



# The Relationship of Economic Growth with Human Development and Electricity Consumption in Indonesia

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## ABSTRACT

The importance of human resource development is one of the goals of sustainable national development as well as the increasing availability of electricity consumption. This study aims to determine the relationship between gross domestic product (GDP) with human development and electricity consumption in Indonesia. Descriptive analysis method to describe the relationship between GDP growth with human development and electricity consumption. Data used from united nations development programme. The results showed that there was a positive correlation between GDP with human development and electricity consumption in Indonesia.

**Keywords:** Gross Domestic Product, Human Development, Electricity Consumption

**JEL Classifications:** O13, O14, O15

## 1. INTRODUCTION

Judging from the stage of development mentioned in the report of world competitiveness report 2016-2017, the Republic of Indonesia is in stage 2 or known by the efficiency stage (efficiency-driven). With population of 255.5 million people, Indonesia gross domestic product (GDP) per capita reached 3,362 USD with the achievement of the value of GDP at USD 859 billion. The main problems inhibiting business development in Indonesia (most problematic factors for doing business) in Indonesia ordered from the top is corrupt, inefficient government bureaucracy, insufficient infrastructure, limited access to sources of financing, and inflation.

As understood that one of the main targets of macro-economic achievement indicators of a country is high and rapid economic growth. A high economic growth is expected to have implications on economic equality and, furthermore, it can trickle down (trickle-down effect). The concept is known for inclusive growth, where economic growth is not merely an indicator of economic progress, but also visible impact on improvement of public welfare improvements. Achievement of economic growth in each country may have a different type and pattern of growth, but the impact on improving the welfare is the ultimate goal of economic

development to be achieved. Such differences may be caused by several factors, including differences in ownership and availability of natural resources, human resources, the accumulation of capital, technology, and so on.

Each country is definitely oriented to the pursuit of high economic growth, but further the achievement may be less implies trickle-down effect, so there is still a lot of various economic development problems that cannot be solved. The development problems are such as poverty and inequality in various aspects of development. That phenomenon reminds us that growth is not always identical with development in the sense of welfare, so it is logical then that many concerns about looking back at the development goal that is considered less oriented to human beings and their human rights (Mudrajad, 1997). In connection with these issues, then began to be reassessed on the meaning of development as the upward movement of the entire social system. In other words, target-oriented economic development is no longer an increase in GDP, but more focused on the quality of the development process. Within this framework, human development as one of the main goals of development is expected to occur through an increase in the ability of human resources and electricity consumption which in turn can act as a subject of development.

The success of human development that becomes the objective of further development of a nation should consider several indicators, such as the quality of human resources. It includes long and healthy lifespan, improving education through literacy and skills so that they can then participate in economic activities. Thus, human development (residents) as the focus and final goal of all development activities can have a real look and perceive impact, not limited to the achievement of macro-economic indicators alone, apart from achieving greater prosperity.

To improve the achievement of human development, it is necessary the economic growth enhancement. However, empirical data shows that economic growth does not automatically improve human development. To increase the acceleration of economic growth to human development, it needs government intervention so that they can run simultaneously. To improve the synergy between economic development and human development and electricity consumption, the focus of economic development should have more attention to the impact on the welfare of the population, particularly those related to health, education and other basic social services. It is very important to avoid the potential economic inequality and social disparities caused by policies that solely pursuing economic growth.

At first Indonesia is the countries that are equally striving to improve the economic welfare, the countries started the economic development of the traditional agricultural development. Judging from the potential of available resources, Indonesia has the potential of natural resources and fertile land. Human resource development success is determined by how far the government's role in paying attention in the field of education and health spending. According to the World Development Indicator Report 1972, government spending on education to GDP in Indonesia the government spending on education to GDP in 1972 is 2.64% and increase to 3.41% in 2012.

Based on the description above, then the problems in this study are: How and what are the causes of economic growth in Indonesia, how and what are the causes of human development in Indonesia and how does the pattern of relations between economic growth and human development in Indonesia and its impact on the supply of electricity.

