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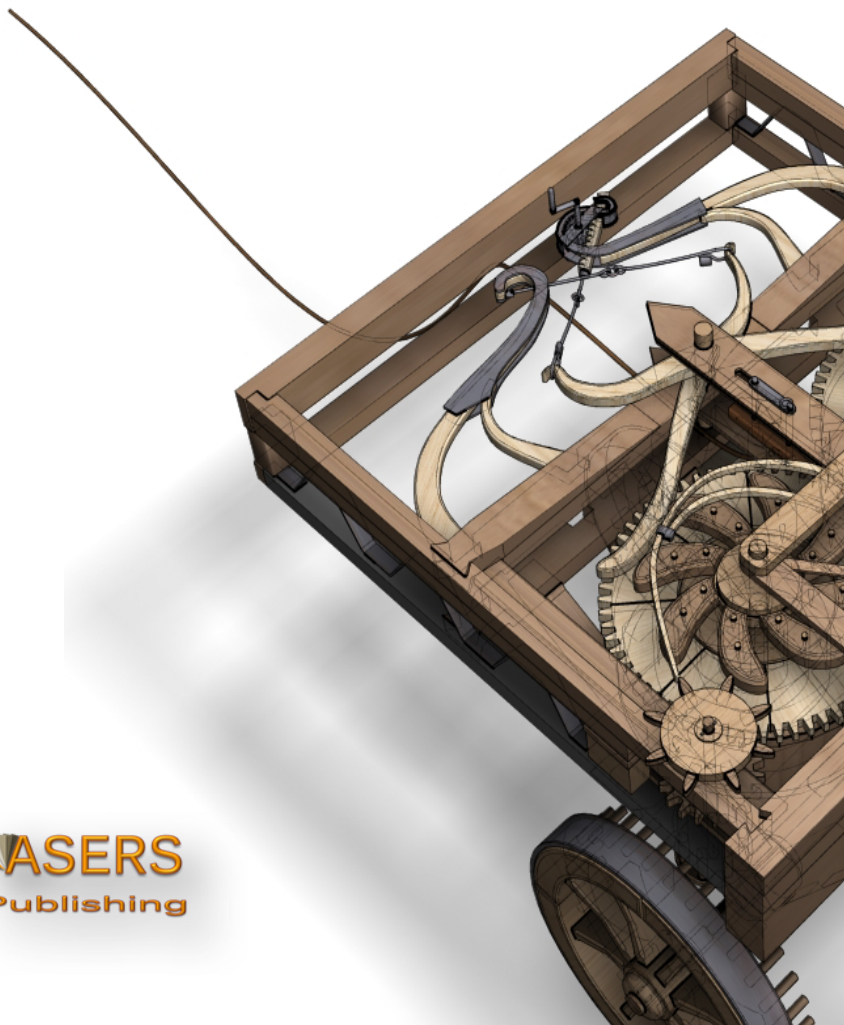

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Consumers' Intention to Use Renewable Energy Based on the Behavioral Reasoning Theory

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Abstract:

Public concerns about climate change and environmental protection have triggered governments and corporations to do research on clean and cost-effective forms of energy. Green energy is relatively new in developing countries, which results in limited market penetration and low consumer acceptance. This study aims to investigate the relationship between global motives and consumer intentions to use renewable energy via the Behavioral Reasoning Theory (BRT). In this research, reasons for supporting the utilization of renewable energy are shown through environmental concerns and perceived benefits, while reasons against it are represented through perceived costs. An online survey obtained 275 valid data responses from Indonesian middle- and upper-class consumers. This data was analyzed using PLS-SEM to maximize the model's predictive value. All hypotheses tested, except for the effect of environmental concern and perceived cost on attitude, were proven to influence customer intentions to use renewable energy. This study found that perceived benefits gave the largest contribution to global motives for using renewable energy. Since this study involved consumers from the middle to upper class in developing countries, perceived behavioral control had the most influence on intention to use renewable energy compared to attitude and subjective norms.

Keywords: behavioral reasoning theory; consumer intention; global motives; perceived benefits; perceived cost; renewable energy.

JEL Classification: M31; Q2; Q40.

Introduction

The frequent use of fossil fuels has resulted in numerous issues with the environment, such as environmental degradation and disruption (Irfan *et al.* 2020). The phenomenon of climate change has the potential to endanger human activities and life (Lin and Zhu 2019). The negative effects of climate change and the depletion of fossil energy reserves trigger governments to invest in clean and cost-effective forms of energy. While many people in

developed countries have been using renewable energy for decades, this is not the case in developing countries, where adoption is low due to their familiarity with fossil fuels and the high investment costs of renewable energy (Cantarero 2020).

