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## Fighting Poverty Gap through Literacy and Electricity: A Case from Indonesia

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### Abstract

Literacy is crucial because it is a gateway for information, knowledge, and technological mastery. Literacy can be a deciding factor in someone working to find a better income. So, electricity is a basic requirement for at least household lighting, but with the development of technology making electricity can be used for various kinds of equipment. Poverty becomes a very complex problem that has broad impacts. Poverty destroys purchasing power, decreases human quality, and decreases economic welfare. Therefore, this paper wants to test how literacy and electricity can fight poverty. The econometrics model in this study is the effect of literacy and electricity on poverty in the Indonesian Territory. This study uses secondary data cross section as many as 501 districts and cities in Indonesia. The analytical method in this study is Robust Least Squared Model. The results of the analysis of this study conclude that an increase in literacy and electricity can significantly reduce poverty. Every 1% increase in literacy will reduce the poverty gap index by 0.066, then every 1% increase in household access to electricity will reduce the poverty gap index by 0.052. This study suggests that the policy of literacy program and fulfilling electricity is crucial to combating poverty in all regions in Indonesia.

### Keywords:

literacy, electricity, poverty gap index

### Introduction

The problem of poverty has become interesting lately. Since the great depression of the 1930s, the focus has been on economic growth rather than poverty and economic stability. Since the world economic crisis occurred in 2008, the problem of poverty has become very interesting because the conditions of poverty and income inequality have triggered the beginning of a serious economic crisis in this modern era (Smeeding, 2005). Poverty and income inequality have damaged aggregate purchasing power of the society (Budiono & Purba (2019b), (2020)). The quantity of goods and services that can be purchased becomes less, so that the production of goods and services becomes less as well (Rajagukguk, et al 2020). As is the market system that supply must be the same as aggregate demand (Budiono (2009b), (2012)).

Economically, the inability of individuals to generate income makes these individuals poor. The causes of this high poverty gap include mastery of knowledge, ownership and control of productive assets, and market forces

and political & legal forces. Educational systems and knowledge mastery is very important both individually and in groups, knowledge is the basis for people to work in a more efficient and productive way and impacting to economic growth (Purba (2015), Budiono et.al (2020), Rajagukguk et.al (2020)). In addition, science helps find new economic and technological resources in the production process to grow new economic business resources based on sustainable innovation technology (Budiono (2011), Purba et al (2020), (2019), (2015). Ownership and control over productive assets greatly affect the poverty gap, individuals who do not own and do not control productive assets or own and control productive assets will get low income or no income at all (Budiono (2009a), Budiono et.al (2020)).

36 The Central Statistics Agency of the Republic of Indonesia noted that the poor population until March 2019 was recorded at 9.41 percent of the total population of Indonesia, or a decrease compared to the previous year 9.82 percent. This data shows an encouraging development. The reason is, when the poverty line increases, the number of poor people has been reduced. The number of poor people in March 2019 was 25.14 million people, a decrease of 0.53 million people in September 2018 and a decrease of 0.80 million people in March 2018 (Sekretariat Kabinet RI, (2020)).

The percentage of poor people in urban areas in September 2018 was 6.89 percent, decreasing to 6.69 percent in March 2019 (Central Bureau of Statistics, 2020). Meanwhile, the percentage of poor people in rural areas in September 2018 was 12.10 percent, decreased to 12.85 percent in March 2019 Compared to September 2018, the number of poor people in March 2019 in urban areas fell by 136.5 thousand people (from 10.13 million people in September 2018 to 9.99 million people in March 2019). Meanwhile, rural areas fell by 393.4 thousand people (from 15.54 million people in September 2018 to 15.15 million people in March 2019). The following is a graph of the development of Indonesia's poverty rate from 1998 to 2019.

