

# Individual Characteristic and Awareness on Environment: Evidence from Indonesia

<sup>1</sup>Ni Made Sukartini\*, Okfrisda Sakti

**Abstract**---This study examines the determinants of individual characteristics to the effort for efficiently consuming clean water and electricity, as well as doing sort on domestic waste. This study applies cross sectional data on *Survei Perilaku Peduli Lingkungan Hidup (SPPLH) 2013* or *Survey for Behavioural Awareness on Environment*. Logistic regression is chosen as main analysis. This study finds that individual awareness is positively associated with age and educational level. Awareness is negatively associated with male and respondent who reside in the urban areas. Furthermore, it is found that respondent with better income aware more on saving electricity rather than saving clean water. Better available information also improves respondent awareness on efficient consumption level for better environmental quality. Policy relevant with this finding is encouraging community awareness through role model such as community leader and scholar. Intensity of spreading information as well as pricing policy are also relevant for improving community awareness.

---

**Keywords:** *Individual Characteristic, Awareness on Environment, Indonesia*

## I. Introduction

As the economic activity focuses on growth of output i.e. gross domestic product (GDP), then another GDP i.e. gross domestic pollution will increase. Increasing use of machine, more factory building, car and household appliance that rely on electricity as source of energy induce the weather warmer. The growth of fast food restaurant which utilize *sterofoam* plastic create more on non-degradable waste, especially in developing countries [1]. Environmental problems emerged as a global phenomenon since 1970 [2]. As the population more concentrated in the cities, the problem of environmental conservation is important to note. The more population put greater pressure on the environment, because larger population requires more resources, such as water, food, minerals, energy and the availability of land for agriculture and residential settlements.[3] describe an environmental crisis is not just about technical problem, but also maladaptive behavior. Maladaptive behavior towards the environment arises because of the anthropocentric view which places the environment just as a tool to meet human needs.

[4] state that population growth will cause problems i.e. decreasing in environmental quality. Environmental quality can be said as a public good and a person's actions or behavior related to the environment can be referred to as externalities [5]. Individual and economic agent face varieties of behavioral choice, either damage the environment (negative externalities), or that one which beneficial for the environment (positive externalities). [6] observed that as income of community increase, both individual and the community awareness to do friendly and care for the environment also increase. The opposite is also

---

<sup>1(a)</sup> *Department of Economics, Faculty of Economics and Business, Universitas Airlangga.*  
email: [nimade.sukartini@gmail.com](mailto:nimade.sukartini@gmail.com)

true. In terms of time horizon, it is said the behavior of the poor and low educated community tends to be present oriented, i.e. trying to fulfill their basic needs first or monetary value rather than caring for the environmental.

[5] states that the environment has close links with economic activities. To be said economically the environment has several functions, namely as a reserve of goods for consumption such as: air, water, recreation areas and as raw materials such as minerals as production inputs. On the other hand, environment also functioning as a receiver waste from the production and consumption processes, i.e. emissions and pollutants. The decrease in environmental quality will certainly have an impact on humans and their lives. Many developing countries recently facing with a scarcity of clean water, energy, fuel, air pollution and climate change problem, as impact of global warming. Demand for natural resources is not only determined by the number of households and consumption per household, but also influenced by an economic and behavioural aspects [7].