Several academic studies have explored and identified consumer intentions to use renewable energy by applying the theory of planned behavior (TPB). The three antecedents in TPB that present the global motives influencing consumer intentions to use renewable energy have been widely researched, but further research on the reasons stimulating the three global motives is needed. Furthermore, energy conservation research has primarily focused on factors explaining the use of renewable energies, while reasons for not adopting renewable energy have been ignored (Irfan *et al.* 2021; Masrahi *et al.* 2021; Nazir and Tian, 2022). While pro-environmental values and favorable attitudes have largely explained consumer decisions to adopt renewable energy (Irfan *et al.* 2020; Saari *et al.* 2021), it does not mean their decision not to adopt it is due to negative attitudes or low pro-environmental values. Price can be a major barrier to adopting renewable energy (Fatima *et al.* 2022), particularly in developing countries. Therefore, the objective of this study is to examine the relationship between global motives and consumer intentions toward renewable energy by employing behavioral reasoning theory (BRT) (Westaby 2005), which helps to distinguish between "reasons for" and "reasons against" and investigates how these reasons influence the connection between global motives and consumer intentions toward renewable energy use.

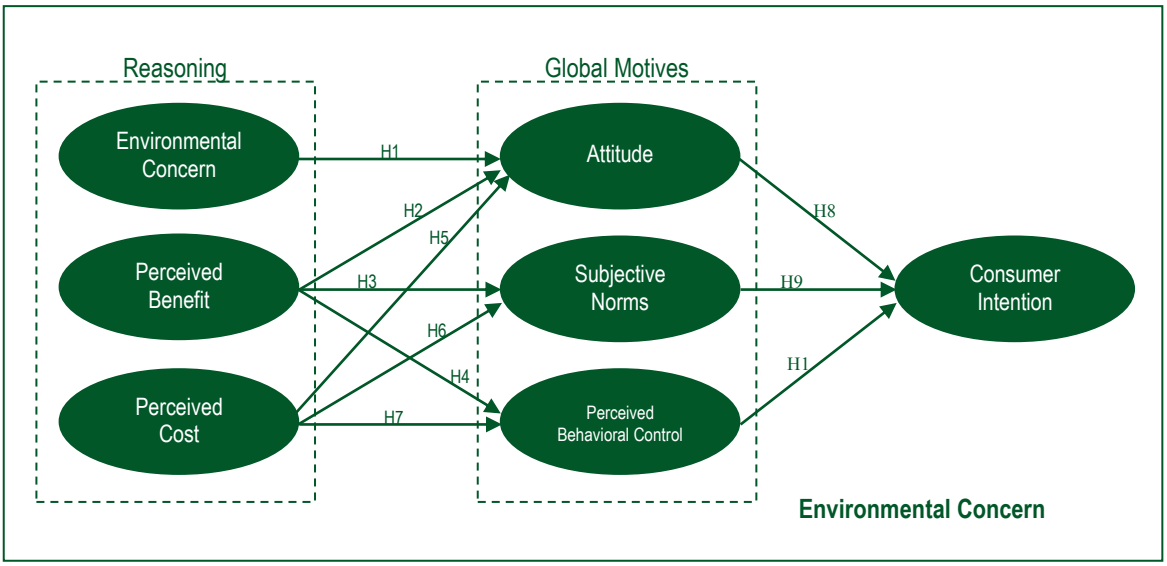
1. Literature Review

1.1 Theoretical Framework

The behavioral reasoning theory (BRT) reveals that reasoning serves as an important link between beliefs, global motives, intentions, and behaviors. This framework's underlying theoretical assumption is that reasons influence global motives and intentions by supporting people in justifying and defending their actions (Westaby 2005). The three sub-constructs related to global motives are: attitude, subjective norms, and perceived behavioral control conveyed in the TPB (Ajzen 1991).

Since its beginning, BRT has been used to determine variables that affect behavior that are not clearly explained by the TPB's global motives (Claudy *et al.* 2013; Wang *et al.* 2021). These key factors are classified as global motives by BRT since they are considered fundamental factors of behavior intentions in various areas. This study employs BRT to identify factors influencing consumer intentions that are not clearly addressed by TPB's global motives. The reasons for using renewable energy are represented through environmental concerns and perceived benefits, while the reasons against it are represented through perceived costs. Both components will influence global motives consisting of attitude toward renewable energy, subjective norms, and perceived behavioral control, which in turn form the intention to use renewable energy, as depicted in Figure 1.

Figure 1. Research Model



Consumers' concern and commitment are increasing to solve environmental issues as global awareness of emerging and existing issues grows. People are beginning to pay more attention to their consumption habits and their environmental impact, which manifests itself in various ways, such as human concern for pollution

levels, green consumption, or sustainable behavior (Gardan *et al.* 2023). The degree of individual awareness of environmental issues and care about solving them is called environmental concern (Tan *et al.* 2017). Milfont and Duckitt (2010) define environmental concern as human awareness or attitude toward environmental protection.

Irfan *et al.* (2021) argue that consumers have grown more mindful of the environmental consequences of their purchasing habits. Environmental concern is thus important in renewable energy adoption, as environmentally conscious consumers are more cautious about energy consumption and have favorable attitudes toward renewable energy use (Jabeen *et al.* 2019). Concerns about the environment play a significant role in consumers' willingness to use renewable energy as well as their willingness to pay for renewable energy (Yue *et al.* 2020). In general, consumers' environmental concern is positively associated with their attitude toward using renewable energy (Liu *et al.* 2013). People's awareness of clean renewable energy sources has been influenced by a sense of responsibility and an ethical obligation to protect the environment (Fornara 2016). When someone has concern for the environment, it can be the reason behind a person's attitude and intention to use renewable energy. The following hypothesis is proposed considering this explanation:

H_1. Environmental concern has a positive effect on attitudes towards renewable energy.