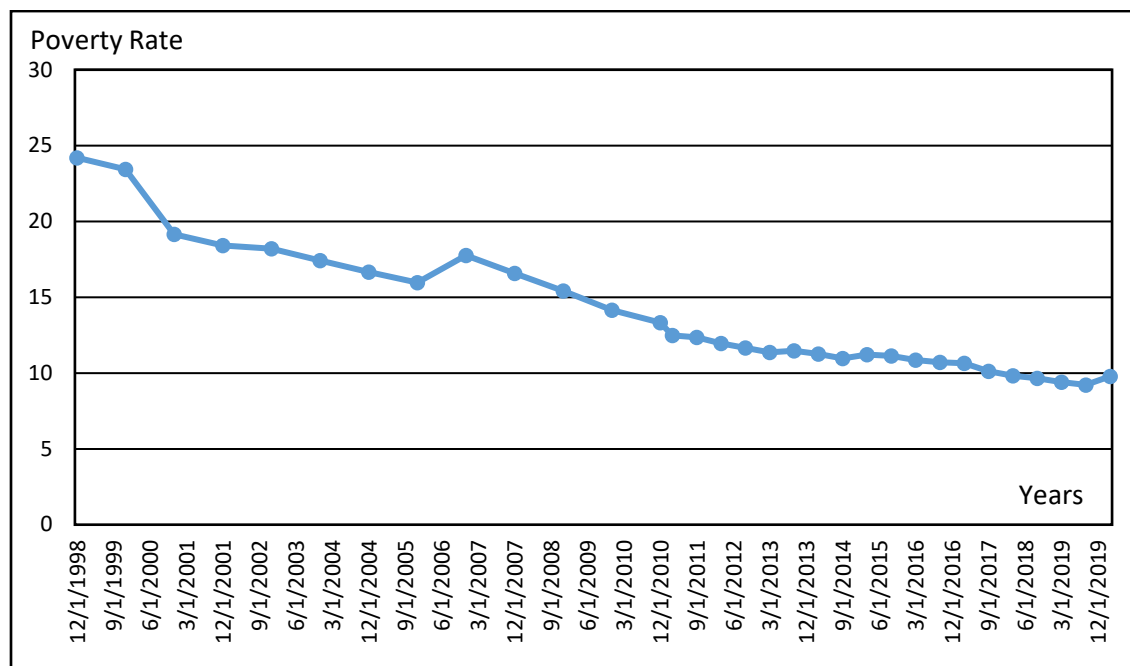


Figure 1 Poverty Rate Decreased in The Last 21 Years, Indonesia

7 The poverty rate in Indonesia has tended to decline in the last 21 years. In 1998 the poverty rate reached 24.2% and continued to fall to only single digits in 2019. It was recorded that the percentage of poor people in September 2019 was 9.22%. This figure decreased 0.19% against March 2019 and 0.44% against September 2018. The Indonesian Central Statistics Agency (BPS) noted that the poor population until March 2019 was recorded at 9.41 percent of the total population of Indonesia, or decreased compared to the previous year 9, 82 percent (Central Bureau of Statistics, 2020).

Although so far poverty alleviation programs have been very powerful, other means that can support poverty alleviation need to be implemented. The formation of the causality model is an important alternative in fighting poverty so that the poverty gap index can decrease (Budiono et al, 2020). Based on the description of the dynamics of poverty rate, in this study the authors want to prove that the Literacy and availability of electricity to reduce poverty gap in every district and city throughout Indonesia.

## Literatur Review

13 The existence of literacy rates is useful for seeing the achievement of basic indicators that have been achieved by an area, because reading is the main basis for expanding knowledge. The literacy rate is an important indicator to see the extent to which the population of an area is open to knowledge (Purba et al, 2020). High literacy rates indicate the existence of an effective primary education system and / or literacy program that allows a large proportion of the population to acquire the ability to use the written word in everyday life and continue learning (Budiono (2009a), Purba & Budiono (2019a)).

An electric power service has been the basic requirement for improving living standards and supporting social development for five main reasons (Niu et al., 2013). First, when obtaining electricity, food, vaccines, and drugs can be stored in a refrigerator for a longer time, thereby improving people's health conditions. Second, lighting makes people study longer with the result that the adult literacy rate increases. In addition, the application of computers, televisions and the internet improve people's ability to obtain information and knowledge (Adirinekso. G.P., Purba, & Budiono, 2020). It can be said that modern society is highly reliant on network information and communication technologies (J.T. Purba, Budiono, Rajagukguk, et al., 2020). Third, the available electricity makes widespread use of various household appliances. It is more convenient for people in heating, cooling, sanitation, entertainment, and equipment, last which greatly improves quality of life. Fourth, electricity can take the place of traditional biomass energy and coal, which is able to reduce indoor pollution and improve the quality of the environment. Finally, the utilization of electricity not only releases people from hard work, but also saves much time for people. In particular, for rural individual it provides opportunities for self-employment and potential development (Tang, 2009). By looking the research results of Ghura & Goodwin (2017) concluded that the private investment in developing countries is stimulated by real GDP growth, increases in government investment, improvements in financial intermediation, reduced the credit to the government, and declines in world interest rates (Budiono & Purba, 2019). The results indicate that developing economies can indeed benefit from the virtuous cycle that links increased private investment and real GDP growth, given that investment becomes the key in contributing factors toward the real GDP growth (Ghura & Goodwin (2017), Rajagukguk et al (2020)).