Indonesia currently faces with severe challenges in terms of maintaining environmental quality and maintaining community care for the environment. [7] calculated the climate change vulnerability index throughout Southeast Asia region. The authors found that among cities in South East Asia and Indonesia (especially Jakarta) is the area classified as the most vulnerable to climate change. Indonesia is the fourth most populous country in the world with population growth rate of 1.34 in 2017. The population of Indonesia reaches 261.9 million (2017) and it is about 25.95 million of population are categorized as poor and life with education below 9 years (BPS, 2018). Indonesia is said as country with the largest CO<sub>2</sub> emitter in Southeast Asia. The CO<sub>2</sub> is mostly produced by energy consumption in factories, transportation, and households [8]. Massive deforestation in Kalimantan and Sumatera, and excessive use of motorized vehicle for daily activities contribute to carbon dioxide [9]. It is predicted that total deforestation in Indonesia between 2014-2015 reached 1.09 million hectares [10]. Indonesia is also listed as the second largest producer of plastic waste in the world after China; with an average per capita waste of 0.52 kg [11]. The next problem facing by Indonesia is related to the availability of clean water. In terms of quantity, water is not scarce resources. However, considering water as safe drinking water, it's availability becoming scarcity one. Once the flow and source of clean water is polluted, it is not easy to purify the water into drinkable one. In 2016 BPS recorded that only 71.4 per cent of the decent households in Indonesia have access on safe drinking water sources. River as one of main source of water is no longer safe for daily consumption. However, it is the majority of rivers in Indonesia are heavily polluted [10]. Regarding energy consumption, Indonesia consume electricity energy in 2017 has reaches 267,453.99 GigaWatt-hour (GWh) or equal to 1.02 GigaWatt-hour (GWh) electricity per capita [12].

In 2014, Indonesia's total greenhouse gas (GHG) emissions reached 1,808 million tons of CO<sub>2</sub>. This figure consistently shows an increase in emissions from 2000-2013 by 3.5 per cent per year [10]. Since the late 1980s, awareness of global warming has increased [13]. Meanwhile, Indonesia targets 2030 to reduce GHG emissions by 29 per cent run by business as usual or subsequently up to 41 per cent with international assistance, this is the basis for changes in the GHG emission reduction target from 26 per cent in 2020. So that related steps are needed in realizing the target, one of which is through increasing public awareness. The importance of concerning on the environment is in line with the concept of Sustainable Development Goals (SDGs). The concept of SDGs is expected strengthening the role and treat of environmental factors as a basis for all development outcomes. Sustainable development requires systematic individual participation, for example in the form of pro-environmental behaviour including not only consumption of goods that are environmentally friendly, but also energy savings, waste management and water conservation [14]. Simple example of consuming environmentally friendly goods is habit for using public transportation. An empirical study by [9] report one potential scenario for reducing CO<sub>2</sub> by transferring 20% of private transportation to the public one has the potential to reduce CO<sub>2</sub> emissions by 1.76% and

CO<sub>2</sub> intensity by 2.1% without reducing economic growth [9]. In terms of waste management the use of the 3R method; i.e. reduce, reuse, recycle as well as the 5R method, i.e. 3R plus replace and replant is expected to minimize the amount of waste. Applying the 3R and 5R is expected that Indonesia has the potential to generate USD 0.5 - 2 billion per year from REDD schemes, i.e. reducing emissions from deforestation and degradation.

Previous research shows that several demographic social factors influence environmental caring behaviour. Women tend to care more about the environment due to their social structure, i.e. not much engage in paid working and taking care of their homes [15]; [16]. More educated individual tends to behave gentle for the environment because they are exposed by knowledge and information through schooling. In terms of relationship between age and environmental caring behaviour have different issue in each region.

Environmental issue is national problem, regional and global problem. However, the problem is an accumulation of individual action, such as illegal lodging, using too much plastic for daily activities, consuming too much electricity and producing exhausted emission from automobile. For this reason, it is interesting to investigate value and habit of individual regarding the environmental issue. This research focuses on habit and behaviour of individuals regarding value and effort for conserving the environment. As individual become aware, it is expected that behaviour of group as well as the community have direct environmental consequences and greater impact on the environment [15]. Individual action for caring to the environment might be induced by knowledge and exposure of information and this can influence individual behaviour.

