

GOVERNMENT POLICY EFFECT TOWARDS ENERGY-EFFICIENT APPLIANCES PURCHASE INTENTION IN WEST JAVA

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Abstract. As the fourth most populous country in the world, Indonesia has a high population density, which contributes to greenhouse gas emissions, particularly through energy consumption. The household sector accounts for the highest energy consumption in Indonesia. To address these emissions, the government has established five main principles to achieve Net Zero Emission: increasing the benefits of household electricity and introducing an official label, the Energy Saving Mark Label, to designate products that meet the government's energy efficiency requirements. This study focuses on the purchasing behavior of residents in West Java regarding energy-efficient products, such as air conditioners, rice cookers, refrigerators, fans, and LED lamps, which are the main priorities of the government. The findings reveal that sub-variables of Government Policy, namely Price Factors, Economic Benefits, and Environmental Awareness, significantly influence Purchase Intention. However, other sub-variables, such as Policy and Propaganda, Social Interaction, Past Purchase Experience, Product Cognition, Gender, Age, Education, and Income, do not have a significant effect on Purchase Intention.

Keywords: purchase intention; energy saving appliance; net zero emission; government policy; energy saving sign label

I. INTRODUCTION

Indonesia is the fourth most populous country in the world [1]. According to the Ministry of Home Affairs, Indonesia's population is projected to reach 273 million people in 2021. The country's population density has been increasing each year and is one of the driving factors behind emissions, including greenhouse gas emissions. It is projected that greenhouse gas emissions will continue to rise until 2030 due to the increased use of fuel, gas, and coal. According to [2], Indonesia's energy consumption reached 848 million Barrels Oil Equivalent (BOE) in 2021, with 148 million BOE derived from energy consumption in the household sector [2]. PT PLN (Persero) states in the 2018-2027 General Plan for Electricity Supply (RUPTL) that the household sector is the largest consumer of electricity in the country, and this number is expected to double by 2027 [3]. Various factors contribute to energy consumption in the household sector, including demographic factors, economic factors, technological factors, and lifestyle factors. An increase in population leads to a rise in the number of households, resulting in increased energy consumption. Additionally, income levels influence energy consumption in the sector, with higher-income households generally consuming more energy than lower-income households [4]. Apart from energy consumption, the energy intensity of the household sector is also influenced by factors such as technological efficiency, lifestyle, and economic growth. Economic growth leads to increase per capita income, which in turn affects energy consumption [4]. Public awareness of the importance of energy conservation also

contributes to reducing energy consumption in the household sector.

In West Java Province, which ranks first among 34 provinces in Indonesia, electricity sales to the household sector reached 20,362 GWh (Gigawatt hours). However, due to the Covid-19 pandemic, sales growth decreased by 2.6% in 2020. The number of customers of the household sector increased from 13 million customers to 14 million customers in 2020 [5], indicating that electricity consumption in West Java is primarily driven by the household sector. To address the excessive energy consumption crisis, including electricity consumption, the government aims to achieve Net Zero Emission by 2060 [6]. Net Zero Emission refers to a condition where carbon emissions do not exceed the earth's atmosphere's capacity to absorb them. To achieve this, transitioning the current energy system of Indonesia's power plants to a cleaner energy system is crucial, ensuring a balanced relationship between human activities and nature. The government is currently developing strategies to achieve Net Zero Emission, such as reducing the risk of climate change by decreasing emissions and carbon footprint. The government has established five policies as the main principles for realizing Net Zero Emission, including increasing the use of New Renewable Energy, enhancing the benefits of electricity use in the household and industrial sectors, promoting the use of Battery-Based Electric Vehicles (KBLBB) in transportation, and implementing Carbon Capture and Storage (CCS). One of the government's efforts to enhance the benefits of household electricity use is the introduction of energy-saving labels or Label Tanda Hemat

Energi (LTHE) for household products. Currently, there are five products on the market with energy-saving standards: air conditioners, rice cookers, refrigerators, fans, and LED lights [7]. This study aims to examine the impact of government policies on the purchase intention of Energy-Saving Products among the residents of West Java, focusing on sub-variables such as Policy and Propaganda, Social Interaction, Past Purchase Experience, Economic Benefits, Price Factors, Product Cognition, Environmental Awareness, and demographic variables including Gender, Age, Income, and Education.