12 Poverty gap index (PGI) is a measure of the average expenditure gap of each poor person against the poverty line. The aggregate value of the poverty gap index shows the cost of alleviating poverty by setting perfect transfer targets for the poor in the absence of transaction costs and constraining factors (Adirinekso et al, 2020). The smaller the poverty gap index value, the greater the economic potential for poverty alleviation funds based on the identification of the characteristics of the poor population and for the target aid targets and programs (Sekretariat-RI, 2020). A decrease in the value of the depth of poverty index indicates that the average expenditure of the poor tends to get closer to the poverty line and the expenditure inequality of the poor is also getting narrower.

Poverty is defined as the individual life in a household with an expenditure of no more than US \$ 1 per day per person which is valued at international prices. Poverty Gap Index (PGI) is an average measure of the expenditure gap of each poor population against the poverty line. The higher the index value, the further the average population expenditure is from the poverty line (Ziliak, 2005). The general PGI formula is as follows (Alkire & Santos (2014), Thon (1979) (Alkire & Santos, 2014) (Thon, 1979):

$$PGI = \sum_{i=1}^q \left[ \frac{z - y_i}{z} \right]^\alpha$$

16  $\alpha$ : the degree of aversion to poverty such that as  $\alpha$  increases there is increasing weight given to the poorest households 1.

z: poverty line

q: total poor families

10  $y_i$ : average monthly expenditure per capita of the population below the poverty line, where the form of the mathematical equation is;

a person is poor if  $y_i < z$ .

n: total population

As describe above, the concept of poverty is a multidimensional concept in social life. Income is not sufficient to be a good enough indicator to measure poverty. To measure poverty, income may need to be supplemented with attributes such as health condition attributes, and education achievements. Multidimensional analogues with the composition of growth and equity are solved (Purba and Budiono (2019b), (2020), (2020); Tsui (1996)).

In 2012 poverty in Indonesia was at 29.25 million. Then, it decreased in 2013 at 28.17 million. Furthermore, it has increased in 2014 and 2015 with a total of 28.28 million and 28.59 million. In 2016, it decreased again at 28.01. The years 2017-2019 continued to decline consecutively, namely 27.77 million; 25.95 million; and 25.14 million. In

its calculations, Indonesia 'Central Statistical Bureau uses the per capita expenditure approach of IDR 425,250 per month per capita as the latest poverty line. This indicator increased from March 2018, where the poverty line was pegged at IDR 401,220 per month per capita. The poverty line is a reflection of people's expenditure to meet the food needs of 2,100 calories. Thus, if food prices increase, the poverty line is also raised.

## Methodology

Based on the problems and possible causal relationships between Literacy (Lit\_15) with Poverty Gap Index (PGI), and household electricity access (HH\_Elt) with PGI, then we compile an economic model as outlined in the following figure.

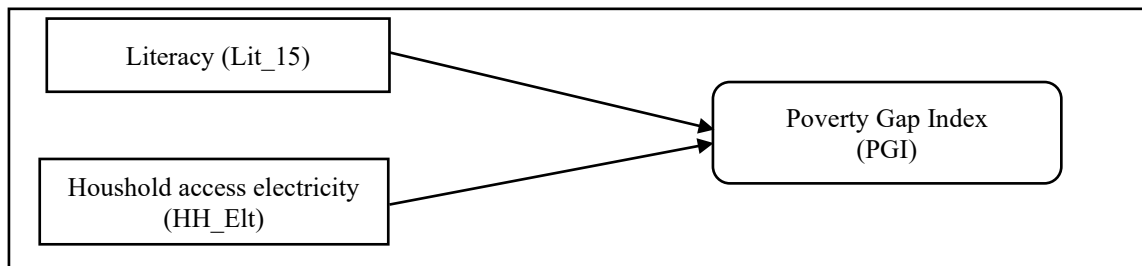


Figure 2. Research Model.

The analysis tools used are the econometrics and statistical methods to test the model and their respective parameters (Greene, 2018). The unknown parameters of the stochastic relation  $y_i = x_i'\beta + \varepsilon_i$  are the objects of estimation. It is necessary to distinguish between population quantities, such as  $\beta$  and  $\varepsilon_i$ , and sample estimates of them, denoted  $b$  and  $e_i$ . the population regression is  $E[y_i|x_i] = x_i'\beta$ , whereas authors estimates of  $E[y_i|x_i]$  denoted

$$\hat{y}_i = x_i'\beta \quad (1)$$

The disturbance associated with the  $i$ -th data point is

$$\varepsilon_i = y_i - x_i'\beta \quad (2)$$

For any value of  $b$ , we shall estimate  $\varepsilon_i$  with the residual

$$e_i = y_i - x_i'\beta \quad (3)$$

From the definitions, so The basic framework for analyzing cross section data is a regression model of the form (Greene, 2018)

$$y_i = x_i'\beta + \varepsilon_i = x_i'\beta + e_i \quad (4)$$

This study uses cross section data that includes in 501 districts & cities in Indonesia Territory. The purpose of this study is to analyze impact of literacy (Lit\_15) and availability of electricity (HH\_W) toward Poverty Gap Index (PGI).