## II. Data, Hypothesis, and Empirical Model

This study utilize data from BPS, *Survei Perilaku Peduli Lingkungan Hidup* (SPPLH) or Survey on Environmental Caring Behavior year 2013. There are two surveys regarding environmental awareness in Indonesia, i.e.: the SPPLH and *Survei Sosial Ekonomi Nasional* (Susenas) or Survey on Social and Economy National. The last survey for SPPLH is year 2013, and the last survey for Susenas is 2018. Both SPPLH and Susenas is conducted annually, but neither of these surveys is a longitudinal study. This study will utilize data from SPPLH 2013 as this data is the most comprehensive data among all the available data. The SPPLH 2013 consists of information regarding: (i) individual characteristic of family or household member, (ii) characteristic of housing, (iii) energy utilization, (iv) source of water, (v) utilization of transportation, (vi) awareness of environment, and (vii) knowledge, awareness and effort for reducing pollution.

### Data

This study uses data SPPLH 2013 released by the Central Bureau of Statistics (BPS). SPPLH 2013 is a special survey of environmental awareness behaviour that covering the entire territory of Indonesia. So that data availability is considered adequate in measuring environmental caring behaviour. The data consist of information: age, gender, marital status, education, employment status, income, residential area, sources of information. The latest point of information is only available in SPPLH 2013. The number of samples in this study is 75,000 households. However, households that have been successfully enumerated 70406 households; this means response rate is 93.87 per cent. Source of information is an household's member (*anggota rumah tangga*/ART) who is taking responsible or decision maker for household expenditure, namely the head of household (*kepala rumah tangga*/KRT) or his spouse (wife/husband).

Variables in this study are specified as questions that related with environment issues. The behavioural issues regarding how individual valuing: water use, energy use and transportation use. Previous studies that discussed environmental behaviour, focus in China are conducted by: [17]; and [18]. These studies were conducted by survey, and the respondents were asked whether in the past year they had taken care of the environment. Respond to the question whether they take action

in terms of water use, information about energy use and transportation use. The respond is noted as binary number: 1 = yes; and 0 = no. This study follows these two studies, i.e. considering individual characteristics as determinant of behavioural awareness on environmental issues.

The independent variables are determined by: (i) age (in years), (ii) sex (1=male; 0=female), (iii) marital status (1=unmarried; 0 =married), (iv) education (1=not having an elementary diploma; 2=elementary school; 3=junior high school/equivalent; 4=Senior High School/equivalent; 5=D1/D2/D3; 6=D4/S1; 7=S2/ S3), (v) income level (1 ≤500 thousand rupiahs; 2 = 500 thousand - 1 million rupiah; 3 = 1.1 -2.5 million rupiahs; 4 = 2.6 - 5 million rupiahs; 5 = 5.1 - 10 million rupiahs; 6 ≥10 million rupiahs); (vi) employment status (1 = work; 0 = not working), (vii) information received directly (1 = yes; 0 = no); (viii) information received through the media (1 = yes; 0 = no), and (ix) area of residence (1 = city; 0 = village).

Point regarding environmental knowledge, this study follows [18]. There are 11 statements about action on environment. For every “normative statement” such as “consuming efficient electric power means saving energy” should be answered as “a true/correct statement”. On the other hand, or every negative statement, such as “Plastics, paper and leftovers is not necessarily to be sorting before thrown away as garbage” should be answer as “false statement”. If respondent answer all as expected to be aware on environment, the total value will be 11; and the opposite if all answer indicate not awareness, the total value will be zero.

### *Hypotheses*

There were three previous studies that all focus in China, i.e.: [18] and [17]. These studies found that awareness on environmental issue arises in line with: educational level, income level and maturity. As all these studies are conducted in China, which also Asia region, this study will state hypothesis follows the results from these three studies. The hypotheses of this study are defined as follows.

#### *Hypothesis 1*

Individual characteristics (educational level, income level and age) are positively associated with awareness on environmental issues

#### *Hypothesis 2*

Individual awareness and action to reduce and conserve the environment are differs in: waste treatment and recycling, consuming water, and electricity consumption.

### *Empirical Model*

Empirical model to be presented in this study is whether individual engage in lowering amount of consumption or saving for using clean water, electricity and classify and recycling domestic waste. Dependent variable is binary option whether individual reporting “yes” for doing lowering consumption in clean water and electricity, also treat and recycle domestic waste, or “no” otherwise. Independent variables are individual characteristics, include: age, sex, education level, marital status, income, residential dummy and employment status. Additional variable independents are: source of information about environmental awareness; either media or person to person exchange information.