## 2. LITERATURE REVIEW

### 2.1. Theory of Economic Growth

To measure a country's economic growth, economists include development GDP data analysis. Basically, the economic growth can be seen from two sides, the demand (aggregate demand) and the supply side (aggregate supply). On the demand side of economic growth, it will be influenced by the amount of household demand economy for goods and services (output). Developed by Keynes, it consists of household consumption spending (C), expenses gross investment of the private sector and the government (I), expenses/expenditures of government (G), and net exports (X-M). Keynesian groups generally assume that economic growth or expansion of economic activity is determined more by the effective demand (demand-effectiveness) formed by

consumption spending, investment, government spending and net exports.

On the supply side, economic growth will be affected by the ownership or availability of production factors, in this case is capital, labor, natural resources, and technology. There are two theories regarding economic growth in terms of aggregate supply (production), they are the theory of neoclassical and modern theory. In a group of neoclassical theory, the production factors that are considered to have highly influential to output growth are the amount of labor and capital. Capital can be defined in the form of finance or goods. Thereby, the increasing number of labor and capital, although the other factors are constant, will increase the generated output.

In a group of neoclassical theory, the role of science and technology to output growth did not receive explicit attention; neoclassical theory group is focusing on the positive effect of the capital accumulation (investments) on the economic growth. In the neoclassical growth model, technology and science are considered constant or not (less) important because it is a constant coefficient so that the productivity of labor and capital cannot be increased. By reason of the weakness of the neoclassical growth model discussed above, the alternative appears as a new model of economic growth (new growth theory) or endogenous growth models that incorporate aspects of endogeneity in the process of economic development.

In the group of new growth theory, besides labor and capital, there are other production factors that are considered important in output growth; they are technological change (embodied in capital goods), science, energy, entrepreneurship, raw materials, and materials. In addition, other factors that are considered influential to output growth by group of modern theory is the availability and condition of infrastructure, laws and regulations (the rule of law), political stability, government policies, bureaucracy and international exchange (terms of trade).

There are a number of fundamental differences in terms of thinking framework about the factors that affect the growth between the neoclassical theory and groups modern theory (new growth theory), which includes labor, capital (capital goods) and entrepreneurship. In terms of manpower, modern group concerns on the importance of the quality aspect rather than the aspect of the quantity. Quality of labor aspect is not only educational level, but also from the aspect of health. In some empirical studies, education level is usually measured from the percentage of highly educated workers to the workforce or the population enrolled in a particular level of education, such as the level of applicants to basic education (primary school enrollment), while the level of general health is measured by life expectancy.

Likewise in the capital, which reflects the quality of technological progress is more important than quantity (capital accumulation). Also entrepreneurship, including the ability to innovate, is one factor that is essential for economic growth. Thus, the modern growth model or endogenous growth model is where the nature of technology is no longer given (exogenous), but it is one of the

dynamic production factors. Similarly with human factors, labor in the production function is no longer an exogenous factor, but it can develop the technology curve. Therefore, technological progress and development of science and education become very important growth factors.

Structurally, the endogenous growth models have a number of similarities with the neoclassical model, but the applied assumption is different. Endogenous growth models reject the assumed rate of return on investment capital decreasing (diminishing marginal returns to capital investment), which is always embraced by neoclassical models. The endogenous growth models suggest otherwise, the return on investment would likely be higher if the aggregate production in the country increases. Furthermore, this endogenous model assumes that private investment and public (government) in the field of resource or human capital can create external economies (positive externalities), and spur increased productivity that could offset the declining trend of returns scale. An increase in the productivity of resources results a tendency of divergent between regions in the economy.

### 2.2. Theory of Human Development and Electricity Consumption

The development understanding is a business or a process to make a better change. In its implementation, the development is facing vary and complex issue because the process would be related to various aspects of human life; it can be economic, political, legal and cultural. Man as subject, and object at the same time, in the development should be able to increase the capacity and quality of life, therefore it is necessary to have the role of government policies in human development. An important role of human development will be to contribute to the regional and national economy (Machmud and Sidharta, 2016). The effort to have the human being as the main goal of development has actually emerged with the birth of the concept of “basic need development”. This paradigm is to measure the success of development by using the index of quality of life (physical quality life index), which has three parameters: The infant mortality rate, life expectancy, and literacy rate.

