# Motivation Of Household Electricity Customers To Generate Electricity In Indonesia

**David Eko Prasetyo, Zaky Adikta, Anita Maharani**

**Abstract :** Technological developments in the world of electricity enable household electricity customers to generate independent electricity. It is reflected from the matter of concern for the environment, electricity tariff, attraction toward technology, attraction toward electricity, reputation of electricity companies, and power outage. The test was carried out empirically to reveal the motives and characteristics that significantly influence the intention to generate electricity at the household scale by using, for instance, electricity from renewable energy. The results of research in Indonesia show that the motivation of household electricity customers is influenced by financial factors related to the price of electricity tariff and supporting factors such as government subsidies, regulations on power generation equipment and the selling price of electricity. Meanwhile, concern for the environment, attraction toward technology, attraction toward electricity, the reputation of the electricity company, and power outages do not significantly influence the motivation of household electricity customers.

**Index Terms**: Household Electricity Customer, Independent Electricity, Motivation, Behavior

## 1. INTRODUCTION

The current electricity condition in Indonesia still utilizes a transmission network interconnection system from each of the large power plants which is then distributed to customers. In its development, renewable energy technology with small capacity has begun to penetrate into household customers. Micro-generation is one of the technological choices of the future [1] and it has implications for future generations [2]. Small capacity generation is actually less efficient than large scale power generation in terms of investment costs and operational costs and the price is 20% higher than regular electricity costs [3]. However, in its development, the high investment costs of micro-generator can influence and discourage household customers from buying and implementing micro-generator for their household electricity needs [4], [5], [3]. Motivation of the use of micro power plants by household customers is triggered more by the aspects of the use of renewable energy or environmentally friendly energy. Sauter and Watson [6] argued that attitude towards domestic investment differ substantially from centralized energy technologies such as nuclear power, wind turbines and environmentally friendly energy since it is not social acceptance but a relevant concept of individual acceptance. Domestic micro power investment requires a more active role from customers and investment at a higher level as seen from for example the use of environmentally friendly energy from energy suppliers [7].


- *David Eko Prasetyo is currently pursuing master degree program in Graduate Program in Management, Bina Nusantara University Indonesia, E-mail: d4vid.eko@gmail.com*
- *Zaky Adikta2 is currently pursuing master degree program in Graduate Program in Management, Bina Nusantara University Indonesia, E-mail: zaky98tl@yahoo.com*
- *Anita Maharani is full time lecturer from Business Management Program, Management Department, BINUS Business School Master Program, Bina Nusantara University, Jakarta, Indonesia 11480, E-mail: anita.maharani@binus.edu*


The use of micro power plants will grow faster with the support of the government related to financial and technical aspects. The current economic situation, government regulations and policy policies do not fully support the use of mini generating technology [1] and one of the government's support for regulations is related to incentives [2]. The possibility of future changes, related to factors from the equipment provider side (for instance, government support in various matters including funding), can quickly change the market situation for micro-power plants [8]. Based on Leenheer's research [9] on household customers in the Netherlands, environmental care, customer knowledge about technology and energy, as well as bad reputation of the electricity company have a positive influence on the intention of household customers to generate electricity independently. Meanwhile, financial motives are not the main motive that influences the intention of household customers to generate electricity independently. Power outages are also not a significant motive for generating electricity independently. The environmental awareness motive has the strongest influence on the intention to generate electricity independently, which is then supported by the factor of attraction towards energy. Planned Behavior Theory is a person's intention to make an individual response or reaction to the environment influenced by three main predictors which include: attitude toward the behavior, subjective standard of behavior about an action (subjective norm), response to a control actions (perceived behavior control) [10]. In Indonesia, research on motivation that influences the intention of household customers to generate electricity independently has not been carried out at this time. This is the basis for us to conduct similar research on household electricity customers in Indonesia. This study aims to determine the motivation that influence the intention of household customers to generate electricity independently in Indonesia. This study discusses whether household customers have the intention to generate electricity as reflected from the motive for caring for the environment, the price of electricity tariffs, attraction toward technology, attraction toward electricity, the reputation of the electricity company, and power outage. This research empirically tests to reveal which motives and characteristics have a significant influence on the intention to generate electricity at the household level. This research studies how

the relationship between the use of independent power plants and energy savings. There is some empirical evidence that installing a micro generator reduces overall household electricity consumption [11], [6]. The composition of this paper consists of literature studies related to motivation that influence purchasing decisions and planned behavior theory. The research methodology describes the methods and steps of data collection and the same research model employed in Leenheer's research [9]. It also tests hypothesis on the relationship between motives and personal characteristics and the intention to generate independent electricity.

## 2 RESEARCH METHODOLOGY

The study applied quantitative method used to obtain data in the form of numbers. Then, the results or information from the data were analyzed [12]. In fact, research objectives can be fragmental, fixed and single dimensioned so that they can be identified, measured and predicted using standard and objective tools [13]. Correlational descriptive research method aimed to find correlations and test between variables. The method explained a correlation and tests with the appropriate theory. According to Sugiyono [14], conducting research aimed at analyzing the independent variables of the causal relations between variables is one of the associative research methods. The sampling technique in this study was carried out using a purposive sampling method or non-random sampling in which the sample selection chose household criteria as electricity customers for household classes with background sex, age, educational background, residence, occupation, marital status and income which they have a major influence on environmental attitudes [15].

### 2.1 The Objective of Research Methodology

This study will test the researchers' hypotheses of previous studies which state that environmental care, customer knowledge about technology and energy, and the bad reputation of the electricity company have a positive influence on the intention of household customers to generate electricity independently. Meanwhile, financial motives are not the main motive that influences the intention of household customers to generate electricity independently. Power outages are also not a significant motive for generating electricity independently. This study will analyze data from household electricity customer surveys on each object of research compared with the intention of household customers to generate electricity independently.

### 2.2 Research Strategy

The sampling strategy in this study is to conduct a survey of household electricity customers as customers of electricity companies in Indonesia of the factors that influence affect the intention of household customers to produce electricity independently. Stages that will be carried out include: 1) collecting primary data obtained from sampling using a questionnaire whose results cannot be seen or analyzed directly as the conditions of the questionnaire; 2) presenting research data; and 3) analyzing the results of data analysis which aims to determine the correlation between the independent variable and the dependent variable associated with the moderating variable.