Empirical model is presented as the standard logistic model for qualitative response regression model (Gujarati and Forter, 2009:561) as follows:

$$L_i = \ln\left(\frac{P_i}{1-P_i}\right) = \beta_0 + Charat\_indv_i' \beta + Source\_Info_j' \delta + \varepsilon_i \dots\dots(1)$$

Where:

**The dependent variable is**  $\ln\left(\frac{P_i}{1-P_i}\right) = 1$  for subjective report from individual respondent that claimed her/his self

engage in environmental awareness for: (i) clean water, (ii) electricity, and (iii) domestic waste management; and

$\ln\left(\frac{P_i}{1-P_i}\right) = 0$  for the opposite one.

**The independent variables**

Charact\_indv<sub>i</sub> represent set of individual caharacteristics, where i=1: age, stated in years; (ii) sex (1=male, 0=female); (iii) marital status (1=married, 0=not married and widow); (iv) educational level, classified as: 0 = never schooling or not finished an elementary school, 1 = elementary school or SD and equivalent, 2=middle school or SMP and equivalent, 3=high school or SMA and equivalent, 4=Diploma degree (D1/D2/D3), 5=Diploma 4 year and bachelor degree(D4/S1), 6=master and doctoral degree(S2/S3); (v) income level, stated in Rupiah; and it is classified as: 1=income Rp 0≤ Rp500,000; 2=income level Rp500,00≤Rp 1,000,000; 3=income level Rp1,000,000≤ Rp2,500,000; 4=income level Rp2,500,000≤Rp5,000,000; 5=income level Rp5,000,000–Rp10,000,000; and 6=income level more than Rp10,000,000. (vi) employment status (1=working and 0=not working); (vii) residential area (1=urban and 0=rural); and additional independent variables, i.e. source information regarding environmental status: (i) media and (ii) individual.

**III. Result and Discussion**

In this section, estimation result of empirical model in equation (1) will be presented and discussed. Before proceeding to the estimation result, summary statistics of the variables uses in this study will be presented in Table 1. This is followed by table 2 presenting regression estimation results and table 3 present tabulation of normative knowledge of environmental issues. All tables are located in appendixes.

Information in table 1 indicates total sample observation in this study is 70,405 individual that representing household information. There are three dependent variables of concerns, i.e. clean water, electricity and transportation. All the three variables are binary, the value of 1 indicates that individuals or represented households member reporting that they have been reducing or saving daily consumption of clean water, use of electricity and riding private automobile. These three items are essential for daily household production and consumption. Summary data indicates that the number of or percentage of representative households reporting that they have reducing daily use far below 40 per cent, especially for water and transportation consumption. The standard deviation of the three data are greater than it's mean value. This implies there is heterogeneity in effort for reduce and reuse in daily consumption of water, electricity and transportation.

In terms of independent variables, almost all the data are measured in non-ratio scale of measurement, unless the age of respondent. Educational and income level are presented in ordinal scale, and the coding is following the BPS standard. Mean of educational level is 1.734 with standard deviation of 1.398. The figure implies that on average respondent length of schooling is between 6 years (elementary school) up to 9 years (secondary school). On the other hand, mean of income level

is 2.71 with standard deviation 1.11. This figure indicates on average respondent has income below Rp 1,000,000 per month. In terms of normative knowledge for caring in environmental issue, respondent understand the issues just above the average.