Human development paradigm that developed by the United Nations Development Programme (UNDP) in 1990 basically concerns on human development as a development model that aims to expand the options that can be grown through the empowerment of residents. Empowerment of this population can be achieved through efforts focused on increasing the basic human skills that improve the health, knowledge, and skills that

can be used to enhance the participation in productive activities, social, cultural and political. Thus, the population is the ultimate goal and development is as a means to a goal. To achieve the goal of human development, there are four main points that must be considered: Productivity, equity, sustainability, and empowerment.

According to the UNDP, an indicator to measure the success of human development is the human development index (HDI). In the HDI, there are three composite indicators used to measure the average achievement of a country in human development: A long life, as measured by life expectancy at birth; education, as measured by average years of schooling and the literacy rate of the population of aged 15 years and over; decent standard of living, as measured by per capita spending adjusted to purchasing power parity. HDI is adopted by many countries to measure the quality of man as a result of the development process. After two decades, UNDP enhances HDI calculation method (new method) in 2010. The differences between the two methods of calculation are showed in Table 1.

To measure HDI level and rank, UNDP sets the criteria as showed in Table 2.

Among the various inputs of economic activity, energy is the most dominant element. GDP is an economic indicator whose nature can be measured directly quantitatively. This is often used as a benchmark of a country’s prosperity. Measuring GDP on electricity consumption can be a reference in continuity of State development. Increased economic activity, both directly and indirectly, will increase growth in all sectors driving the economy that result in increased energy demand. Indonesia’s energy needs to this vessel are mostly derived from its own production.

Primary energy production is based on the amount of energy extracted. Primary energy such as crude oil is also used for the process and which is supplied to the producer other energy. Electrical production includes gross production which includes consumption used auxiliary stations and lost on the way is considered part of the auxiliary station. There are two categories in electricity that is (1) general electricity is electricity generated for the purpose of sale by producing, transmitting and distributing electrical energy. This is done by private companies, cooperatives, local government and central government. (2) Electricity produced and used alone is electricity produced to meet its own needs.

**Table 1: Comparison of old and new HDI calculation method**

Dimension	Indicator	
	1990	2010
Health	Life expectancy (AHH)	Life expectancy (AHH)
Education	Literacy rate (AMH)	Literacy rate (AMH)
Decent living standard	Average years of schooling (RLS)	Average years of schooling (RLS)
Aggregation index	PDB per kapita (27 comodity of PPP) Calculation mean $HDI = \frac{1}{3} \times (IH+IE+IPP)$	PNB per kapita (96 comodity of PPP) Geometric mean $HDI = \sqrt[3]{IH+IE+IPP}$

Yuwono, 22<sup>nd</sup> December, 2015, HDI: Human development index

### 2.3. The Relationship of Economic Growth with Human Development and Electricity Consumption

Human resources and economic growth are two things that are always interrelated and inseparable. There is a relationship or interdependence between economic growth and human resources because the low economic growth and lead to the low quality of human resources and tend to electricity consumption.

As stated by Gustav et al. (2000), there is a strong two-way relationship between economic growth and human development. On the one hand, economic growth provides the resources to enable the increased and sustainable human development; on the other hand, sustainable improvement in the quality of human resources is a very important supporting factor for economic growth (GNP).

National income (GNP) contributes to human development through community activities (households), and government and