### 2.3 Research Time

Saunders [16] articulated that the time to examine a phenomenon does not depend on the research methodology chosen or the research method/ technique. There are 2 (two) choices. The first is a cross sectional study that aims to find out the factors that measure the number of different variables by observing together and at the same time from a population in a certain period. The second is a longitudinal study which is one of the studies on social life that compares changes in research subjects after a certain period of time and is used for long-term research so that it takes a very long time [17], [18]. This study applies a cross sectional study of household electricity customers in Indonesia in 2019.

### 2.4 Model

According to Leenheer [9], to make this model useful for public policy, it does not measure attitudes, subjective norms, and control, but looks for relevant factors in the energy context that can be considered as one of the factors of attitude, norm or control. Leenheer [9] uses literature on environmental care behavior and energy-related decision making, experts with eight professionals active in the energy industry (in distribution, operators and suppliers of energy) to identify relevant factors and to conceptualize their influences on household decisions in providing independent electricity. In this study, there are six relevant factors, which might have an impact on the intention of households to generate their independent electricity and derive specific hypotheses about this according to references from Leenheer's research [9].

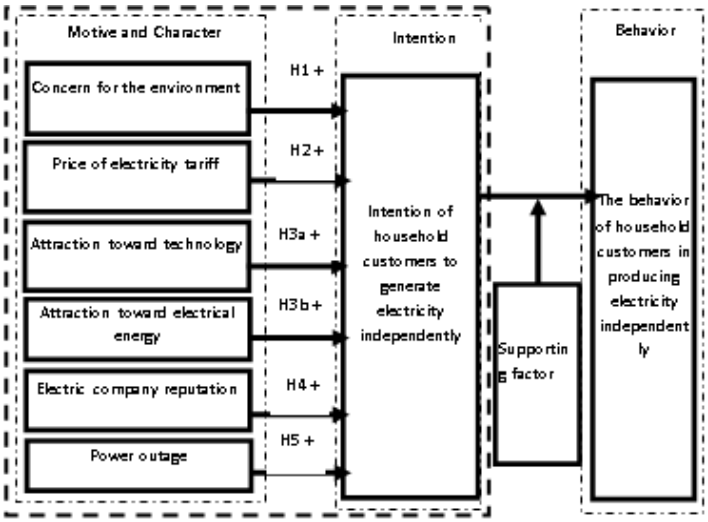


***Fig. 1**. Research Framework*

### 2.5 Hypotheses Development

#### 2.5.1 Concern for the Environment

The influence of knowledge on the environment is very influential on customer behavior [19]. The higher the knowledge and level of attention to the environment that customers have, ecological behavior or attitudes will be higher compared to customers who do not have knowledge and attention to the environment. Kusumo assumed that customers who have a higher level of knowledge of the environment will have higher motivation to buy

environmentally friendly products [20]. Concern for the environment is a parameter that can predict customer behavior. It can be a major factor in the decision to purchase environmentally friendly products [21]. The level of commitment and level of customer emotion is also one of the issues towards environmental care [22]. Attention and care for the environment can be considered as attention to customer behavior as an adjustment to the environment [23]. Concern or attention related to environmental issues can influence customer attitudes and behavior [19]. Attitudes and behavior towards the environment and nature play an important role in making decisions to save energy and use alternative forms of energy [24], [25]. Thus, those who consider the environment vulnerable to human inference will have the most positive attitude towards environmentally friendly behavior [24]. Customers who have a strong environmental concern tend to have an interest in generating electricity independently. Therefore, it is hypothesized that: Hypothesis 1. Concern for the environment positively influences the intention of household customers to generate electricity independently.

**2.5.2 Price of Electricity Tariff**

Price is a nominal or the amount of money or value the seller applies to the buyer or customer of an item or service [26]. Alma [27] explained that the price of goods and services must include or cover production costs plus profits from goods or services that are reasonably sold. Price is also the value of money from goods or services available and can be bought by buyers with various choices of products available and prepared by the seller [28]. Financial factors can also motivate customers to look for alternative power plants. When the electricity market price or electricity tariff is considered high or customers do not expect price increases, customers will look for cheaper alternatives. Customers sometimes misjudge prices and perceive price perceptions as subjective norms of perceptions of electricity prices that are more relevant [29], [6]. Hypothesis 2. The price of more expensive electricity tariffs positively influences the intention of household customers to generate electricity independently.

**2.5.3 Attraction toward Technology and Energy**

Leenheer [9] argued that the more technological knowledge and influence technology has on customers related to energy issues, customers will consider more and more in choosing power plants to meet their own electricity needs. Azjen and Madden [30] mentioned that technology has a positive influence on the current generation. The results of household research in the Netherlands found that knowledge about technology and energy possessed by household customers has a positive influence on the intention of household customers in the Netherlands to generate electricity independently [9]. We derive the following two hypotheses: Hypothesis 3A. The attraction toward technology positively influences the intention of household customers to generate electricity independently. Hypothesis 3B. The attraction toward energy positively influences the intention of household customers to generate electricity independently.

**2.5.4 Reputation of Electricity Company**

In the business world, it is mentioned that the company's reputation is a consumptive perception of the company's ability to provide the best quality of service or the company's assessment of past performance and future potential for the quality of the products and services they provide Rosidah [31]. Walsh [32] stated that company's reputation is an evaluation of all activities carried out by stakeholders on the company's performance at any time. Another opinion related to the company's reputation is the assumption of a group of people who give a mental assessment of the company from people outside an organization [33]. In this regard, reputation refers to what stakeholders think or value about the organization or company. Walsh [32] explained that customers give an assessment of a company's reputation based on five factors which include: (1) customer orientation, (2) good employers, (3) strong company finances so that profits or benefits can be obtained, (4) quality products and services, (5) environmental and social responsibility, [34]. The company's reputation has a direct impact on influencing customers in determining their choices. Reputation is a form of customer perception of the products and services they obtain. In fact, reputation can be considered to be a guarantee that customers will get results based on the expectations they have [35]. Currently, there is increasing evidence that companies benefit from acting in a socially responsible manner [36], [37], [38]. According to, Maignan [39] when customer's attitudes towards electricity companies are such that they assume that they are not socially responsible, this will damage the reputation of the company and customers will start looking for alternatives to meet their own energy needs. In the behavior literature, this is called conflict-avoidance approach [40]. Thus: Hypothesis 4. The low reputation of the electricity company has a positive influence on the intention of household customers to generate electricity independently.