Table 2 summarizes estimation result i.e. determinant of individual characteristic on subjective perception about environment awareness. The first thing to note is that individual awareness on environment is positively associated with age and educational level. As individual getting mature, and better educated, their awareness on environment getting better. In terms of coefficient of estimation, the maturity tends to increase the log of odd ratio of awareness on waste management by 0.006 point; the importance of saving clean water by 0.007 point and the electricity as scarce source of energy by 0.008 point. In similar ways, better educational attainment tends to increase the log of odd ratio being aware on saving clean water, manage domestic waste and save electric power about 0.09-0.10 point. It is interesting to find out that income level of respondent have different association in three effort for caring to environment. An improvement in income level is found negatively associated with effort for consuming electric efficiently; i.e. better income respondents are more likely saving energy of electricity. On the other hand, better income respondents less aware for saving water, i.e. as income improve it is likely consume more clean water. Why respondent more aware on saving electricity rather than clean water? We do need to care more for interpreting this result. This might relate with more information recently regarding the use of efficient and economies electric devices. Media promotions are intensive about LED lighting, AC with inverter technology and others. Housing design is also promoted to use more light translucent, so light can be swift off during the day. On the other hand, it is rarely media remind that the quantity and quality of clean water is becoming a scarce one.

In terms of gender, the estimation result indicated that male tends to careless for environment awareness compare to female respondents. Working status and residential areas have difference association among the three resources under consideration of this study. Working individuals or those who reside in the rural areas tends to better aware on domestic waste management compare to those respondents who are not working or reside in the urban areas. The opposite awareness is estimated for treating clean water and electricity. This finding is quite interesting. Both clean water and electricity generally part of regular budget for household. For those working individual seems to be less concern on electricity and clean water consumption as they might afford the bill compare to those who are currently not working. On the other hand, respondents reside in the urban areas also more aware on keeping efficient consumption for clean water and electricity. Cross tabulation of the data (table 4) implies that urban resident tend to use larger wattage of electricity compare to those reside in rural areas. The larger the wattage more expensive is the rate of electricity cost. This might induce behavioural respond for urban customer to put concerns on efficient clean water and electricity consumption. Self-awareness and any kind of source of information either peer learning or from media tend to improve individual awareness on consuming economic resources (clean water and electricity) and how to manage domestic waste.

#### **IV. Conclusion and Policy Implication**

This study investigates determinant of individual characteristics on his or her effort for consuming clean water, electricity and treating domestic waste. This study finds that individual awareness in line with his or her educational level and age. Well educated and mature individual aware more to consume economic resources (clean water, electricity) more efficiently. We find different result regarding association of income level and awareness on saving electricity and clean water. As income level of respondents increase, they are more aware on saving electricity but not for saving clear water. We would say that gentle interpretation should be done regarding this association with income level. Urban respondent also consume clean water and electricity more wisely compare to rural respondent. On daily activities, the urban respondents report that they use the water and electricity as efficient as possible.

Possible policy implications for this study finding as follows. Firstly, it is necessary spreading the knowledge and awareness of environmental issue and practicing efficient consumption and production. This study finding clearly indicates that awareness of the respondents positively associate with educational level and information received. Secondly, it seems that behavioural respond of urban consumer in respond with higher electricity wattage. In Indonesia, the higher the electricity wattage the more expensive the rates. Urban areas on average use higher electricity wattage. This implies, pricing strategy can be applied to enforce consumer consuming economic resources efficiently. Progressive pricing for electricity and clean water sales should be applied for consumer that consume the quantity above the conventional amount per capita. Consumer who consume above conventional amount per capita means enjoying premium quality. Ratio electrification and access to clean water is low in some eastern part of Indonesia [10]. The progressive pricing strategy for clean water and electricity, beside improve the efficient consumption also possible for cross subsidy.

## Appendix

Table 1. Summary statistics of pro-environmental behaviours, environmental knowledge and sociodemographic conditions of respondents.