**Table 2: HDI ranking based on UNDP criteria**

HDI value	HDI status
<50	Low
50≤IPM<66	Lower mid
66≤IPM<80	Upper mid
≥80	High

UNDP: United nations development programme, HDI: Human development index

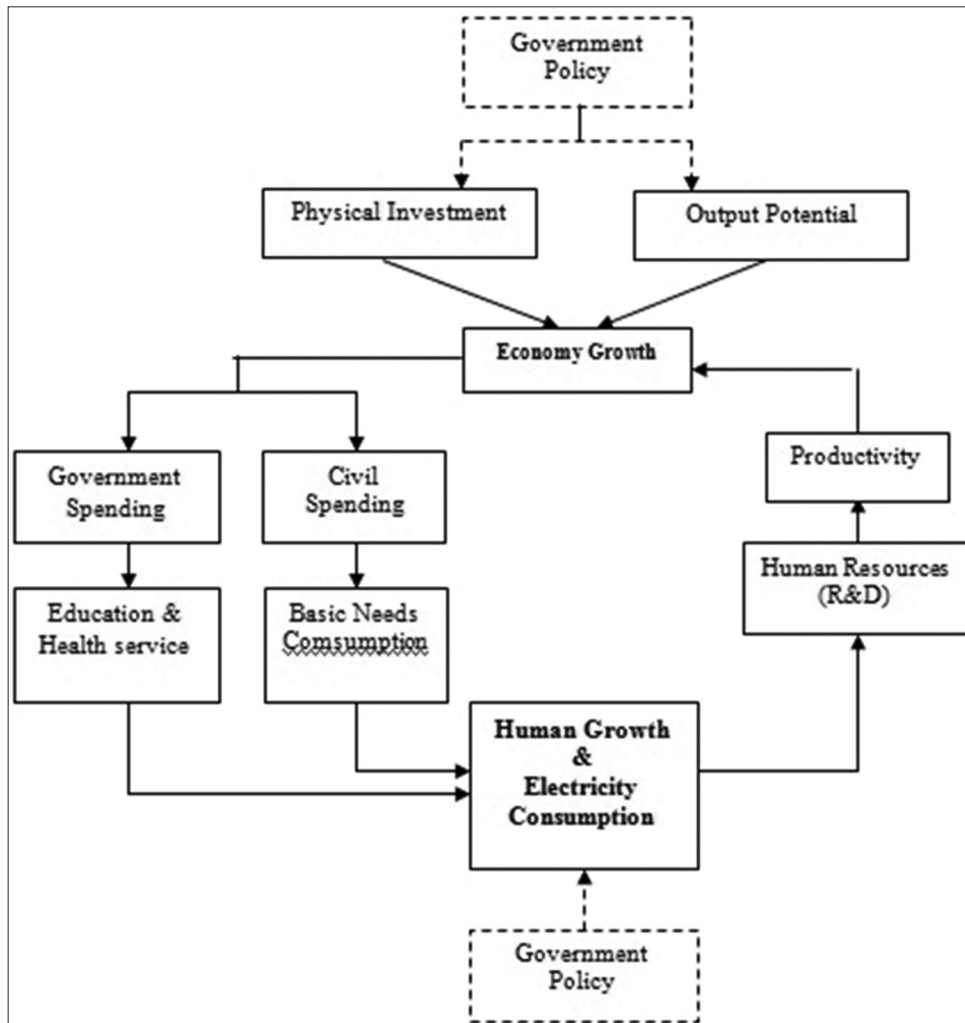
civil society through community organizations and other non-governmental organizations. Therefore, at the same level of GNP could lead to different human development performance, this will depend on the size of the GNP used for the allocation of human development in each country or region. The relationship of human development and economic growth can be seen in Figure 1.

From the Figure 1 it can be concluded that there is a reciprocal relationship between economic growth and human development. Human development requires public and private investment in various fields, for example in health and education. This investment will have an impact on health status, skills and knowledge and productivity of the population. All of which in turn will have an impact on economic growth. Economy growth requires private and public investment. These investments will increase economic activity and ultimately will have impact on income per capita and spending behavior of households (consumption) for education and health. All of which in turn will affect the quality of human development.

### 3. METHODOLOGY

This type of research is a descriptive research that seeks to find fundamental answers about causality by analyzing the factors that

**Figure 1: Human development and economy growth relationship**





cause the occurrence of economic growth, human development and electricity consumption in Indonesia. This comparative study is to find similarities and differences about economic growth, human development and electricity consumption in Indonesia. The data collection is done by taking the secondary data from the UNDP, the World Bank, and the Central Bureau of Statistics Indonesia.

## 4. RESULTS AND DISCUSSION

### 4.1. Economic Growth in Indonesia

One indicator that is widely used to view the progress of the economy is economic growth. Increased economic growth shows the change in GDP and changes in GDP shows the turnover of economic sectors in the economy. Real GDP growth and economic growth in Indonesia can be seen from Figure 2.