II. RESEARCH METHODS

This research employs a quantitative approach and gathers primary data using a survey. The Partial Least Squares-Structural Equation Modeling (PLS-SEM) technique with Smart-PLS 3.0 software is utilized to evaluate the collected sample. After careful screening, we obtained 100 valid questionnaires from a diverse group of participants who meet two specific criteria: 1) residents of West Java Province, Indonesia, and 2) owners of energy-efficient appliances such as air conditioners, rice cookers, LED lamps, refrigerators, and fans. Each item in the questionnaire, except for demographic information, was rated on a five-point Likert scale, allowing respondents to express their level of agreement with the statements. The scale ranged from "strongly agree"=5 to "strongly disagree"=1. The descriptive statistics of the demographic variables are presented in Table 1.

Table 1. Respondent Profile

| Variable | N | Percentage |
|----------------------------|----|------------|
| Gender | | |
| Male | 20 | 20% |
| Female | 80 | 80% |
| Age | | |
| Under 20 | 8 | 8% |
| 21-25 | 48 | 48% |
| 26-30 | 3 | 3% |
| 31-35 | 5 | 5% |
| Above 35 | 36 | 36% |
| Education level | | |
| High school or equivalents | 52 | 52% |
| Diploma or equivalents | 16 | 16% |
| Bachelor's degree | 29 | 29% |
| Master's degree | 3 | 3% |
| Monthly income (Rp) | | |
| Below 2.000.000 | 46 | 46% |
| 2.000.000-5.000.000 | 26 | 26% |
| 5.000.000-10.000.000 | 13 | 13% |
| 10.000.000-20.000.000 | 6 | 6% |
| Above 2.000.000 | 9 | 9% |

After collecting the data from the respondents, the next step involves measuring the structural and measurement models. The following are the details of the measurement model for both the validity and reliability tests.

Table 2. Respondent Parameter Of Measurement Models

| Test | Parameter | Rule of Thumb |
|------------------------------|----------------------------------|---------------|
| Convergent Validity | Loading factor | Above 0.7 |
| | Average variance extracted | Above 0.5 |
| Discriminant Validity | Cross loading Fornell-larcker | |
| Reliability | Cronbach's alpha | Above 0.7 |
| | Composite reliability | Above 0.7 |

III. RESULTS AND DISCUSSION

Structural Equation Model (SEM) Analysis

a) Outer Model Measurement

The loading factors for items EA_3, EA_4, EA_5, PC_1, PC_4, PF_2, PI_4, PP_1, and SI_1 did not meet the criteria for validity test, as their loading factors were below 0.7. Consequently, these items were removed, and we retested the validity of the model. After removing these items, all remaining items met the criteria of the outer model measurements, as indicated in the Table 3 below.

Table 3. Outer Model Measurements

| Indicators | Loading Factor | AVE | Composite Reliability | Cronbach's Alpha |
|------------|----------------|-------|-----------------------|------------------|
| AGE | 1.000 | 1.000 | 1.000 | 1.000 |
| EA_1 | 0.889 | | 0.910 | 0.878 |
| EA_2 | 0.837 | | | |
| EA_6 | 0.760 | 0.671 | | |
| EA_7 | 0.722 | | | |
| EA_8 | 0.874 | | | |
| EB_1 | 0.887 | | 0.918 | 0.866 |
| EB_2 | 0.892 | 0.789 | | |
| EB_3 | 0.885 | | | |
| PC_2 | 0.927 | | 0.888 | 0.754 |
| PC_3 | 0.860 | 0.799 | | |
| PE_1 | 0.783 | | 0.915 | 0.876 |
| PE_2 | 0.869 | 0.729 | | |
| PE_3 | 0.863 | | | |
| PE_4 | 0.896 | | | |
| PF_1 | 0.892 | 0.772 | 0.872 | 0.706 |
| PF_3 | 0.866 | | | |
| PI_1 | 0.823 | | 0.881 | 0.821 |
| PI_2 | 0.801 | 0.650 | | |
| PI_3 | 0.794 | | | |
| PI_5 | 0.808 | | | |
| PP_1 | 0.913 | 0.865 | 0.928 | 0.846 |
| PP_2 | 0.946 | | | |
| SI_2 | 0.899 | | 0.905 | 0.843 |
| SI_3 | 0.827 | 0.761 | | |
| SI_4 | 0.889 | | | |
| EDU | 1.000 | 1.000 | 1.000 | 1.000 |
| INC | 1.000 | 1.000 | 1.000 | 1.000 |
| GEN | 1.000 | 1.000 | 1.000 | 1.000 |

