Original Article

Rural Electrification Development To Enhance Human Development Index In Majalengka District

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Abstract - *There is a positive relationship between infrastructure development programs and economic growth. One of the outcomes is to fulfill rural electrification. In 2018, almost 99% of the West Java region take benefit of electric infrastructure implementation. Majalengka district as part of West Java is one of the priority areas for the rural electrification program. The result of this research is prospering and convincing. The result using quantitative data during the 2009-2015 rural electrification program is converse to electricity production and also resident has shown positive outcome and significant to Human Development Index.*

Keywords - *Rural Electrification, Economic Growth, Human Development Index.*

I. INTRODUCTION

Economic growth stability and equal distribution of development outcomes that can be enjoyed by the entire community is a national development goal in creating prosperity and prosperity for the people, including people living in rural and underdeveloped areas. The community itself is declared prosperous and prosperous if its basic needs are fulfilled. Meanwhile, the basic needs of the community itself are one of them is the need for energy. Energy is an essential requirement for humans after food, water, and shelter. The use of energy in human life becomes very important along with the improvement in the quality of life standards of the community. Starting from simple methods such as burning wood to produce heat to warm the body, and as a light for lighting, energy utilization has developed as technology advances. The energy that is widely used and utilized by people in everyday life is electricity. In modern society, electricity has become a basic need that has a vital role in economic and social development. In the context of social development, Niu. Et al., 2013, stated that electrical energy is vital to improve welfare, which includes improving health, education, comfort (amenities), improving environmental quality.

The increasing need for electrical energy to sustain economic growth, especially access to electricity in rural areas, is the concern of all parties. Electricity development in rural areas is intended to encourage economic activities and welfare. Besides encouraging economic growth, rural electricity programs are also aimed at increasing the intelligence and welfare of the people in the region. Pereira et al., 2010, through their study of rural electricity and energy poverty in Brazil, concluded that there was a change in the profile of energy and electricity consumption towards reducing energy poverty. On the contrary, through his study of electricity consumption in industrialized countries, Mazur. A., 2011, concluded that the increase in energy and electricity consumption per capita in the last three decades has not been associated or associated with improving quality of life. Kanagawa & Nakata's study, 2008, also stated that in socio-economic terms, increasing access to electricity would increase the quality of life drastically. Basically, the standard or level of human welfare is actually difficult to measure, but currently, several indicators can be used to measure it, the simplest is to calculate gross domestic product per capita. GDP describes the final value of all goods and services produced by a country in a region for a certain period, usually within one year. A more advanced indicator for measuring the level of community welfare is by calculating the human development index which considers life expectancy, literacy rates, and purchasing power. Martinez &Ebenhack., 2008, through their study of energy consumption per capita with HDI in 120 countries stated that there was a significant relationship between HDI and energy consumption. It was also stated that for developing countries, increasing little access to energy would increase extraordinary human development. Jorgenson et al., 2014, state that the relationship between the energy intensity of human well-being and economic growth is very complex and changes dramatically over time. Moreover, in the last few years, the study period shows an increase in the continuing relationship between the energy intensity of human well-being and economic development. As the results of the TeteSaepudin study, 2018, there is a positive correlation between the electrification ratio and the human development index, in West Java Province.

The implementation of the electricity program is one form of implementation of the mandate of the Law of the Republic of Indonesia Number 30 of 2009 concerning Electricity, and the Regional Regulation of West Java Province Number 21 the Year 2014 concerning the Implementation of Electricity. In article 3 paragraph 1, Law of the Republic of Indonesia Number 30 of 2009, that the principle of electricity is; a. Benefits; b. Good efficiency; c. Sustainable; d. Economic optimization in the utilization of energy resources; e. rely on one's abilities; f. good business rules; g. Security and safety; h. Preservation of

environmental functions; and i. regional autonomy. The increasing need for electrical energy to sustain economic growth especially access to electricity in rural areas has been the focus of the West Java Provincial Government since 2003.