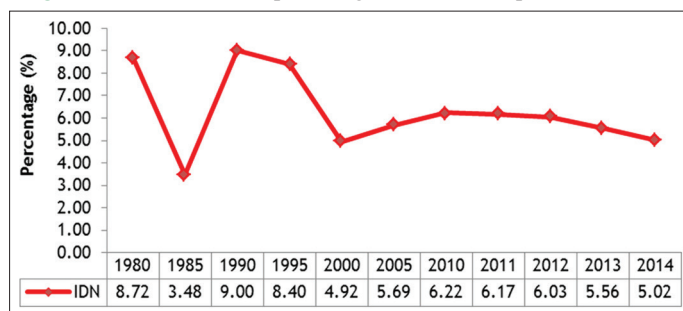
In 1960 Indonesia's economy is not much different from the Republic Korean economy. The economic development of both countries started from building a traditional agricultural sector. Through the 5-year development program in both countries, economic growth continues to increase and there are changes in the economic structure from agriculture to industry. In the last few years, the Indonesian economy showed a good performance, although still overshadowed by global economic uncertainty. After the 1998 economic crisis of Indonesia economic growth slowed down. The economic growth GDP of Indonesia is above 6.22% and 5.02% (World Bank) as showed in Figure 2.

When viewed from the per capita income, in 1980 Indonesia's per capita income is US \$ 1,096, increased to \$ 3,834 in 2015. In Indonesia, since 1980 until now the development of per capita income is annually creeping and able to raise about more than tripled.

From the side of utilization, Indonesia's economic growth is strongly influenced by household expenditure and investment, while from the side of business field, Indonesia's economic growth is largely determined by the industrial sector, services and agricultural sector. According to the Country Statistical Profile of Indonesia, in 2015 Indonesia's economic structure is contributed by agriculture sector: 14.0%, industry including energy: 30.6% and services: 55.4% as showed in Figure 3.

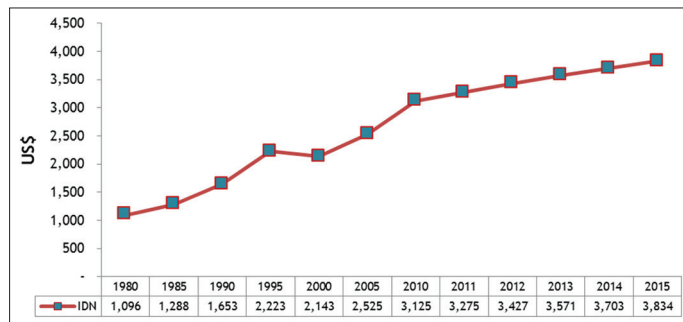
In the future, Indonesian economy will be largely determined by the effectiveness of government policies to mitigate the economic risks posed by external factors (global) and domestic factors, notably the success of the economic reformation that have been implemented by President Jokowi and has been running for 2 years. Global economic challenges for the Indonesian economy are the result of the continuing economic slowdown in the Republic of China (PRC) and the United States. The impact of economic slowdown in China and the United States results the declining flow of investment funds to various countries including Indonesia. Slowing investment led to the declining of demand for goods and services in the country. A slowdown in the global economy results the demand for world energy and commodity prices remain stagnant, this has resulted the low exports yields of primary industry commodity.

Figure 2: Gross domestic product growth annual republic Indonesia,



Source: World Bank

Figure 3: Gross domestic product per capita of Indonesia



Source: World Bank, Bank data

Indonesian domestic economy challenges include the non-optimal state of tax revenues. Tax amnesty policy for funds has not reached the target. Assuming the funds collected is 30% entered as an investment in the real sector, the economy growth will increase. Another domestic challenge is the portion of the infrastructure spending that continues to increase. It leads to cumulative of deficit budget that continues to grow. Other domestic challenge is the remaining activity of the private sector which is relatively stagnant due to relatively slow credit growth, in addition to the Non Performance Loans in the banking sector that continued to increase or remained high.

### 4.2. HDI

The success of economic development is shown by many indicators; they are economic growth, increased employment, increased purchasing ability, health care quality improvement, and many other indicators. From the various indicators of the economic development progress, one of which is a success in improving the quality of human development. Indicators of improving the quality of human development come from changes in the HDI.