b) Inner Model Measurement

The rule of thumb for hypothesis testing states that the t-statistic should be higher than 1.96, and the p-value should be less than 0.05 for each variable. Therefore, here are the results of the hypothesis testing for each variable:

Table 4. Inner Model Measurements

| Variable | β | T | P |
|--------------------|---------------|-------|--------------|
| PP > PI | 0.040 | 0.450 | 0.653 |
| SI > PI | 0.077 | 0.676 | 0.501 |
| EA > PI | 0.309 | 2.771 | 0.007 |
| PC > PI | 0.120 | 1.297 | 0.198 |
| EB > PI | 0.257 | 2.254 | 0.026 |
| PF > PI | 0.347 | 4.100 | 0.000 |
| PE > PI | -0.053 | 0.508 | 0.612 |
| Gender > PI | -0.073 | 1.075 | 0.285 |
| Age > PI | 0.069 | 0.801 | 0.425 |
| Education > PI | 0.020 | 0.263 | 0.793 |
| Income > PI | 0.077 | 0.959 | 0.340 |
| Education > Income | 0.585 | 8.566 | 0.000 |

Based on the results in Table IV, we can observe that four variables have a significant effect on Purchase Intention. These variables are Environmental Awareness (EA), Economic Benefits (EB), and Price Factors (PF). Additionally, Education has a significant effect on Income. On the other hand, variables such as Policy and Propaganda (PP), Social Interaction (SI), Product Cognition (PC), and Past Purchase Experience (PE) do not have a significant effect on Purchase Intention.

c) Discussion of Findings

The findings indicated that policy and propaganda doesn't have any significant effect to energy efficient appliances purchase intention in West Java. According to the research results of past studies [8], policy and propaganda have a positive but insignificant effect on purchase intention. Like this research, the policy and propaganda in Indonesia do not have a strong influence on the willingness of people in West Java to purchase energy-saving products. The results of this study are allegedly not significant because the Indonesian government's policies regarding the use of energy-efficient products are not in the form of subsidies, like those implemented by the governments of China, the United States, South Korea, and Australia [8]. Instead, they are in the form of an energy-saving label, known as the Energy Saving Mark Label or LTHE, for products that meet the standards set by the Indonesian government, specifically the Ministry of Energy and Mineral Resources. These products include air conditioners, refrigerators, rice cookers, LED lights, and fans. Therefore, the policy environment and media propaganda only raise awareness among the people of West Java about the availability of energy-saving products with the Energy Saving Mark Label, without significantly affecting their intention to make a purchase.

The relationship between the social interaction and the purchase intention shows an initial positive sample value of 0.077. This value suggests that social interaction positively affects purchase intention, which aligns with previous research conducted by past studies [8]. However, based on the t-statistic value of 0.676 and a p-value of 0.501, where the t-statistic value < 1.96 and the p-value > 0.05, it indicates that Social Interaction has no significant effect on purchase intention (Y). In the past studies [8], it was concluded that social interaction significantly influences the purchase of energy efficient appliances among the Chinese population. This finding is supported by the presence of strong traditional

Chinese cultural factors and the adherence to traditional values, including the widespread adoption of Confucian ideology. When individuals observe others purchasing energy efficient appliances, they tend to follow suit as a means of conforming to community norms [8]. Therefore, the differences in respondent characteristics between the past study [8] and this study, specifically the people of West Java Province, are believed to contribute to variations in the research results.