**2.5.5 Power Outage**

According to Kotler and Armstrong [41], product quality is the ability of a product to carry out its functions which include durability, accuracy and reliability of the product. Another opinion states that product quality is a dynamic condition related to humans, products, the environment, goods and services that can provide more hope [42]. Generating independent electrical power can avoid power outage and some non-financial impacts on power outage. So that: Hypothesis 5. Power outages positively influence the intention of households to generate electricity independently.

## 3. DATA

**3.1 Household Survey**

To test hypotheses and models, we conducted a survey by distributing questionnaires online. The survey was carried out through the google form application. The questionnaire will contain a statement based on indicators of the research variables on 180 household electricity customers in Indonesia. According to multiple regression analysis, the number of samples is 10 times the number of research variables [43]. The hypothesis was empirically tested using a survey among a representative sample of 30 measurement variables so that it obtained a minimum of 110 household electricity customers in Indonesia. This is in line with Fraenkel and Wallen [44] in Wiyadi [45], [46] who provide guidance in taking the number of samples which states that the number of samples is in the range of 30 to 500 subjects in each study and the sample size is at least 30 subjects for each section. This questionnaire was

tested before among 30 household customers to test the clarity of the questions and observe the possible lack of variation in understanding the questions and providing answers. Only household electricity customers who have an income above 5 million per month are included as research respondents. Household customers who rent a house where electricity costs are included in the cost of renting a house are not included as respondents because of the possibility that households have economic limitations to generate electricity independently. Household customers who get accommodations together like boarding houses are excluded from this study. Research that uses qualitative data uses a purposive sampling method in determining the criteria or characteristics needed in sampling so that it matches the research objectives; in this case, to household electricity customers in Indonesia.

### 3.2 Measurement

Respondents gave responses related to their intention to generate electricity independently, motives and relevant characteristics to run it as illustrated in the model and hypothesis. In addition, we give questions to respondents regarding their intention to buy certain products related to the intention to generate electricity independently, and their intention to save electricity. So, it will produce information about the characteristics of households and respondents. A multi-item scale is used for concepts that contain several aspects. If the question directly leads to the subject matter, it will cause a considerable measurement error; for instance, for sensitive concepts such as intentions and attitudes. Multi-item scales can be relied on more than one item scale [47]. All items in the presented scale are taken using a random order to avoid bias. Some items are formulated as a list of questions that must be filled and answered by respondents to find out and measure the extent to which respondents gave agreed responses. We use a Likert scale with a value of 5 points so that respondents can provide responses or wide answers. For Likert scale assessment, point or number 1 reflects strongly disagree and point or number 5 reflect strongly agree.

### 3.3 Research Variables

The research variables consist of eight independent variables consisting of concern for the environment, the price of electricity tariff, attraction toward technology, attraction toward electricity, the reputation of the electricity company, power outage, the desire to save electricity and the desire to use the product. Two dependent variables are the desire to produce independent electrical energy and independent behavior in producing independent electricity. Then there is a moderation variable that is a supporting factor for generating electricity independently. The following table 1 is the description of research variables.

***TABLE 1***
***RESEARCH VARIABLES***

| Variables | Symbols - Indicators |
|---|---|
| Concern for the environment<br><br>Independent variable | EC 1 – I am worried about reducing natural areas in Indonesia |
| | EC 2 – I am worried about global warming |
| | EC 3 - I am worried about the environment |
| | EC 4 - Homeostasis (Homeostasis is a system that regulates the balance conditions in the body of living things) in an easily disturbed environment |
| | EC 5 - Interaction between humans and nature has the potential to cause natural disasters |
| Price of electricity tariff<br><br>Independent variable | PP1 - Electricity tariff has risen dramatically |
| | PP2 - I consider that the electricity tariff is too expensive |
| | PP3 - I consider that paying my electricity bill too expensive |
| | PP4 - I predict that the future price of electricity will be more expensive |
| Attraction toward technology<br><br>Independent variable | AWT1 - I find out information about current electricity technology |
| | AWT2 - I often do electrical repairs at home independently |
| | AWT3 - Technically, I can repair and add electrical installations at home |
| | AWT4 - I am interested in information about electricity technology |
| Attraction toward electrical energy<br><br>Independent variable | AWE1 - I know which household electrical appliances use a lot of electricity and use a little electricity. |
| | AWE2 - I always control the use of electric power in my house |
| | AWE3 - I like trying to save electricity usage |
| Reputation of electricity energy company<br><br>Independent variable | REC 1 - Does PLN provide good services? |
| | REC 2 - Is PLN managed very well? |
| | REC 3 - Does PLN only want to get profit? |
| | REC 4 - Does PLN play an active role for the community |
| | REC 5 - Is PLN socially responsible for its operations (CSR) |
| Power outage<br><br>Independent variable | PO 1 - Do power outages often occur in the last 12 months? |
| | PO 2 - Does the power outage last long? |
| Desire to produce independent electricity<br><br>Dependent variable | IGOP1 - I like to meet my own electricity needs rather than buying from PLN |
| | IGOP2 - I want to influence people to use alternative electricity (such as solar panels, wind power, hydropower, UPS or small generators) |
| | IGOP3 - I intend to use alternative electrical energy |
| Desire to save electricity<br><br>Independent variable | ISE1 - I intend to better control the use of electricity that I use |
| | ISE2 - I intend to save household electricity better |
| Desire to use the product<br><br>Independent variable | PA1 - I intend to use a UPS or generator as a backup for power outage |
| | PA2 - I intend to buy small-scale power generation equipment such as solar panels, wind power and water as an alternative to electrical energy |
| Supporting factors to generate electrical energy independently<br><br>Moderating variable | SSF 1 - I want to build a small-scale power plant independently if there is a subsidy from the government |
| | SSF 2 - I want to build my own small-scale power plant if there are regulations about the price of generating equipment that is affordable and the selling price of electricity to PLN that is good |
| | SSF 3 - I want to use my own small-scale power plant as the excess electricity generated can be sold to PLN at an attractive tariff |
| Independent behavior in producing independent electricity<br><br>Dependent variable | BH1 - I am able to finance the operating costs of a UPS or generator as a backup power that I buy and use during a power outage |
| | BH2 - I am able to pay for the operation and maintenance costs for small-scale household power plants such as solar panels, wind power and hydropower that I generate |

### 3.4 Analysis

Measurement was carried out using the method of partial least squares analysis through structural equation modeling (SEM). SEM is a statistical analysis method that is used to simultaneously test and estimate the causal correlation between the independent construct and the dependent construct [48]. In SEM analysis through Partial Least Square, there are 3 stages consisting of: 1) specification of the model, 2) evaluation of the outer model, and 3) evaluation of the inner model [49].