The West Java Provincial Government continues to actively implement rural electricity assistance as one of the steps to accelerate the electrification ratio. The target for the 2018 electrification ratio is 100%. In September 2017, the electrification ratio had reached 98.5%. Regency / City areas that are the priority of PLN in reaching West Java in 2018 include; Pangandaran Regency, Tasikmalaya, Garut, Indramayu, Cianjur, Majalengka, Sukabumi, and a small part of the area in Bandung Regency and West Bandung Regency. For regions with the lowest electrification ratio, they are Pangandaran, Garut, and Tasikmalaya Regencies. For 2014, the rural electrification program in Majalengka District was spread in 21 Subdistricts, which consisted of 44 villages, while the electricity needs for homes, 3,735 houses were installed. For 2015 it increased to 24 sub-districts, while villages experienced a significant increase of up to 664 villages, with 4,794 houses installed in many villages. In the remote areas, there were a lot of villages in the remote areas that grew opportunities, ranging from increasing levels of education to children can learn at night with electricity and good lighting, in addition to education, it is hoped that there will also be economic writing from home. Electricity is expected to stimulate home-based businesses from the family. Ouedraogo., N. S., 2013, stated that there is a positive cointegration relationship between electricity consumption with the Human Development Index (HDI). In more detail, it is stated that a 1% increase in electricity consumption per capita will increase the HDI value by 0.22%. Through his study of energy consumption, human welfare, and economic development in several countries in Eastern Europe.

A. Electricity Development in Majalengka Regency

The need for energy availability, especially electricity, in Majalengka Regency has been increasing from year to year. This situation is in line with the increase in population and the development of economic development in the Majalengka Regency. In 2012 electricity was sold for 334 621 154 Kwh. 2013 amounted to 366 525 020, and for 2017 the number of uses of kWh electricity sold was 481.757,156 kWh.

Table 1.1 Power Installed, Production and Distribution of ElectricityState Electricity Companyin Majalengka District2012-2017

Year	Power Installed (kwh)	Electricity Production (KWh)	Electricity Sold (KWh)	Lost (KWh)
2012	214 362 910	436 207515	334 621 154	101 586 361
2013	235 363 860	480 605 296	366 525 020	114 080 276
2014	250 092 060	450 634 461	400 235 745	50 398 716
2015	269 641 910	479 773 745	427 860 065	51 913 680
2016	289 716 110	507 363 796	454 623 188	52 512 625
2017	322.876.150	531.326.303	481.757.156	49.569.147

Source: Majalengka District in 2018 figures

For installed power, production, electricity sold, and shrinkage or loss for six years from 20122017 shows a continuous increase, wherein 2012 installed power 214 362 910 kWh, in 2013 installed power 235 363 860 kWh, in 2014 installed power 250 092 060 kWh, in 2015 installed power was 269 641 910 kWh, and for 2016 was the largest growth for five years (2012-2017) installed power of 289 716 110 kWh. For production in 2012 amounting to 132,827,696 kWh, electricity sold 122,450,917 kWh, a loss / loss of 10,376,779 kWh, and the amount was 341,608,592 kWh. For 2014 and 2015, installed power was 95,709,500 kWh, and 103,849,150 kWh, for the production of 170,337,853 kWh in 2014, and for 2015 103,849,150 kWh. Electricity sold in 2014 amounted to 155,750,763 kWh, and in 2015 amounted to 168,596,468 kWh, which experienced depreciation or loss for 2014 amounting to 14,587,090 kWh, in 2015 amounting to 17,202,539 kWh.

B. Development of the Human Development Index (HDI) in Majalengka Regency

Human Development Index (HDI), which is one indicator to measure the progress of economic development in a region. Human Development Index can be used as a

benchmark in determining the success of the development of Human Resources in a region. So far, the method used to measure the level of success of economic development is the GDP method, while in the GDP method, it only measures one element of the measure of community welfare, namely the economic sector, while HDI itself consists of three elements, namely Economics is measured by purchasing power, Education, its literacy, and the third element is health. The Human Development Index (HDI), which consists of the Education Index, which is formed through the Average School Length (RLS), and Literacy Rate (AHH), Health Index formed from Life Expectancy (AHH), and the Purchasing Power Index in the form of Power Purchasing Parity (PPP).