When considering the t-statistic value of 2.771 and a p-value of 0.007, where the t-statistic value is above 1.96 and the p-value under 0.05, it indicates that environmental awareness has a positive and significant effect on purchase intention. According to the past studies [8], environmental awareness is the most influential factor on the purchase intention of energy efficient appliances among the Chinese population. Pro-environment consumer behaviour is highly prevalent when it comes to purchasing energy efficient appliances. As individuals' environmental awareness grows, they are more likely to proactively choose to buy energy efficient appliances. This trend is crucial for Indonesia, particularly West Java Province, as it progresses towards energy conservation, emissions reduction, and achieving Net Zero Emissions by 2050. The findings indicate that price factors do affect purchase intention significantly with p-value of 0.000. This demonstrates that price factors have a highly significant positive effect on purchase intention. In the past study [8], it was concluded that Price Factors do not affect the Purchase Intention of Chinese consumers. However, according to the past studies [8], two factors contribute to these results. While price is a consideration and an objective factor for many individuals when making a purchase, it does not necessarily influence their purchase intentions significantly. Other subjective factors, such as sensitivity to energy conservation and environmental awareness, hold greater influence. These variations in findings may be attributed to differences in respondent characteristics. One of the past study [9] found that price perception has a positive and significant influence on purchasing decisions and concluded that price has a significant effect and is the dominant influence on purchasing decisions. Additionally, another past studies [10] demonstrated a positive and significant effect of price sensitivity on purchasing decisions, highlighting that higher perceived price levels are associated with increased consumer satisfaction.

Same as the price factors, the findings also indicates that economic benefits have significant effect to energy-efficient appliances purchase intention. In the questionnaire, the respondents' views on the Economic Benefits of Energy-Saving Products were collected. For the item EB_1: "I believe that energy-efficient appliances save more costs," 39% of respondents strongly agreed, and 42% of respondents agreed. Additionally, 14% of respondents chose neutral, while 5% of respondents disagreed with the statement. Moving to the item EB_2; "I believe that the costs incurred for energy-efficient appliances are less than ordinary products that are not energy efficient," 31% of respondents strongly agreed, and 50% of respondents agreed. Similarly, 15% of respondents chose

neutral, while 4% of respondents disagreed. Finally, for the item EB_3: "I choose to buy Energy-Saving Products because they can save more costs," 44% of respondents strongly agreed, followed by 34% of respondents who agreed. Furthermore, 18% of respondents chose neutral, while 4% of respondents disagreed with the statement. The overall findings indicate that most respondents expressed agreement or strong agreement with the statement items related to the economic benefits of energy-efficient appliances. This suggests that the economic advantages, such as cost savings, significantly influence their purchase intention of energy-efficient appliances.

Product cognition doesn't have a significant effect on energy-efficient appliances purchase intention in West Java. According to a past studies [8], the lack of significance in Product Cognition can be attributed to the Chinese people's limited understanding of Energy Saving Products, despite the high statistical response indicating awareness. Similarly, in this study, respondents showed awareness of the existence of energy-efficient appliances, but still lack of cognition with the Energy Saving Label Mark (LTHE). Among the respondents, 38% were aware of energy-efficient appliances in the market through the Energy Saving Mark Label, followed by 18% of other respondents. Additionally, 20% of respondents expressed neutrality, while 24% had no knowledge of energy-efficient appliances through the Energy Saving Mark Label. Regarding the PC_3 item in the product cognition variable, only 32% of respondents demonstrated an understanding of the meaning behind each star indicator on the Energy Saving Sign Label. Furthermore, 23% of respondents expressed neutrality, and 45% of respondents lacked comprehension regarding the star indicators on the Energy Saving Sign Label. Based on this data, it can be concluded that the people of West Java have limited understanding of the energy-efficient appliances standards established by the West Java Government through the Energy Saving Sign Label, despite being aware of the availability of energy-efficient appliances in the market.