Based on the basic framework of this regression model, the applied regression model for this study is

$$PGI = \beta_0 + \beta_1 Lit_{15} + \beta_2 HH\_Elt \quad (5)$$

Subsequently a calculation is made by estimating the suitability of the econometric model that is the magnitude of the R-squared and F-test with a significance level of 5%.

Based on the theoretical estimates for each parameter to achieve the desired model conditions in mathematical equations are as follows.

$$\beta_1 = \frac{\partial PGI}{\partial Lit_{15}} < 0 \text{ and } \beta_2 = \frac{\partial PGI}{\partial HH\_Elt} < 0 \quad (6)$$

Based on the calculus equation, the partial test of each independent variable is one way. Literacy affects PGI in the opposite direction and HH\_Elt also affect PGI in the opposite direction. Thus, the value of each parameter  $\beta$  is expected to be negative.

While the partial testing of each independent variable on the dependent variable is carried out by t-test with a significance level in this study amounting to 5%.

By using the null hypothesis ( $H_0$ ) and alternative hypothesis ( $H_1$ ) for partial testing on the  $\beta_1$  parameter as follows:

$H_0 : \beta_1 = 0$ , Literacy does not affect Poverty Gap Index.

$H_1 : \beta_1 < 0$ , Literacy affects Poverty Gap Index in the opposite direction.

The null hypothesis ( $H_0$ ) and the alternative hypothesis ( $H_1$ ) for partial testing on the  $\beta_2$  parameter are as follows

$H_0 : \beta_2 = 0$ , the availability of household electricity access does not affect Poverty Gap Index.

$H_1 : \beta_2 < 0$ , the availability of household electricity access influences Poverty Gap Index in the opposite direction.

The following is an explanation of the Literacy and household electricity access and Poverty Gap Index variables used in the economic model.

Table 1 Variables Description, Indicator, and Label

Variable	Indicator	Description	Label
Literacy	Literacy	13 Proportion of population aged 15 years and over who can read and write simple sentences in Latin Letters, Arabic Letters, and other letters	Lit_15
Electricity	Electricity	The percentage of households that can access electricity in regencies and cities	HH_Elt
Poverty Gap Index	20 Poverty Gap Index	The average size of the expenditure gap of each poor person against the poverty line	PGI

Source: Selection of research variables, 2021

## Conducting Research and Discussion

Based on the proposed econometrics model, we conduct data processing in 501 observations (districts and cities) cross section. By using linear regression and robustness feasibility, the output of data processing is as follows.

Table 2 Result of Linear Regression for Poverty Gap Index in Districts and Municipalities

LINEAR REGRESSION				
Number of observation : 501				
24 F (2, 497) : 49.40				
Prob > F : 0.0000				
R-squared : 0.3785				
Root MSE : 1.8748				
PGI	Coefficients	Robust Standard Error	t-test	P value > t
Lit_15	- 0.065	0.019	- 3.32	0.000
HH_Elt	- 0.052	0.001	- 6.78	0.000
Constant	13.200	1.642	8.04	0.000

Source: Result of Data Processing, 2020

Based on the value of R-squared = 0.3785 shows that 38,0% changes in PGI are influenced by independent variables in the model, while the influence of variables outside the model and poverty alleviation program is 62.0%. The test results for the proposed model that the results of the value of F-test = 49.40 and probability F = 0.00 smaller than the significance level of 5%, we reject the null hypothesis. The independent variable literacy and household access to electricity simultaneously influence the PGI in every city and district throughout Indonesia.

Based on the results of partial testing of the literacy variable (Lit\_15) is t-test = -3.32 and probability value t = 0.000 states that we reject null hypotheses and accept alternative hypotheses. Literacy (Lit\_15) significantly influences the poverty gap index in every district and city throughout Indonesia. Subsequent partial testing of the electricity variable is t-test = - 6.78 and probability value t = 0.000 states that we reject null hypothesis and accept alternative hypotheses. Household Access Electricity (HH\_Elt) significantly influences the PGI in every district and city throughout Indonesia. So, testing together or partially shows the behavioral model in this study has met the statistically requirements. Next, we construct the equation of the econometric model in this study as follows.

$$PGI = 13.20 - 0.065 Lit_{15} - 0.052 HH\_Elt$$

From the results equation the literacy and existence of electricity affects poverty gap index as the foundation of the economy in Indonesia.

