricity is needed as a means of providing the necessary energy to support daily life. The lack of these two availability, road and electricity, will cause the high cost economy. This happens because of the additional costs that are incurred in conducting the economic activities.

The government itself allocates budget for the development of basic infrastructure in the form of additional roads and the provision of installed electricity capacity especially for the eastern part of Indonesia. So far, the installed electricity capacity is still mainly concentrated in the western part of Indonesia, especially on the island of Java. The difference in installed electrical capacity can be seen in the installed electricity capacity chart by 2015 for all provinces in Indonesia. In the table below, it is very visible that the province of Java, especially East Java is dominating the electricity capacity throughout Indonesia.

Figure 1
Installed Electricity Capacity by Province in 2015
(In Mega Watt Unit)




The ultimate goal of the development acceleration, especially the development of infrastructure, in addition to minimize the gap between the economy on the island of Java with the economy outside Java island, this massive development is also aimed to open the isolated areas with the urban areas. The backwardness of these outskirt regions will shrink if the infrastructure development can be properly implemented.

The definition of development, extensively explained, is the development of Indonesian people completely, then the most appropriate measure to describe about development is the index of human development. In the context of the human development index, there are at least three aspects to be assessed: health, education and income. The calculation of the health index is calculated from life expectancy, the calculation of the education index is calculated from the net enrollment rate of basic education in one particular area and the per capita income of the community becomes the duty to evaluate one's income.

Table 1
Indonesia Development Index Year 2010 - 2016

| PROVINCE | Human Development Index | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| **ACEH** | 67.09 | 67.45 | 67.81 | 68.3 | 68.81 | 69.45 | 70 |
| **SUMATERA UTARA** | 67.09 | 67.34 | 67.74 | 68.36 | 68.87 | 69.51 | 70 |
| **SUMATERA BARAT** | 67.25 | 67.81 | 68.36 | 68.91 | 69.36 | 69.98 | 70.73 |
| **RIAU** | 68.65 | 68.9 | 69.15 | 69.91 | 70.33 | 70.84 | 71.2 |
| **JAMBI** | 65.39 | 66.14 | 66.94 | 67.76 | 68.24 | 68.89 | 69.62 |
| **SUMATERA SELATAN** | 64.44 | 65.12 | 65.79 | 66.16 | 66.75 | 67.46 | 68.24 |
| **BENGKULU** | 65.35 | 65.96 | 66.61 | 67.5 | 68.06 | 68.59 | 69.33 |
| **LAMPUNG** | 63.71 | 64.2 | 64.87 | 65.73 | 66.42 | 66.95 | 67.65 |
| **KEP. BANGKA BELITUNG** | 66.02 | 66.59 | 67.21 | 67.92 | 68.27 | 69.05 | 69.55 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **KEP. RIAU** | 71.13 | 71.61 | 72.36 | 73.02 | 73.4 | 73.75 | 73.99 |
| **DKI JAKARTA** | 76.31 | 76.98 | 77.53 | 78.08 | 78.39 | 78.99 | 79.6 |
| **JAWA BARAT** | 66.15 | 66.67 | 67.32 | 68.25 | 68.8 | 69.5 | 70.05 |
| **JAWA TENGAH** | 66.08 | 66.64 | 67.21 | 68.02 | 68.78 | 69.49 | 69.98 |
| **DI YOGYAKARTA** | 75.37 | 75.93 | 76.15 | 76.44 | 76.81 | 77.59 | 78.38 |
| **JAWA TIMUR** | 65.36 | 66.06 | 66.74 | 67.55 | 68.14 | 68.95 | 69.74 |
| **BANTEN** | 67.54 | 68.22 | 68.92 | 69.47 | 69.89 | 70.27 | 70.96 |
| **BALI** | 70.1 | 70.87 | 71.62 | 72.09 | 72.48 | 73.27 | 73.65 |
| **NUSA TENGGARA BARAT** | 61.16 | 62.14 | 62.98 | 63.76 | 64.31 | 65.19 | 65.81 |
| **NUSA TENGGARA TIMUR** | 59.21 | 60.24 | 60.81 | 61.68 | 62.26 | 62.67 | 63.13 |
| **KALIMANTAN BARAT** | 61.97 | 62.35 | 63.41 | 64.3 | 64.89 | 65.59 | 65.88 |
| **KALIMANTAN TENGAH** | 65.96 | 66.38 | 66.66 | 67.41 | 67.77 | 68.53 | 69.13 |
| **KALIMANTAN SELATAN** | 65.2 | 65.89 | 66.68 | 67.17 | 67.63 | 68.38 | 69.05 |
| **KALIMANTAN TIMUR** | 71.31 | 72.02 | 72.62 | 73.21 | 73.82 | 74.17 | 74.59 |
| **KALIMANTAN UTARA** | - | - | - | 67.99 | 68.64 | 68.76 | 69.2 |
| **SULAWESI UTARA** | 67.83 | 68.31 | 69.04 | 69.49 | 69.96 | 70.39 | 71.05 |
| **SULAWESI TENGAH** | 63.29 | 64.27 | 65 | 65.79 | 66.43 | 66.76 | 67.47 |
| **SULAWESI SELATAN** | 66 | 66.65 | 67.26 | 67.92 | 68.49 | 69.15 | 69.76 |
| **SULAWESI TENGGARA** | 65.99 | 66.52 | 67.07 | 67.55 | 68.07 | 68.75 | 69.31 |
| **GORONTALO** | 62.65 | 63.48 | 64.16 | 64.7 | 65.17 | 65.86 | 66.29 |
| **SULAWESI BARAT** | 59.74 | 60.63 | 61.01 | 61.53 | 62.24 | 62.96 | 63.6 |
| **MALUKU** | 64.27 | 64.75 | 65.43 | 66.09 | 66.74 | 67.05 | 67.6 |
| **MALUKU UTARA** | 62.79 | 63.19 | 63.93 | 64.78 | 65.18 | 65.91 | 66.63 |
| **PAPUA BARAT** | 59.6 | 59.9 | 60.3 | 60.91 | 61.28 | 61.73 | 62.21 |
| **PAPUA** | 54.45 | 55.01 | 55.55 | 56.25 | 56.75 | 57.25 | 58.05 |