N o	Variable Description	No of Obsv.	Mean and SD	Minimu m Value	Maximu m Value
<b>Dependent Variables</b>					
1	Clean Water. Value 1=subjective report that individual engage in reducing daily use of water; 0 otherwise	70,4 05	0.174 (0.379 )	0	1
2	Electricity. Value 1=subjective report that individual engage in reducing daily use of electricity; 0 otherwise	70,4 06	0.362 (0.480 )	0	1
3	Waste. Value 1=subjective report that individual engage in treating domestic waste; 0 otherwise	70,4 06	0.137 (0,344 )	0	1
<b>Individual Characteristics</b>					
4	Age (years)	70,4 06	43.69 3 (14.23 8)	12	98
5	Sex (1=male)	70,4 06	0.459 (0.498 )	0	1
6	Marital Status (1=married)	70,4 06	0.200 3 (0.400 2)	0	1

7	Educational Level	70,4 06	1.724 ( 1.398)	0	6
8	Income Level	70,4 06	2.714 (1.111 )	1	6
9	Employment Status	70,4 06	0.643 (0.478 )	0	1
1 0	Dummy location (urban=1)	70,4 06	0.422 1 (0.493 9)	0	1
1 1	Source of Inf. (Self-Knowledge)	70,4 06	0.698 8 (0.458 7)	0	1
1 2	Source of Inf. (Media)	70,4 06	0.717 5 (0.450 2)	0	1
1 3	Normative Knowledge about Environmental Issues	70,4 06	6.774 (2.444 )	0	11

Table 2. Estimation Model Subjective Report that Individual Engage in Environmental Conservation

Independent Variabels	Depd. Varb. is: Individual engage in Conservation for [...] Consumption; Yes=1		
	electricity	waste	clean water
Constant	-1.917*** (0.0457)	-3.129*** (0.0547)	-3.711*** (0.0604)
<b>Individual Characteristics</b>			
Age (year)	0.00816*** (0.000598)	0.00683*** (0.000695)	0.00784*** (0.000773)
Sex (male=1)	-0.165*** (0.0185)	-0.246*** (0.0212)	-0.151*** (0.0238)
Educ. Level	0.0913*** (0.00720)	0.0960*** (0.00802)	0.133*** (0.00890)
Marital Stat	-0.0512**	-0.185***	-0.0210



(married=1)	(0.0206)	(0.0244)	(0.0265)
Work Status	-0.0942***	0.0643***	-0.125***
(work=1)	(0.0189)	(0.0218)	(0.0240)
Income Level			
(Rp)	-0.0292***	-0.00126	0.0989***
	(0.00866)	(0.00985)	(0.0109)
Dummy Region	0.154***	-0.109***	0.597***
(urban=1)	(0.0177)	(0.0204)	(0.0225)
<b>Information regarding environmental awareness</b>			
Self-Knowledge	0.0759***	0.177***	0.0933***
	(0.00381)	(0.00471)	(0.00524)
Media	0.456***	0.174***	0.437***
	(0.0217)	(0.0245)	(0.0299)
Normative	0.191***	0.316***	0.184***
Knld. Evt			
Issues	(0.0189)	(0.0218)	(0.0236)
<b>Goodness of Fit Model</b>			
Observations	70,406	70,406	70,406
Wald Chi			
Sq(10)	2,446.30	2,773.50	4,134.72
Prob> Chi Sq	0.0000	0.0000	0.0000
Pseudo R <sup>2</sup>	0.0262	0.0398	0.0643
Robust standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Table 3. Normative Knowledge of Respondent Regarding Environmental Issues

No	Statement	Normative/Expected Answer	Percentage of Respondent's Answer		
			True	False	Do not Know
1	Burning garbage pollutes the air	True	78,86	10,3	10,84
2	Plastic waste, food waste, paper waste and other garbage do not need to be sorted before dispose	False	37,25	41,79	20,96
3	Waste containing chemicals (such as used mosquito repellent cans, battery light bulbs, insecticide bottles, etc.) should be buried	False	72,25	9,77	17,98

4	Vehicle exhausted causes warmer the earth's temperature	True	65,22	6,2 9	28,49
5	Water flows without utilization is wasting resources	True	89,23	4,2 6	6,51
6	Households need to provide a water catchment area	True	59,93	7,2 8	32,79
7	Save electricity means saving energy	True	81,01	5,4 1	13,58
8	Riding with public transport when traveling means saving fuel	True	66,31	14, 36	19,33
9	Perform maintenance on motor vehicles has nothing to do with conserving the environment	False	34,95	32, 3	32,75
10	Sunlight can be used as an alternative energy for electric	True	77,1	3,1 2	19,78
11	Covering the pan properly when cooking can save fuel	True	75,9	6,0 7	18,03