According to UNDP, the changes of HDI are affected by three indicators, they are: Health index, education index, and the purchasing power index. Therefore, the changes in the HDI are associated with changes in the three indexes. The increased of HDI can be caused by these three components altogether or may be due to increased one or two of these components, and vice versa. Indonesia have a very lame HDI. In 1980 the Indonesian HDI trend continues to increase from 0.474 in 1980 to 0.684 in 2014 as showed in Figure 4.

From the 188 countries surveyed by the UNDP, in 2014, HDI Indonesia was ranked 110<sup>th</sup>, with this ranking the position of Indonesia is in the category of medium human development group of country. The low Indonesia HDI is due to the low of health and education index. If the 1980s is regarded as the initial condition, the education and health of Indonesian society, Indonesia HDI keeps getting away from Republic Korea HDI.

Judging from the dimension of health, the indicator life expectancy at birth of Indonesia in 2014 reaches 68.90 years. The life expectancy at birth Indonesia is through to 68 years in 2010. Seen from an educational dimension, in 2014 the indicators mean years of schooling of Indonesia is at 7.6. This means that the average length of education in Indonesia is equivalent to secondary education level of Grade 2, although the 9-year compulsory education has pre-defined by government for long enough (UNDP). The mean year of schooling in Indonesia achieved in 2005. For more details about the development of HDI indicators, it can be seen in Table 3.

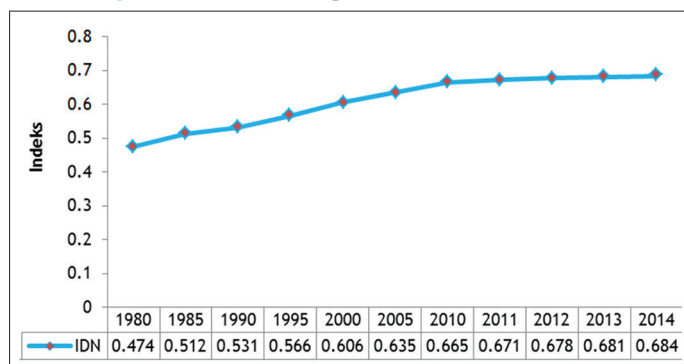
Low indicators in health and education dimensions in Indonesia is allegedly because of the low allocation of central and local government budget for infrastructure spending in education and health sectors. This means that the Indonesian government is late in paying attention to the education and health sectors. According to the report of the World Bank, Data Bank, Last Updated on February 2017, in Indonesia have a Electric power consumption in KWh per capita. In 2000 the Indonesian trend Electric power consumption continues to increase from 0.474 in 2000 to 0.684 in 2014.

### 4.3. Patterns of Economic Growth, HDI and Electricity Consumption

Several previous studies indicate that between economic growth and human development has a relationship of mutual influence or a two-way relationship, it means that human development will affect the economic growth and so does economic growth will affect human development.

The results of Andrianus study (2003) shows that in Indonesia, by using ECM models simultaneously, it is found that national income and expenditure of the government education has a significant impact on improving human resources represented by the level of literacy. Likewise that literacy level has a positive influence on economic growth. Other finding indicates that the improvement of public health as a result of health spending by the government encourages the creation of demand for education. Other finding is the research results from Maqin’s study (2006) in West Java of Indonesia. By using data panel (Panel Regression Data Model) with a two stage least square method and fixed effects approach (fixed effect), it is found that the causal relationship occurs in both directions (two way causality relationship) between economic growth and human development in West Java at lag 1 to lag 4. It means that human development in a particular year is able to increase the economic growth of 1 year or more in the future or in the past. This condition can be understood due to an investment in human resources requires quite a long time so it will not immediately be able to boost the economic growth.

Figure 4: Human development index value Indonesia



Source: United Nations Development Programme

Table 3: Indonesia HDI components

Year	Life expectancy at birth	Expected years of schooling	Mean years of schooling
1980	59.60	8.7	3.1
1985	61.60	9.9	3.5
1990	63.30	10.2	3.3
1995	65.00	10.2	4.2
2000	66.30	10.7	6.7
2005	67.20	11.2	7.4
2010	68.10	12.5	7.4
2011	68.30	12.7	7.5
2012	68.50	13	7.6
2013	68.70	13	7.6
2014	68.90	13	7.6