Source :BPS, processed

From the phenomenon above, this paper looks more comprehensively about how infrastructure development can create a better development index. The infrastructure availability intended is the physical and non-physical social infrastructure. More specifically, this paper tries to find out the relation of electricity availability, and credit banking to the human development index.

**Statement of the Problems**

Referring to the background that has been mentioned before, then the issues raised in this study are:

1. How is the effect of electricity availability on human development index?

2. How is the effect of bank credit on human development index?
3. How does the gini ratio index affect the human development index?
4. How is the effect of economic growth on human development index?

## 2. REVIEW OF RELATED LITERATURE AND HYPOTHESES

### Availability of Regional Infrastructure and Economy

Economic development, in some literature is defined as a continuous process to increase income per capita population or society. The process takes a long period of time and is followed by some fundamental changes, especially in terms of community institutions. Some important features that can be seen in the process are changes in the mindset of the community, whether it is individual or communal mindset, and the technology used in daily life.

The definition of economic development that focuses on the process, means that in the development process, it is needed an initial conditions which already have adequate infrastructure to support the development process optimally. Infrastructure within a certain region can be classified as one of the requirements needed to carry out economic development. Economic development basically can be started whether a region has adequate infrastructure or not, but with the availability of adequate infrastructure, economic development process can run faster. Thus, the availability of infrastructure is a requirement that must be fulfilled first to facilitate the economic development.

According to the World Bank, infrastructure can be classified as follows: infrastructure related to public services such as telecommunications, availability of raw water, sanitation and health, garbage disposal, and gas for energy availability. Infrastructures classified as public works include: roads, main dams, canals and irrigation and drainage channels. Infrastructure related to public transport or mass transportation: intercity connecting roads, urban transport, airports, ports and transportation of sea crossing . The last classification is the infrastructure related to social issues, including basic education, availability of health facilities and banking services (Majumder, 2005).

Some literature then classified the infrastructure into two major classes, namely physical infrastructure and non-physical infrastructure. Physical infrastructure is any form of support needed to facilitate development that is generally technical, while non-physical infrastructure is any form of support used to facilitate the development and generally institutional system. The process of economic development requires good infrastructure condition of physical and non physical infrastructure.

### Empirical Studies

Richard Price in a study conducted in Britain in 2016, emphasized the importance of central government to establish a special institution to handle the infrastructure issues. The institution has the authority to undertake further studies on infrastructure that will be prioritized for the development, the implementation of infrastructure development to the stage of development monitoring and the use of infrastructure facilities. Further Price (2016) suggests to include markets with the primary objective of making financing more efficient. Comprehensive collaboration from various parties is necessary to bring the infrastructure that has the economy capability.