#### 3.4.1 Model Specification Analysis

Hair [49] argued that the stages of determining model specifications are closely related to building inner and outer models. To reveal the correlation between constructs that are being studied use the inner model or structural model. Meanwhile, evaluating the relationship between indicator variables and related constructs using the outer model or called the measurement model. The first step is to create a path model that connects variables and constructs based on theory and logic.

#### 3.4.2 Outer Model Evaluation

The second stage is to assess the reflective outer model where reliability and validity must be ensured. Outer model evaluation is a measurement of internal consistency reliability of a construct [50]. According to Hair [51], an assessment of reliability of internal consistency is carried out using Cronbach's alpha and composite reliability. Measurement using Cronbach's alpha assumes that all indicators are reliable where the use of PLS-SEM is about priorities that correspond to the reliability of each indicator. Measurement using Cronbach's alpha related to the number of measurements is so sensitive that it tends to underestimate internal consistency reliability [51]. Thus, the use of the Composite Reliability measurement enables more precise measurements for internal consistency reliability where Composite reliability does not assume that all loadings indicators are the same in the population [49], [51]. The results of measuring the value of internal consistency reliability are expected above 0.7 which are considered good. The higher the score, the better the construct reliability. However, values of 0.6 to 0.7 are acceptable and have good reliability [52], [51], [53]. Validity assessment aims to obtain convergent validity and discriminant validity. Convergent validity checks the value (AVE) Average Variance Extracted [54]. The acceptable AVE number is 0.5 or >00.5 and the value of outer loadings for each item must be above >0.70 [51]. Whereas, discriminant validity is a different level of construct size [55]. Measuring discriminant validity was carried out by looking at the cross-loading indicator. If the indicator of each construct is higher or greater than the cross loadings of other constructs with block values or indicator points then it has a higher loading value for each latent variable tested and compared to other latent variable indicators [49]. Hair [51] states that the evaluation of discriminant validity is recommended to see the results of heterotrait-monotrait ratio (HTMT) that previously used cross loading or Fornell-Larcker criterion, which substantially often exaggerates the existence of discriminant validity. HTMT is an average of heterotrait-heteromethod correlations, which is an indicator correlation to a construct that measures different phenomena to the average monotrait-heteromethod correlation in the same construct. In addition, HTMT values must be less than 0.9 to ensure discriminant validity between the two reflective constructs. However, if one of the criteria signifies a lack of discriminant validity, the first approach is to maintain a construct that causes discriminant validity problems in the model and aims to increase the average monotrait-heteromethod correlation [51].

#### 3.4.3 Inner Model Evaluation

Criteria for measuring inner models or structural model evaluations include: Collinearity, ($R^2$) and regression coefficient (path coefficient). Collinearity was carried out to check that there is a strong correlation between independent variables. Collinearity evaluation was performed by checking the value (VIF) of the Variance Inflation Factor of all predictor constructs in the structural model. If the value is above 5, it indicates collinearity between the construct predictors [51]. Coefficient of Determination ($R^2$) is used to measure the accuracy of the predictive ability of a model [51]. $R^2$ is the number of variants of endogenous latent variables that can be explained by exogenous latent variables [48]. The value of $R^2$ is in the numbers from 0 to 1. The value of $R^2$ is considered to be good if it reaches 0.67, moderate if it reaches 0.33, and weak at 0.19 (Chin, 1998). The value of $R^2$ is an adjusted value so that it will be smaller than $R^2$ and can be negative. $R^2$ adjusted is the coefficient of determination in measuring regression with two or more independent variables. Effect Size $f^2$ serves to assess a significant relationship between variables so that the existence of the relationship between variables can be known. Research must assess the magnitude of influence between variables with Effect Size or $f^2$ [67]. A value of $f^2$ equal to 0.02 has a small significant value, 0.15 has a moderate significant value, and a value of 0.35 has a large significant value. Values less than 0.02 can be ignored or considered to have no influence [51]. Path Coefficient aims to assess the strength and significance of the path coefficient regarding the relationships between constructs. The value of the path coefficient (β) has a value between -1 and +1 [51]. If the beta value approaches +1, it has a strong positive relationship. When approaching -1 it indicates a negatively strong relationship [51]. The path coefficient is said to be significant at the 5% level [55]. The significance of the path coefficient is obtained using standard bootstrapping errors as the basis for calculating the p-value and t-value of the path coefficient [51]. Boot strapping is a sampling technique or resampling that describes how much the number of sub-samples from the initial data or original data that has met the reliability and validity and estimates the model for each sub-sample [51]. The number of bootstrap samples must be high or at least equal to the number of valid observations in the data set. The recommended number of samples is 5,000 bootstrap samples [49]. According to Hair [30], to show that the results of the study are statistically significant, the critical value of the t-value for two-tailed testing must be 1.96 or greater (with a significant level = 5%), or with a p-value ≤ alpha value α = 0.05.

***TABLE 2***
***DESCRIPTIVE STATISTICS BASED ON SMART PLS***

| No. | Items | Missing | Mean | Median | Min | Max | Standard Deviation |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | Age | 0 | 1.200 | 1 | 1 | 3 | 0.427 |
| 2 | Sex | 0 | 1.217 | 1 | 1 | 2 | 0.412 |
| 3 | Educational Background | 0 | 2.817 | 3 | 1 | 4 | 0.778 |
| 4 | Major | 0 | 1.278 | 1 | 1 | 2 | 0.448 |
| 5 | Marital Status | 0 | 2.522 | 3 | 1 | 3 | 0.785 |
| 6 | Residence Type | 0 | 1.183 | 1 | 1 | 2 | 0.387 |
| 7 | Residence Location | 0 | 1.167 | 1 | 1 | 2 | 0.373 |
| 8 | Income | 0 | 1.489 | 1 | 1 | 4 | 0.806 |