Over six years, HDI in Majalengka Regency continued to increase.HDI is generally due to the existence of programs run by the regional government and the support of all levels of society. The Majalengka Regency HDI rate in 2015 was 64.75 in the moderate category (60 <HDI <70). The health component represented by the component of Life Expectancy (AHH) of 69.06 percent, means that the average population of Majalengka can survive to the age of 69 years. In 2014, the HDI of Majalengka Regency amounted to 64.07 and 63.71 in 2013.

Table 1.2. Human Development Index
Majalengka Regency2010-2017

Year	HDI
2010	62,30
2011	62,67
2012	63,13
2013	63,71
2014	64,07
2015	64,75
2016	65,25
2017	65,92

Source: Regional Statistics of Majalengka Regency various publications
(2010 – 2018)

In general, the HDI rate of the Majalengka Regency is below West Java, meaning that the quality of human development in the Majalengka Regency is still below the average Regency / City in West Java Province. The education component is reflected by the average length of school-age (RLS) aged 25 years and over where the average population of Majalengka spends 6.8 years on formal education during his lifetime. The other education component is the Harapan Lama School (HLS) of 11.74 years, meaning that a Majalengka resident who is over seven years old has hopes of going to school up to 11.74 years.

The last component that forms the HDI is PPP / Expenditure per capita is 8,477 thousand rupiahs, meaning that the per capita expenditure of the Majalengka population is an average of 8,477,000 rupiahs.

Source: Regional Statistics of Majalengka Regency 2016
Fig. 1.1 Component of Forming HDI of Majalengka Regency 2015

Achievement of Human Development in Majalengka Regency during the period of 2013-2015 was under the Regencies of Cirebon, Kuningan, and Cirebon City and above Indramayu. During this period the HDI of all districts in the Ciayumajakuning Region was in the moderate category (60 = HDI <70) while Cirebon City was in the high category (70 = HDI <80).

C. Impact of Electricity Development on the Human Development Index (HDI)

The progress of the economic development of a country or region is inseparable from how big the role or ownership of resources, which are owned, both natural resources, human resources, and technology. The era of the government is now actively developing infrastructure in all fields, including roads, bridges, waters, housing, and electricity infrastructure. West Java Province, in 2018, proclaims 100%, West Java people can enjoy electricity lighting, then is a factor of human resources, this is a significant factor, which means abundant natural resource factors if human factors are weak, and also technology is not created.

The parameters of successful development achieved by the community, often using the Human Development Index, in this case, to see the success of development in Majalengka Regency, from rural electricity development programs that have been built to the Human Development Index (HDI) will be analyzed using multiple linear regression equations. The data used are economic development the human development index (HDI) as an influenced variable, rural electricity programs are electricity production, and the potential of human resources is the population. The data used for more details can be seen in the following table:

Table 1.3. HDI, Electricity Production, and population in Majalengka 2009-2015

Tahun	IPM (Y)	Produksi Listrik (Kwh)	Penduduk (orang)

		(X1)	(X2)
2009	62,00	310.124.367	1.165.794
2010	62,30	310.124.368	1.165.795
2011	62,67	310.124.369	1.171.478
2012	63,13	310.124.369	1.176.117
2013	63,71	365.542.846	1.180.774
2014	64,07	400.235.744	1.176.313
2015	64,75	427.860.065	1.182.109

Source: Majalengka Regency In a number of publications (2010 – 2016)

In the form of function equations are as follows:
$$Y = f\ (X_1, X_2) \dotsc\dotsc\dotsc\dotsc\dotsc 1.1.$$