The findings indicate that past purchase experience doesn't have significant effect on energy-efficient appliances purchase intention in West Java and -0.053 value indicate that past purchase experience has a negative impact on purchase intention, which contrasts with the findings of a previous study [8] that reported a positive direction of influence. Considering the t-statistic value of 0.508 and a p-value of 0.612, where the t-statistic value is less than 1.96 and the p-value is greater than 0.05, it is evident that past purchase experience does not have a significant effect on purchase intention. This finding diverges greatly from the conclusions of the past studies [8], who found that a memorable purchase experience of an energy-efficient appliances leads to a strong preference for the product and repeat purchases. The experiences or impressions of individuals in West Java when purchasing energy-efficient appliances are presumed to be unsatisfactory, resulting in the lack of a significant impact of past purchase experience on the purchase intention of energy saving products. This insight can serve as valuable input for energy-efficient appliances manufacturers to improve the

overall experience for potential buyers and thereby enhance the purchase intention of energy-efficient appliances. The aim is to provide excellent service that aligns with buyers' expectations [11].

The variable demographics gender, age, education and income shows an insignificant effect on energy-efficient appliances purchase intention in West Java. Differences in the characteristics of respondents are believed to be a contributing factor to the lack of significance in the influence of demographic variables on the purchase intention of energy-efficient appliances among the people of West Java Province compared to the people of China. And finally, education does have a significant effect on income. The relationship between education and income is generally very strong, and it is commonly observed by previous studies that individuals with higher levels of education tend to earn higher incomes.

IV. CONCLUSION

After conducting extensive research on the factors influencing the purchase intention of energy-efficient appliances in West Java, the findings shed light on several key insights. This study aimed to examine the effects of various factors, including policy and propaganda, social interaction, environmental awareness, price factors, economic benefits, product cognition, past purchase experience, and demographic variables. Through rigorous analysis and comparison with previous studies, the following conclusions were drawn: Firstly, the study found that policy and propaganda did not have a significant impact on the purchase intention of energy-efficient appliances in West Java. Unlike other countries that implement subsidies, the Indonesian government's approach involves an energy-saving label, which raises awareness but does not significantly affect purchase intention. However, environmental awareness emerged as a powerful driver, positively and significantly influencing the purchase intention of energy-efficient appliances. As individuals' awareness of environmental issues and energy conservation grows, they become more proactive in choosing energy-efficient products. Price factors were also found to have a highly significant positive effect on purchase intention. In contrast to previous research, where price was not a dominant influence, this study observed that price considerations played a crucial role in the decision-making process for energy-efficient appliance purchases. The economic benefits associated with energy-efficient appliances, such as cost savings, were found to significantly influence purchase intention. On the other hand, factors such as social interaction, product cognition, and past purchase experience were found to have no significant impact on purchase intention in the context of West Java. Despite initial positive indications, social interaction did not demonstrate statistical significance, suggesting that other factors may have a greater influence on consumer behavior. Similarly, limited understanding of product labels and unsatisfactory past purchase experiences contributed to the lack of significant effects in product cognition and past purchase experience,

respectively. Demographic variables, including gender, age, education, and income, were also found to have no significant effect on purchase intention in West Java. These results highlight the unique characteristics and preferences of the West Java population compared to previous research conducted in China. In conclusion, this research provides valuable insights into the determinants of purchase intention for energy-efficient appliances in West Java. Environmental awareness and price factors emerged as influential factors, while policy and propaganda, social interaction, product cognition, past purchase experience, and demographic variables showed no significant effects. These findings suggest the need for targeted strategies that emphasize environmental benefits and cost savings to promote the adoption of energy-efficient appliances in the region. Furthermore, efforts to improve consumer education and enhance the overall purchase experience can play a vital role in shaping purchase intentions. Building upon these findings, further research can explore additional factors and their impacts on the purchase intention of energy-efficient appliances, as well as identify effective interventions to overcome barriers and encourage sustainable consumption patterns in West Java

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