***TABLE 3***
***DEMOGRAPHIC CHARACTERISTICS BASED ON SMART PLS***

| Category | | Total | Percentage (%) |
|---|---|---|---|
| Sample | Household electricity customer | 180 | 100 |
| Age | < 40 years<br>40 – 60 years<br>> 60 years | 146<br>32<br>- | 81.1<br>17.8<br>- |
| Sex | Male<br>Female | 141<br>39 | 78.3<br>21.7 |
| Educational Background | Senior High School<br>Associate's Degree<br>Bachelor's Degree<br>Master's Degree<br>Doctoral Degree | 16<br>26<br>113<br>25<br>- | 8.9<br>14.4<br>62.8<br>13.9<br>- |
| Major | Engineering<br>Non-Engineering | 130<br>50 | 72.2<br>27.8 |
| Marital Status | Single<br>Married and having no children<br>Married and having children | 33<br>20<br>127 | 18.3<br>11.1<br>70.6 |
| Residence Type | Own house<br>Rent house | 147<br>33 | 81.7<br>18.3 |
| Residence Location | Town<br>Village | 150<br>30 | 83.3<br>16.7 |
| Income | 5 – 15 million<br>15 – 25 million<br>25 – 35 million<br>> 35 million | 121<br>37<br>15<br>- | 67.2<br>20.6<br>8.3<br>- |

## 4. RESULT

### 4.1 Model Specification

The path model connects variables and constructs based on theory and research framework using the smartPLS application (v.3.2.8). It obtains a measurement model for the independent variables, moderation variables, and the dependent variable as follows:

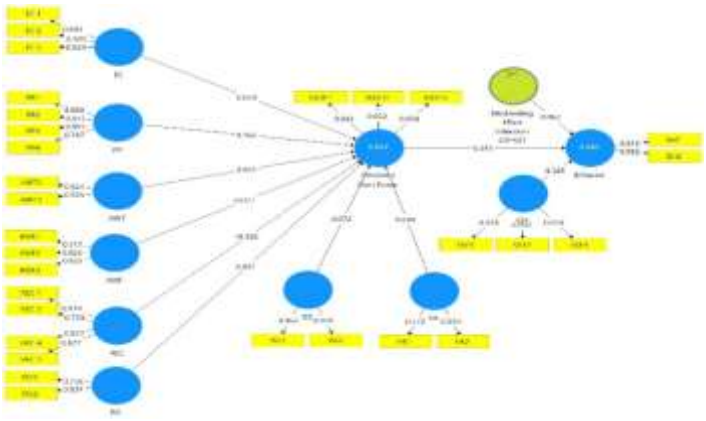

***Fig. 2****. Outer loading value of path model after several indicators are eliminated based on Smart PLS.*

Based on the analysis results in Figure 2, more than 70% of each of the three indicators including AWE 1, AWE 2, and AWE 3, can be explained by the latent variable of attraction toward electrical energy. The latent variable of attraction toward technology can explain the variants of the AWT2 indicator, and the AWT2 is each greater than 90%. Variants for EC 1, EC2 and EC3 indicators can be explained by latent variable of concern for the environment above 80%. The latent variable of the electricity tariff is considered capable of explaining variants of indicators PP 1, PP 2, PP 3 and PP4 more than 70%. The latent variable of the reputation of the electricity company is able to explain the variants of the indicators REC 1, REC 2, REC 4 and REC 5 each by more than 70%. Variants of the PO1 and PO 2 indicators can each be explained by latent variables of power outage above 70%. The latent variable of the desire to conserve electricity is able to explain the variants of the ISE1 and ISE2 indicators, each more than 90%. Variants of the indicators PA1 and PA2 can each be explained by latent variables PA1 and PA2 above 70%, namely the desire to use the product. Meanwhile, the desire to produce electrical energy independently is a latent dependent variable that can explain the three indicators including IGOP1, IGOP2, and IGOP4, where each indicator is above 80%. Variants of the BH1 and BH2 indicators can each be explained by the latent variable bound of independent behavior in producing electricity independently above 90%. Meanwhile, the latent variable of supporting factors for building electricity independently is a latent mediator variable that can explain the three indicators of SSF1 and SSF2 above 90%. Thus, it is concluded that the latent variable has been able to explain the variance of each indicator above 70%.

### 4.2 Outer Model Evaluation

In testing hypotheses, to predict the correlation between latent variables in the structural model, evaluation of measurements to verify indicators and latent variables can be carried out to conduct further testing. In addition, the reflective outer model aims to ensure the reliability and validity of latent variables. The results of measuring internal consistency reliability using Composite Reliability (CR) (Hair) [53], [51] are as follows:

***TABLE 4***
***COMPOSITE RELIABILITY VALUE AND AVE MEASUREMENT MODEL BASED ON SMART PLS***

| Item | Composite Reliability | Average Variance Extracted (AVE) |
|---|---|---|
| AWE | 0,832 | 0,624 |
| AWT | 0,922 | 0,856 |
| BH | 0,933 | 0,875 |
| EC | 0,932 | 0,820 |

The composite reliability values in Table 4 show that the latent variable shows the composite reliability value above 0.7. It shows that the specified indicator is able to measure each latent variable properly or all measurements are considered reliable. The higher correlation between indicators in constructing a construct shows that the convergent validity value is better. AVE in Table 3 shows that all latent variables have AVE values above 0.6 or above the minimum value so that they are categorized as meeting the convergent validity criteria [51]. The following table shows the value of discriminant validity using the heterotrait-monotrait ratio method:

***TABLE 5***
***HETEROTRAIT-MONOTRAIT RATIO (HTMT) BASED ON SMART PLS***

| | AWE | AWT | BH | EC | IGOP | ISE | Moderating IGOF*SSF | PA | PO | PP | REC | SSF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AWE | | | | | | | | | | | | |
| AWT | 0,350 | | | | | | | | | | | |
| BH | 0,240 | 0,266 | | | | | | | | | | |
| EC | 0,403 | 0,044 | 0,056 | | | | | | | | | |
| IGOP | 0,407 | 0,256 | 0,672 | 0,150 | | | | | | | | |
| ISE | 0,700 | 0,106 | 0,185 | 0,463 | 0,448 | | | | | | | |
| Moderating IGOF*SSF | 0,152 | 0,087 | 0,340 | 0,210 | 0,252 | 0,086 | | | | | | |
| PA | 0,374 | 0,293 | 0,887 | 0,084 | 0,916 | 0,453 | 0,369 | | | | | |
| PO | 0,328 | 0,131 | 0,284 | 0,195 | 0,526 | 0,323 | 0,101 | 0,493 | | | | |
| PP | 0,161 | 0,140 | 0,236 | 0,127 | 0,459 | 0,231 | 0,112 | 0,302 | 0,504 | | | |
| REC | 0,134 | 0,047 | 0,079 | 0,063 | 0,255 | 0,056 | 0,175 | 0,131 | 0,471 | 0,420 | | |
| SSF | 0,305 | 0,230 | 0,667 | 0,080 | 0,729 | 0,345 | 0,556 | 0,832 | 0,313 | 0,299 | 0,236 | |