The problem of infrastructure, especially the problem of road availability, became the subject of Nguyen Dinh Giang (2011). Taking the location of research in the city of Hanoi, Vietnam, Nguyen came to the conclusion on the importance of the provision of representative road facilities to support the economy. The urban suburbs (pheripheri) in Hanoi City are

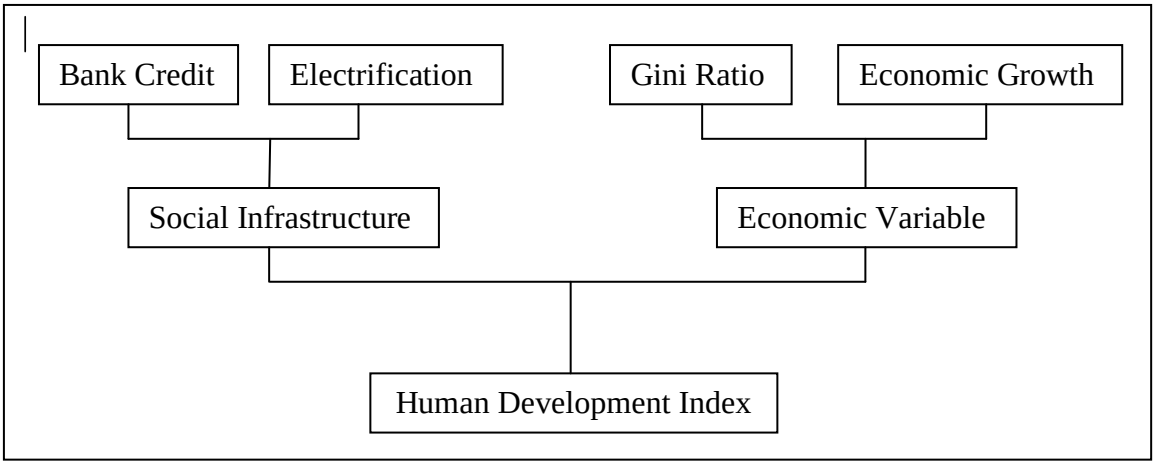
becoming more developed with the presence of adequate road. The development can be done equally not only focused in the city of Hanoi.

The importance of the infrastructure role is to reduce the disparities that occur in the society. This point becomes the main thought of Rajarshi Majumder. In his research in 2005 and taking research sites in India, Majumder concluded that infrastructure development could reduce the level of inequality in the Indian region. Infrastructure development in India, especially in the transportation sector is far from convenient, but with the development and availability of existing infrastructure, at least, the economic gap in India can be reduced.

**Research Flow Chart**

Here is the research flow chart used in this study.

Figure 2
Research Flow Chart




**Hypothesis**

Based on theoretical exposure and some previous research that has been presented before, here are the hypothesis in this study:

1. The availability of electricity has a positive and significant effect on the Human Development Index
2. Credit banking has a positive and significant impact on the Human Development Index
3. The Gini ratio has a negative and significant effect on the Human Development Index
4. Economic growth has a positive and significant impact on the Human Development Index.

## 3. RESEARCH METHODS

The data obtained will be processed using quantitative approach. In the quantitative analysis, the initial hypothesis will be determined, that is; the availability of social infrastructure both physical infrastructure in the form of availability of electricity and non-physical infrastructure such as banking credit and economic variables i.e. gini ratios and regional economic growth can affect the Human Development Index. Researchers used multiple linear regression analysis with panel data approach.

$$Y_{it} = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \varepsilon_{it} \quad \text{.....(1)}$$

Where:

Y = Human Development Index
$X_1$ = Availability of Electricity
$X_2$ = Banking Credit
$X_3$ = Gini ratio
$X_4$ = Regional Economic Growth
$\alpha$ = Constant
$\beta_1$ .. $\beta_4$ = Parameter
t = Time
$\varepsilon$ = Error terms
i = Location Identification

Some literature of econometrics states to find out which model of Common Effects Model (CEM) or Fixed Effect Model (FEM) to be selected for data estimation can be done using F-Test. CEM is a restricted model in which the model implements the same intercept for all individuals. It has been known that sometimes the assumption that each cross section unit has the same behavior tends to be unrealistic because it is possible that each cross section unit has different behavior. The steps taken to perform this test is using the Chow Test. The restricted F Test step is performed under Fixed Effect Model. If it is decided that Fixed Effect Model is better than Common Effect Model in Chow test, then it proceeds to perform the Haussman test to see if Fixed Effect Model or Random Effect is better to use, however, if it is found out that Common Effect Model is better, then the Haussman test is not necessary to be performed.