Source: United Nations Development Programme, HDI: Human development index

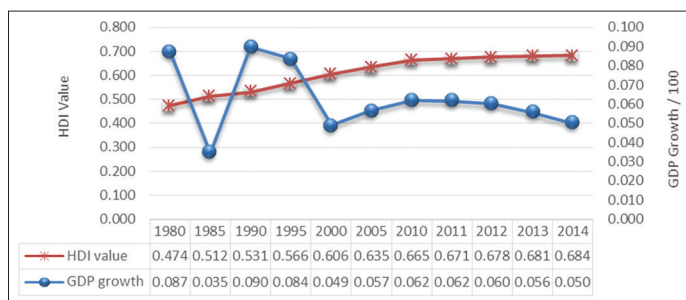
As in previous research studies, when it is viewed descriptively, the same thing happened in Indonesia and Republic Korea. There was a positive trend relationship between economic growth and human development. In Figure 5 are shown the trend of economic growth with human development in Indonesia during the period of 1980-2014. By the time the economy experience the relatively high growth, then the HDI growth is also high. After the year 2010, the economic growth tends to slow down, and then the development of HDI tends to slow down also. The picture means there is a positive relationship between economic growth, human development and electricity consumption in Indonesia as showed in Figure 5 and Table 4.

Indonesia has the bonus of better demographic and economic growth prospects, which means that Indonesia has great prospects for improving the HDI in the future, assuming that if the government is able to:

1. Improve the basic health
2. Realize the expectations of the old school into a reality
3. Maintain the economic growth
4. Improve the education and basic health conditions in line with educational and health programs by the government.

In 2014, the national gross electricity production reaches 881.06 kWh per capita, with about 50% coming from coal-fired mines. Electricity production is estimated to increase more than 6 times or an average growth of 5.1% per year. Low capacity of national power generation capacity due to high reserve margin to meet

**Figure 5:** Gross domestic product growth and human development index value of Indonesia



Source: World Bank, United Nations development programme

**Table 4: Indonesia electricity consumption**

Year	Electricity consumption	Access electricity	Energy use
2000	390.37	86.30	6.25
2001	411.43	86.26	6.48
2002	417.47	87.60	6.63
2003	428.86	87.94	7.06
2004	474.41	89.01	7.15
2005	500.73	87.13	7.66
2006	516.16	90.62	8.14
2007	546.34	91.10	8.93
2008	570.32	92.73	9.47
2009	594.33	93.55	9.23
2010	636.57	94.15	9.45
2011	681.14	94.83	10.63
2012	734.60	96.00	11.06
2013	775.65	96.46	11.56
2014	814.06	97.01	11.92

Source: World Bank, United Nations Development Programme

scheduled and unscheduled generator maintenance, damage to networks and substations, availability of water resources, delays in new power plant construction, uneven load patterns, and others. For that need improvement to improve the provision of electricity consumption by: Increase renewable resources, Improve the spread of electrical access and Collaborate on the use of potential sources in the region.

Based on the results of Umit and Bulut (2015) which proves that there is a positive influence between GDP and consumption of energy. Furthermore of Jumbe (2004) research proves that there is positive influence between GDP and electricity consumption. Similarly only with Narayan and Singh (2007) which proves that increasing GDP will increase electricity consumption.

### 5. CONCLUSION

After the economic crisis, the economic growth and per capita income of Indonesia experience a slowdown, it is caused by the influence of the global economic slowdown, especially because

the world commodity price and energy is still stagnant. In 2015, Indonesian economic structure is contributed by agriculture sector: 14.0%, industry including energy: 30.6% and services: 55.4%. Republic Korea's economic structure is contributed by the agriculture sector: 2.3% energy including industry: 32.9%, and services: 64.8%. The rank of Indonesia HDI is ranked 110, in the category of medium human development group of country. Indonesia shows that the lower of growth.

The weakening of HDI growth is in line with the weakening purchasing ability. It is caused by the weakening of per capita income growth in both countries. The low Indonesia HDI is due to not only the effects of low per capita income, but also the low life expectancy at birth and mean years of schooling. The low of both indicators is because not only the low purchasing ability in the fields of education and health, but also the low government budget for education and health. There is a positive relationship between economic growth, human development and electricity consumption in Indonesia. This means that when economic growth or per capita income increases, the HDI and electricity consumption also tends to increase.

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