Dalam persamaan regresi linier berganda adalah:
$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \mu \dotsc\dotsc\dotsc\dotsc 1.2$$
where:
Y = Majalengka Regency Human Development Index (HDI) (Index)
X_1 = Electricity production of Majalengka Regency (kwh)
X_2 = Population of Majalengka Regency (people)
β_0 = Intercept
β_1 = estimation of electricity production
β_2 = estimation of population Majalengka
μ = error term

The estimation results from the influence of electricity production, and the population on the human development index (HDI) can be seen in the following table:

Tabel 1.4 Hasil Estimasi Produksi listrik, Jumlah Penduduk terhadap Indeks Pembanganan Manusia

Dependent Variable: Y
Method: Least Squares
Sample: 2010 2015
Included observations: 6

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-28.92650	22.90715	-1.262771	0.2959
X1	1.05E-08	3.14E-09	3.349928	0.0441
X2	7.54E-05	2.01E-05	3.750239	0.0331

R-squared	0.959462	Mean dependent var	62.98000
Adjusted R-squared	0.932436	S.D. dependent var	0.807762
S.E. of regression	0.209962	Akaike info criterion	0.023072
Sum squared resid	0.132252	Schwarz criterion	-0.081049
Log-likelihood	2.930785	Hannan-Quinn criter.	-0.393730
F-statistic	35.50208	Durbin-Watson stat	2.574498
Prob(F-statistic)	0.008162		

Source: Results Using EViews 6

The model for the electrification program in Majalengka is:

$$Y = -28,92650 + 0,0000000105 X_1 + 0,0000754 X_2 \dotsc 1.3$$

a). Estimation of Electricity Production on Human Development Index (HDI)

The relationship between electricity production and the human development index in Majalengka Regency has a positive relationship, meaning that if electricity production increases by 100 million kWh, then the ratio of the human development index in Majalengka Regency will increase by 0.01, and other factors are considered to not affect.

It is undeniable that with the electricity program in the village, the level of welfare of the population will increase. Majalengka Regency which received electricity assistance to villages in 2014 and 2015 was 109 villages. The effect is quite significant; it can be seen from community activities in economic activities. In processing agricultural production from rice, cassava, palm sugar, is increasingly productive. People's purchasing power also increases. Likewise, social religion, for example in the village of NunukBaru, MajaSubdistrict, the activities of PKK mothers in Health Integrated Service Post activities are increasingly active. The community's interest in learning also increased, so continuing formal education to a higher level also increased.

I Made Agus Dharma Susila and DwiRahmasariPribadi (2014), stated that electricity consumption and the electrification ratio in Indonesia have a strong relationship with human development indicators. The industrial sector has the most considerable influence on life expectancy, followed by the commercial and household sectors. Related to HDI, total electricity consumption and electrification ratio affect the value of literacy indicators more than indicators of life expectancy.

b). *Estimation of Population against Human Development Index*

The relationship between the population and the human development index in Majalengka Regency shows a positive relationship, meaning that if the population of the Majalengka Regency increases by 1 million people, then the ratio of the human development index will increase by 7.5 and other factors are considered to not affect.

The population is development capital if the population is productive. Productive residents can move other production factors, both capital and technology production factors. The population also creates entrepreneurship, only the problem that occurs when the birth rate is too high and becomes a burden for the productive population. Besides that, the existence of the population in Majalengka Regency is not evenly distributed, and there is a shift in the work of the population from agriculture to industry, whereas the contribution of the agricultural sector in Majalengka is still the largest compared to other sectors, besides the migration from village to city also occurs.

II. CONCLUSION

The role of infrastructure development in increasing the level of population welfare / economic development is quite positive. One of the infrastructure programs that achieved quite high was the rural electricity infrastructure program, the rural electricity program which was launched in 2003 until now, in West Java Province the achievements have been almost one hundred percent of the population enjoying the electricity infrastructure. Majalengka Regency which is one of the districts that is the priority of rural electricity programs, with analysis of multiple linear regression equations, years of observation 2009-2015, the results are

obtained, that the electricity program that is converted to electricity production and population shows positive and significant results towards the human development index (welfare).

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