If it is known that the unrestricted model is better to use than the restricted model, then the next step to find out whether the unrestricted model follows a random effect or fixed effect, the Hausman Test is performed. If in the Haussman test the significance is found, then the fixed effect model is chosen, on the other hand, if the significance is not found, then the random effect is chosen.

In this research, classic assumption test (multikolinearity, heteroscedasticity and autocorrelation) is not applied because the model used in this research is panel data model. According to Nachrowi (Nachrowi, 2006), panel data model does not require the classical assumption, same as when it applies time series or cross section data model, because the parameter estimation either with random effect approach or fixed effect approach does not require data to meet classical assumptions such as the release of such data from multicollinearity, heteroscedasticity and autocorrelation problems. Some other literature also asserted, that panel data which is a combination of time series data with cross section data will cover each other weaknesses. Time series data which are very vulnerable to autocorrelation problems will be minimized by including the cross section elements. Similarly, cross section data are likely to be affected by heteroscedasticity. Common heteroskedasticity problems appearing in cross section data are minimized by entering the time series data.

## 4. RESULT AND DISCUSSION

### Research Result

Based on the calculation results, the most appropriate model to use in this study is fixed effect model. Here are the results of the calculation using the fixed effect model approach:

**Table 2**
**Fixed Effect Model Estimation Results**

| Variable | Coeffisient | T – Statistic | Probability |
|---|---|---|---|
| Constant* | 69,21 | 43,65 | 0,0000 |
| Growth*** | 0,001492 | 0,10 | 0,918 |
| Credit* | 7,50 E – 9 | 4,71 | 0,000 |
| Electricity* | 0,00033 | 2,61 | 0,0101 |
| Gini Ratio** | - 7,8158 | - 1,86 | 0,0638 |

Description * Siginificant at α = 1%
** Significant at α = 10%
*** Not significant
Sumber : Data, processed

Based on the estimation result table of fixed effect model, it can be concluded that from economic variable and social infrastructure offered, only the variable of economic growth which is not statistically significant. The social infrastructure variables represented by the availability of electricity and banking credit are statistically significant against the Human Development Index. The direction of the coefficient generated from the calculation, in accordance with the hypothesis presented earlier. It is concluded that the results of this study corresponds to the hypotheses that have been previously stated, therefore, it can be concluded that the results of this study are the same as the hypothesis.

**Discussion**

From the calculation results, it can be seen that social infrastructure can affect the human development index. The two variables representing social infrastructure in this study, able to influence positively and significantly. This means that any increase in bank credit and an increase in the amount of electricity availability will be able to raise the human development index. Looking at the small number of coefficient generated from the calculation, then the big efforts from the government to increase the human development index by increasing the electrification and distribution of bank credit are needed to be done.

Banking and electrification loans are the two main components of development support in general. Banking credit is required as a provider of funds for economic development actors. The influence of banking credit in development affirms the importance of the banking sector in the development process. Some literature even mention that banking is the superstructure in development considering the importance of the role of the banking sector in the development process. The banking sector serves as an intermediary institution between parties who have excess funds with the parties who need funds. The term superstructure is given to the banks with the consideration that the development process requires funds, and the banking sector is the fund provider for the development process. If there are some obstacles in the channeling of credit by the banks, then the development process will face constraints due to unavailability of financing.

The availability of electricity also provides a role in the development process. The availability of sufficient electricity will make the process of economic development run faster. Electrical energy is needed primarily as an energy source to drive the economy in general. Almost all human activity requires electrical energy. The data from the table of the amount of installed electrical capacity illustrates clearly how important the electrical

infrastructure for the development process is. Provinces with sufficient electricity capacity, such as provinces in Java island, are generally provinces with high human development index. The data on the table also shows the human development index figures by province. Thus, the availability of electricity becomes very vital, especially to encourage the economy of certain region until the community income increases.

Meanwhile, two other economic variables, the economic inequality as measured by the gini ratio and economic growth, show different results. Gini ratio showed significant results with coefficient direction opposite to human development index, while economic growth is unable to influence the human development index. This result confirms that infrastructure development plays a very important role for the development of human development index. Development aimed only at pursuing economic growth is not enough to raise the human development index.

## 5. CONCLUSION

### Conclusion

This study came to the conclusion that the human development index can be increased by improving the infrastructure sectors such as banking credit and electricity. Physical and non-physical infrastructure is proved to have influence on human development index in Indonesia. The economic growth does not influence the human development index because the development is mainly focused in western part of Indonesia. It is also supported by the statistic calculation which shows that growth variable has 0,918 probabilities which means it has no significant influence on human development index. The government's focus on infrastructure is the right choice to improve the human development index.

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