Table 5 shows that the Heterotrait-Monotrait Ratio (HTMT) value is less than 0.9 except for the latent variable of the desire to use the product against the latent variable of desire to produce electrical energy independently with value above 0.9. Thus, these latent variables indicate a lack of discriminant validity. However, to increase the mean of monotrait-heteromethod correlation and/or reduce the average heteromethod-heterotrait correlation construct size, we can maintain the construct that causes discriminant validity problems that have low values [51].

**4.3 Inner Model Evaluation**

Measurement of inner model or structural model evaluation includes Collinearity ($R^2$) and regression coefficient (path coefficient). Collinearity was carried out to check the strength of correlation between independent variables and collinearity evaluation was carried out by examining the value of Variance Inflation Factor (VIF) of all predictor constructs in the structural model. Here are the results of measurements with inner VIF values.

***TABLE 6***
***INNER VIF VALUES BASED ON SMART PLS***

| | Behavior | Intension Own Power |
|---|---|---|
| AWE | | 1,636 |
| AWT | | 1,144 |
| Behavior | | |
| EC | | 1,270 |
| ISE | | 1,814 |
| Intension Own Power | 1,888 | |
| Moderating Effect Intension OP*SSF | 1,151 | |
| PA | | 1,314 |
| PO | | 1,227 |
| PP | | 1,309 |
| REC | | 1,260 |
| SSF | 2,068 | |

Table 6 shows the correlation between the independent variable, the dependent variable and the moderating variable with the inner VIF values below 5. Thus, the relationship between the independent variable, the dependent variable and the moderating variable has a strong correlation. Furthermore, the measurement of $R^2$ value was carried out to measure the accuracy of the predictive ability of a model. R-square adjusted is used as the coefficient of determination for regression which has more than two independent variables.

***TABLE 7***
***THE RESULT OF ($R^2$) BASED ON SMART PLS***

| | R Square | R Square Adjusted |
|---|---|---|
| Intension Own Power | 0,664 | 0,649 |
| Behavior | 0,440 | 0,430 |

Based on Table 7, the $R^2$ adjusted value for the dependent variable of desire to produce electrical energy independently is 0.649. Thus, the independent variable of environmental care, the price of electricity tariff, attraction toward technology, attraction toward electric energy, the reputation of the electricity company, power outage, the desire to use the product, and the desire to conserve electricity simultaneously can explain the dependent variable of the desire to produce independent electrical energy of 64.9% and the remaining 35.1% can be explained by other variables not included in this study. And the $R^2$ adjusted value for the behavior for the dependent variable of independent behavior in producing independent electricity is 0.430. Thus, it is concluded that all independent variables of desire to produce independent electrical energy and moderating variables of supporting factors for building electrical energy independently can simultaneously explain the dependent variable of independent behavior in producing independent electricity by 43% while the remaining 57% can be explained by other variables not included in this study. The results of the path coefficient and t-statistic values obtained through the bootstrapping process with a sample size for resampling of 180 and repetition of 5000 times are shown in the following Table 8:

***TABLE 8***
***PATH COEFFICIENT VALUE OF STRUCTURAL MODEL***

| | Original Sample (O) | Sample Mean (M) | Standard Deviation (STDEV) | T Statistics | P Values |
|---|---|---|---|---|---|
| AWE -> Intension Own Power | 0.077 | 0.080 | 0.064 | 1.206 | 0.228 |
| AWT -> Intension Own Power | 0.022 | 0.019 | 0.048 | 0.446 | 0.656 |
| EC -> Intension Own Power | 0.020 | 0.024 | 0.052 | 0.380 | 0.704 |
| ISE -> Intension Own Power | 0.072 | 0.068 | 0.062 | 1.170 | 0.242 |
| PA -> Intension Own Power | 0.648 | 0.649 | 0.046 | 14.144 | 0.000 |
| PO -> Intension Own Power | 0.041 | 0.040 | 0.054 | 0.757 | 0.449 |
| PP -> Intension Own Power | 0.166 | 0.166 | 0.056 | 2.968 | 0.003 |
| REC -> Intension Own Power | -0.100 | -0.106 | 0.049 | 2.051 | 0.040 |
| Intension Own Power -> Behavior | 0.341 | 0.339 | 0.087 | 3.930 | 0.000 |
| SSF -> Behavior | 0.395 | 0.398 | 0.094 | 4.223 | 0.000 |
| Moderating Effect Intension OP*SSF - | 0.062 | 0.060 | 0.059 | 1.038 | 0.299 |

The level of significance is at 0.05
Based on Table 8, the independent variables that have a significant positive influence on the desire to produce independent electricity with a p-value <0.05 and a t-statistic value >1.94 are the price of electricity tariff, the desire to use product, and the reputation of the electricity company. Meanwhile, the independent variable that significantly influences the dependent variable of independent behavior in producing independent electricity with a p-value <0.05 and a t-statistic value >1.94 is a supporting factor for building electricity independently and the desire to produce independent electricity. In addition, the moderating variable significantly does not influence the independent behavior in producing independent electricity
.

### 4.4 Univariate Analysis

Table 2 presents descriptive statistical data. Variables measured with the response scale 1-5 show a fairly large variation of responses. Scales for independent variables use values 1 and 5 but the mean values are not close together. Household customers responded that power outages had occurred in the past 12 months on a scale of 5 by 6.11%, while those who disagreed with this were 37.22. Table 3 shows the percentage of research variable indicators.