Table 4. Cross Tabulation of Electricity Usage and Region

Region	Electricity usage (watt)							Total
	No Electricity	450	900	1300	2200	>2200	without watt control	
Rural	8,697	15,444	9,312	1,491	157	57	5,529	40,687
Urban	342	10,674	10,904	4,074	861	403	2,461	29,719
Total	9,039	26,118	20,216	5,565	1,018	460	7,990	70,406

## References

- [1] Kaynak E, Kucukemiroglu O, Aksoy S (1996) Consumer Preferences for Fast Food Outlets in a Developing Country *Journal of Euro-Marketing* **5** 99-115
- [2] Buttel, FH (2002) Environmental sociology and the sociology of natural resources: institutional histories and intellectual legacies *Society and Natural Resources* **15(3)** 05–11
- [3] Maloney M P and M P Ward (1973) Ecology: Let's hear it from the people *American Psychologist* **28** 83-86
- [4] Cropper, M, & Griffiths, C (1994) The interaction of population growth and environmental quality *The American Economic Review* **84** 2 50-54
- [5] Siebert H (2004) *Economics of the Environment* 16-17 Lexington, Berlin: Springer
- [6] Stroup, R L (2016) *Eco-nomics: What Everyone Should Know About Economics and the Environment* Cato

*Institute*

- [7] Biesiot, W, & Noonman, K J (1999) Energy requirements of household consumption: A case study of the *Netherlands Ecological Economics* **28** 67–83
- [8] Farabi, Ahmad & Abdullah, Azrai & Heru Setianto, Rahmat (2019) Energy consumption, carbon emissions and economic growth in Indonesia and Malaysia *International Journal of Energy Economics and Policy* **9** 38-45 1032479/ijeeep6573
- [9] Yusuf, Arief Anshory & Herminia Francisco, Hotspots! Mapping Climate Change Vulnerability in Southeast Asia, 2010, *Economy and Environment Program for Southeast Asia*, Singapore ISBN 978-981-08-6293-0
- [10] BPS (2018) Statistik Indonesia 2018 *Jakarta Badan Pusat Statistik*
- [11] Jambeck, JR, Andrady, A, Geyer, R, Narayan, R, Perryman, M, Siegler, T, Wilcox, C, Lavender Law, K , (2015) Plastic waste inputs from land into the ocean, *Science*, **347** 68-71
- [12] ESDM (2018) *Statistik Ketenagalistrikan Indonesia 2017* Jakarta Direktorat Jendral Ketenagalistrikan
- [13] Sukoco, Badri & Suprayogi, Noven & Aini Hidayati, Nur (2018) The Effects of Market Orientation on Environmental Social Responsibility Programs: The Moderating Effects of Institutional Pressures *Pertanika Journal of Social Science and Humanities* **26**
- [14] Binder, M, & Blankenberg, A K (2017) Green lifestyles and subjective well-being: More about self-image than actual behavior? *Journal of Economic Behavior & Organization* **137** 04-23
- [15] Stern, PC, Dietz, T & Kalof, L (1993) Value Orientations, Gender, and Environmental Concern *Environment and Behavior* **25(5)** 22–48
- [16] Hunter, LM, Hatch, A & Johnson, A (2004) Cross-National Gender Variation in Environmental Behavior *Social Science Quarterly* **85 (3)** 77-94
- [17] Chen, X, Peterson, MN, & Hull, Vanessa (2010) *Effects of Attitudinal and Sociodemographic Factors on Pro-environmental Behaviour in Urban China* Environmental Conservation 1 of 8 C Foundation for Environmental Conservation 2011
- [18] Xiao, C & Hong, D (2010) Gender Differences in Environmental Behaviors in China *Population and Environment*, **32(1)** 88-104