The value of all the parameter coefficient is negative, this shows the results of this study are in accordance with the hypotheses and theoretical basis. The magnitude of the parameter coefficient reflects the magnitude of the impact of the independent variable on the dependent variable. The value of Lit\_15 parameter with coefficient of 0.065 shows that each 1% increase in Lit\_15 resulted in an decrease of PGI around 0.065 in each district and city throughout Indonesia. Likewise, for the HH\_Elt parameter coefficient of 0.052, it shows that 1% increase in percentage of household access electricity results in a decrease of poverty gap index about 0.052 in every district and city in



Indonesia. The value of the literacy parameter coefficient is greater than the electricity parameter coefficient relatively, this shows that the impact of literacy on poverty gap index is greater than the household access electricity.

## Discussion

Now, the Ministry of National Development Planning (PPN)/ National Development Planning Agency has prepared five strategies to accelerate poverty reduction. The strategy is expected to accelerate the reduction of the poverty rate according to the 2019 Government Work Plan target of poverty rate 8.5% -9.5%.

The Minister of National Development Planning / Head of the Indonesian National Development Planning Agency pointed out that the five strategies were carried out across Indonesian ministries. First, promoting inclusive economic growth. In a macroeconomic order, the government encourages inclusive economic growth, maintains macroeconomic stability, stabilizes prices, creates productive employment, maintains the investment climate, maintains trade regulations, increases the productivity of the agricultural sector, and develops infrastructure in disadvantaged areas. At the micro level, people below the national poverty line are given food assistance (rice) and non-cash food assistance, the Family Hope Program, as well as health insurance contributions for the Healthy Indonesia Card. The Indonesian government also seeks to increase the income of the poor and vulnerable with access to capital, improve product quality and access to marketing, develop business service skills, and develop entrepreneurship, partnerships, and intermediary.

Second, the development of economic growth centers outside Java to strengthen infrastructure, connectivity that connects the economic center and supporting areas, as well as strengthening local product development. Third, reform of the subsidy budget. The allocation for fuel oil subsidies is diverted into transfers to regions and village funds to reduce inequality. Fourth, increasing the social protection budget. A significant reduction in subsidies, from 3.4% to 0.8% of GDP, was allocated for social protection through health insurance premiums for the poor and expansion of social assistance programs.

Fifth, strengthening the domestic economy and managing imports. Strengthening the domestic economy is realized through increased ease of doing business in areas that are closely monitored and ease of business permits through Online Single Submission (OSS). The government reduces import pressure through the implementation of the obligation for online stall providers to sell local goods with a certain minimum composition as well as easing investment in the industrial sector to provide raw materials that have been imported.

## Conclusion

Based on the results of these discussions, the government still must implement poverty alleviation programs with strategies that are tailored to the conditions of each region in Indonesia. Poverty alleviation programs play a major role outside of the model I propose. Thus, the variables selected in the poverty alleviation model and program synergize each other to reduce the poverty gap index. The combination of policies on literacy and meeting electricity needs together is the key to alleviating poverty. With everyone's reading and writing skills, they can work individually or in groups. The ability of people to be able to read and write will enable these individuals to pursue prosperity and at the same time get out of poverty.

However, electricity is a basic component for all activities in every social and economic sector. Currently, the Indonesian government is trying to meet electricity needs by building power plants, especially on large and densely populated islands. Electricity in households has played a very powerful role in alleviating poverty. The availability of sufficient and distributed electricity throughout Indonesia makes the economy more efficient, improves the environmental conditions of activities and further reduces the poverty gap index.

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## Acknowledgements

The researchers would like to thank to Office of Research and Publication (ORP) of Faculty of Economics and Business Universitas Pelita Harapan, Karawaci, Tangerang Indonesia for financially supporting the research and community development.

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**John Tampil Purba**, obtained a degree Doctor (S3) majoring Management from De La Salle University Systems Manila, Philippines in 2002. Dr. Purba also has several certifications international competition in management information systems and technology, among others: MCP, MCSA, MCSE, MCSSES, MCSAS, MCDL and MCT from Microsoft Technologies, USA and CSE from Cisco System USA. **He is also Professional Membership of IEOM Society since last year 2019.** He has several managerial experiences in the Service Industries more than 25 years. He is currently a senior lecturer at the Faculty of Economics and Business Pelita Harapan University, Karawaci Banten, Indonesia.

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