### 4.5 Multivariate Regression Analysis

Table 8 presents the results of multivariate regression analysis where the intention of household customers and the behavior of household customers to produce electricity independently as the dependent variable and the motives and characteristics hypothesized as independent variables. This study measures demographics such as gender, age, educational background, number of children, home ownership, income and residence location where they are designated as control variables. This model is significant (t = 1.96; p <0.005) with $R^2$ = 0.649. Concern for technology has no positive influence on the intention of household customers to generate electricity independently (b = 0.024; t = 0.380, p >0.05) which rejects to support H1. The price of electricity tariff has a positive influence on the intention of household customers to generate electricity independently (b = 0.166; t = 2.968; p <0.05), so H2 is accepted. The attraction toward technology (b = 0.019; t = 0.446; p> 0.05) and the attraction toward electrical energy (b = 0.080; t = 1.206; p >0.05) do not have a positive influence on the intention of household customers to generate electricity independently (H3a and H3b are rejected). The reputation of the electric energy company has a negative influence on the intention of household customers to generate electricity independently (b = -0.100; t = 2.051 p <0.05); H4 is rejected). Power outages did not have a positive influence on the intention of household customers to generate electricity independently (b = 0.040; t = 0.757; p >0.05); H5 rejected).

## 5. CONCLUSION AND SUGGESTION

### 5.1 Conclusion

Based on the measurement results related to the intention of household customers to generate electricity independently in Indonesia compared to previous studies conducted by Leenheer conducted on households in the Netherlands, the two studies obtained conflicting results. Research conducted by Leenheer shows that environmental care, customer knowledge about technology and energy, and the bad reputation of the electricity company have a positive influence on the intention of household customers to produce electricity independently. Meanwhile, financial motives and power outage are not the main motives that influence the intention of household customers to generate electricity independently. The results of research in Indonesia show that financial motives are the only main motive and positively affect the intention of household customers to produce electricity independently. Meanwhile, environmental care, customer knowledge about technology and energy, as well as the bad reputation of electricity companies and power outages are not the main motives that influence the intention of household customers to produce electricity independently. The results of research in Indonesia show that the theory of planned behavior toward household electricity customer behavior is strongly influenced by attitude toward the behavior where the behavior of household electricity customers is influenced by: (a) Behavior is not only influenced by general attitude but is influenced by specific attitudes towards behavior, (b) Behavior is not only influenced by attitudes but subjective norms also play a role in influencing behavior, (c) Attitudes that affect behavior and subjective norms will form an individual's intention to perform a behavior or action that influences decisions. The measurement results on the behavior of household electricity customers in producing electricity independently are greatly influenced by supporting indicators such as subsidies from the government, regulations on the price of household class generating equipment and the selling price of electricity that is sold to electricity companies if it produces excess energy than needed. This factor significantly influences the independent behavior in producing electricity by t = 4.223 and p <0.05. Other variables that have a significant positive influence on independent behavior in producing electricity themselves are the intention of electricity customers to produce electricity independently, the intention to use household power generation products and the reputation of the electricity company. The most powerful independent variable which has a positive influence on independent behavior in producing electricity itself is the intention to use household electricity generation products, followed by supporting factors to produce electricity independently and supporting factors to produce electricity and the intention to produce electricity independently. The behavior of household

electricity customers in producing electricity independently is not supported by concern for the environment and customer knowledge of technology and energy. Thus, further research needs to be carried out to determine concern for the environment, customer knowledge about technology and energy and support the intentions and behavior of household electricity customers to be able to generate electricity independently.

**5.2 Suggestion**

PLN and the government carry a pretty heavy task in providing education and understanding of energy security that is influenced by the intentions and behavior of the Indonesian people. Understanding of concern for the environment, customer knowledge about technology and energy must be improved so that the community or electricity customers have the intention to generate electricity independently. The government is also obliged to encourage behavioral factors in generating independent electricity such as making regulations related to the price of household class generating equipment and the benefits of electricity generated. PLN also faces a major challenge in improving PLN's reputation in the eyes of customers and also in providing services related to power outages experienced by several household electricity customers who respond that power outage greatly disrupts daily life by 43.89%.Broadly speaking, the influence of intentions and behavior for households in generating electricity independently is influenced by the norms and behavior of household customers on environmental concerns, customer knowledge about technology and energy and behavioral drivers that pose challenges for the government and PLN in electric energy security in the future.

## REFERENCES


[1] J. Watson and R. Sauter, Domestic micro-generation: economic, regulatory and policy issues for the UK. Energy Policy 36, pp. 3085–3096 , 2008.

[2] C. Adams, P. Taylor, and S. Bell, Equity dimensions of micro-generation: A whole systems approach. Journal of renewable and sustainable energy 4. 053122, 2012.

[3] S. Salmela and V. Varho. Consumers in the green electricity market in Finland. Energy Policy 34(2006), pp. 3669-3683, 2006.

[4] R. Scarpa and K. Willis, Willingness-to-pay for renewable energy. Energy Economics 32, pp. 129–136, 2010.

[5] E.M. Ben Maalla, P.L. Kunsch, Simulation of micro-CHP diffusion by means of system dynamics. Energy Policy 36, pp. 2308–2319, 2008.

[6] R. Sauter and J. Watson, Strategies for the deployment of micro-generation: implications for social acceptance. Energy Policy 35, pp. 2770–2779 , 2007.

[7] K. Arkesteijn, and L. Oerlemans, The early adoption of green power by Dutch households. An empirical exploration of factors influencing the early adoption of green electricity for domestic purposes. Energy Policy 33, pp. 183–196, 2005.

[8] N. Bergman, A. Hawkes, and Brett, UK microgeneration. Part I: Policy and behavior aspects. Energy, 2009.

[9] J. Leenheer and Md. Nooij, O. Sheikh, Motives of having electricity without the energy company. Energy Policy, 2011.

[10] I. Ajzen, and M. Fishbein, A theoretical analysis and review of empirical research. Psychological Bulletin 84, 888–918, 1977.

[11] J. Keirstead, Behavioural responses to photovoltaic systems in the UK domestic sector. Energy Policy 35, pp. 4128–4141 , 2007

[12] M. Kasiram, Metodologi Penelitian. Malang: UIN-Malang Pers, 2008.

[13] Sudjana, Nana, dan Ibrahin, Penelitian dan Penilaian Pendidikan. Bandung: Sinar Baru Algesindo, 2007.

[14] Sugiyono, Statistik untuk Penelitian. Bandung. Alfabeta, 2012.

[15] N, Takayama, E. Petrova, H. Matsushima, H. Ueda, K. Furuya, and Y. Aoki, Difference in and Causes of Environmental Attitudes between Russia and Japan [abstract]. Chiba 2013.

[16] M. Saunder, P. Lewis, and A. Thornhill, Research Methods for businees students Pearson Education Limited England, 2009.

[17] E. Ruspini, Longitudinal research in the social sciences. Social research Update 28, 2000.

[18] N. Taylor and W. McClintock, The value of longitudinal research as a basis for subsequent social impact assesment. Paper for impact assessment. Hongkong, 2000.

[19] Yuliana. Pengaruh sikap pindah kerja, norma subjektif, percieved behavior control pada intensi pindah kerja pada pekerja teknologi informasi. Jurnal Ilmiah Psikologi terapan 6, 1-18, 2004.

[20] R. Kusumo, Y. Sukayat, dan G.W. Mukti, Kajian Edukasi ramah lingkungan dan karakteristik konsumen serta pengaruhnya terhadap sikap dan perilaku ramah lingkungan. Jurnal Ilmu Keluarga & Konsumen, 2007

[21] J. Angelovska and A. Nina, The Impact of Enviromentals concern and Awarness and Consumenr Behaviors. Journal International Enviromental Application & Science, 2012

[22] A., Amran and B.A. Lim, Relationship of firm attributes, ownership structure and business network on climate change efforts. International Journal of Sustainable Development & World Ecology, 2012.

[23] P. Joshi, Effects of Enviromental concern and social norms on Environmental Friendly Behavior intension. business intelligenc journal. Vol 16. No. 2, 2012.

[24] W. Poortinga, L. Steg, and C. Vlek, A study into household energy use. Environment and Behavior 36, pp. 70–93, 2004.

[25] W.F. Van Raaij, Th.M.M. Verhallen, A behavioral model of residential energy use. Journal of Economic Psychology , 1983.

[26] D. Saladin, Majemen Pemasaran. Bandung: Linda Karya, 2007.

[27] B. Alma, Manajemen pemasaran dan pemasaran jasa. Edisi revisi, Bandung CV. Alfabeta, 2007.

[28] F. Tjiptono, Strategi Pemasaran. Yogyakarta: ANDI, 2008.

[29] S. Niemeyer, Consumer voices: Adoption of residential energy-efficient practices. International Journal of Consumer Studies 34, pp. 140–145, 2010.

[30] I. Azjen and T.J. Madden, Prediction of goal-directed behavior: attitudes, intentions, and perceived behavioral control. Journal of Experimental Social Psychology. 22, pp. 453–474, 1986.

[31] Rosidah and A. S. Teguh, Manajemen Sumber daya manusia. Yogyakarta: Graha Ilmu, 2011.
[32] G. Walsh, H. Evanschitzky, and M. Wunderlich, Identification and analysis of moderator variables, Investigating the customer satisfaction loyalty link. European Journal of Marketing, 2008.
[33] T.J. Brown and D.A. Whetten, Identity, intended image, construed image, and gnreputation: An interdisciplinary framework and suggested terminology. Journal of the Academy of Marketing Science. 34(2), 2006.
[34] N.A. Gardberg, C.J. Fombrun, and J.M. Sever, A Multi-stakeholder measure of corporate reputation. Journal of Brand Management, 2013.
[35] C. Fombrun, Realizing Value From the Corporate image, 1996.
[36] F., Allen and R. Marquez, Stakeholder Capitalism, Corporate Governance and Firm Value. Ljubjana Meetings. 2007.
[37] M.A. Reynold, K. Yuthas, Moral disclosure & corporate social responsibility reporting. Journal of Business, 2008.
[38] C.B. Bhattacharya, D. Korschun, S. Sen, Strenghening stakeholder–company relationships through mutually beneficial corporate social responsibility initiatives. Journal of Business Ethics. 85, pp. 257–272, 2008.
[39] I. Maignan, Consumers' perceptions of corporate social responsibilities: a cross-cultural comparison. Journal of Business Ethics 30, pp. 57–72 , 2001.
[40] L. Festinger, A Theory of Cognitive Dissonance. Stanford University Press, Stanford, 1957.
[41] P. Kotler and G. Amstrong, Prinsip prinsip pemasaran. Edisi 12 Jilid 1 . Jakarta: Erlangga, 2008.
[42] R Lupiyoadi dan A. Hamdani, Manajemen pemasaran jasa. Jakarta: Salemba Empat, 2008.
[43] L.R. Gay and P.L. Diehl, Research Methods for Business Management. Macmillan, New York, 1992
[44] J.R. Fraenkel and N.E. Wallen, How to Design and Evaluate Research in Education. McGraw-Hill Inc, Singapore, 1993.
[45] Wiyadi. Pengukuran Indeks Daya Saing Industri Kecil Menengah (IKM) di Jawa Tengah. Jurnal Siasat Bisnis, 2009.
[46] J. Roscoe, Fundamental Research Statistics for the Behavior Sciences. Holt, Rinehart, and Winston, New York, 1975.
[47] D.R. Cooper, P.S. Schindler, Business Research Methods, Tenth ed. McGraw Hill International Edition. Journal of Environmental Education 9, pp. 10–19, 2008.
[48] D. Gefen, D. Straub, and M.C. Boudreu, Structural Equation Modeling and Regression: Guidelines for research practice. Communication of The AIS Volume 4, article 7, 2000.
[49] J.F. Hair, G.T.M. Hult, C.M. Ringle, and M.A. Sarstedt, Primer on partial least squares structural equation modeling (PLS-SEM). United States of America: SAGE, 2014.
[50] A. M., Memon, H., Ting, and J. Cheah, A review of the methodological misconceptions and guidelines related to the application of structural equation modeling. Journal of Applied structural equation modeling, 2017
[51] M., Sarstedt, C.M., Ringle, & J.F. Hair, Partial Least Squares Structural Equation Modeling. Market Research, 2017.
[52] J.F. Hair, W.C. Black, B.J. Babin, R.E Andersin, and L. Tatham, R. Multivariate data analysis. New Jersey: Pearson International Edition, 2006.
[53] I. Ghozali and H. Latan, Partial Least Squares ''Konsep, Teknik dan Aplikasi'' SmartPLS 2.0 M3. Badan Penerbit Universitas Diponegoro, 2012.
[54] C. Fornell and D.F. Larcker, Structural Equation Model with unobservable variables and measurement Error: Algebra and Satistic. AmericanMarketing Assisiation, 1981.
[55] N. Urbach, and F. Ahlemann, Structural equation modeling in information system research using partial least square. Journal of Information Technology Theory and Application , 2010.