1.2 Perceived Benefits

Perceived benefits are perceptions about the good outcomes of behavior performed in response to an actual or perceived threat (Chandon *et al.* 2005). Consumers are more likely to purchase green products and spread the word about a greener lifestyle when they understand that the long-term benefits outweigh the costs (Huang *et al.* 2014).

Renewable energy is one of the natural resources that can help reduce air pollution and greenhouse gas emissions, thereby improving public health (Basit *et al.* 2020; Irfan *et al.* 2019). Given the importance of climate change, the notion that technologies that reduce CO2 emissions are environmentally beneficial has led to a stronger perception of the advantages of renewable energy resources (Huijts *et al.* 2012). Technological advances and potential cost reductions from renewables outperform non-renewables, making them more affordable and cost-stable in the future (Kaygusuz 2012). Renewable energy generation systems take an important role in the overall electrical energy demand and have gained much attention because they are renewable, environmentally friendly, and flexible to install (Guney and Onat 2008). As such, these benefits will direct an individual's global motives to use renewable energy.

A person's rationality will encourage one to maximize the benefits obtained from a product. Therefore, the benefits of renewable energy will form a positive attitude toward the product, which in turn will motivate people to use the product (Claudy *et al.* 2013). The benefits of renewable energy will indirectly shape the public's view of the product (Alrashoud and Tokimatsu 2020). As an individual desires social acceptance, the person is likely to follow the advice of those around him/her (Schulte *et al.* 2022). In addition, the benefits provided by renewable energy will encourage a person to learn more about it. This knowledge allows the individual to make the most of renewable energy, thus influencing his/her desire to use renewable energy (Alam *et al.* 2014; Fornara *et al.* 2016; Rezaei and Ghofranfarid, 2018). The relationships are shown through the following hypotheses:

H_2. Perceived benefits have a positive effect on attitudes toward renewable energy.

H_3. Perceived benefits have a positive effect on subjective norms for renewable energy.

H_4. Perceived benefits have a positive effect on perceived behavioral control over renewable energy.

1.3 Perceived Costs

Renewable energy refers to a power source that does not pollute the environment. The recent increase in fuel prices has impacted expectations on the cost of renewable energy. Perceived costs refer to the initial capital value incurred at the beginning of renewable energy adoption (Alam *et al.* 2014). An individual's financial background, educational exposure, and social influence may lead one to have a different perspective of perceived costs compared to other people. Although renewable energy was once considered uneconomical, it is now becoming very economical in most countries, which makes it a very promising alternative to oil and coal (Liqun and Zhixin 2009).

Perceived costs are believed to have a negative relationship with consumer behavior, such as willingness to pay or purchase intention (De Medeiros *et al.* 2016). Among the many possible factors influencing users' willingness to adopt new technologies and services, cost-related factors are regarded as one of the most important barriers to a user's sense of wanting to take advantage of emerging technology and services

(Masukujjaman *et al.* 2021). However, when evaluating product costs, individuals must compare them with the benefits that will be obtained from the product purchased (Jayaraman *et al.* 2017). The greater the benefit-cost ratio, the more likely people are to switch to renewable energy (Bandara and Amarasena 2020).

In referring to BRT, the perception of the high cost will be a factor that prevents a person from using renewable energy because the individual will view it as an expensive product, and it will affect his/her attitude toward renewable energy (Claudy *et al.* 2013). Perceived costs also influence public views that form subjective norms (Alrashoud and Tokimatsu 2020) and make a person assume that he/she cannot afford to adopt renewable energy because of one's limited financial condition, and this discourages the individual from using it. The relationships are expressed in the following hypotheses:

H_5. Perceived costs have a negative effect on attitudes toward renewable energy.

H_6. Perceived costs have a negative effect on subjective norms for renewable energy.

H_7. Perceived costs have a negative effect on perceived behavioral control over renewable energy.

1.4 Global Motives and Behavioral Intention

Global motives refer to the intention- and behavior-forming components indicated in TPB. Attitudes toward the behavior, subjective norms, and perceptions about the individual ability to effectively engage in the target behavior shape intentions (Ajzen 1991), including in the context of renewable energy consumption (Almrafee and Akaileh 2023; Kumar and Nayak 2023). In this context, intentions are the intentions to use renewable energy, which demonstrate a person's willingness to try and make efforts to perform this behavior.

Intentions to use renewable energy are influenced by attitudes (Zainudin *et al.* 2014; Zografakis *et al.* 2010), which are a person's positive or negative feelings toward engaging in a target behavior (Ashinze *et al.* 2021). Attitudes are positive or negative perception of an individual that appears as a precursor to an intention to purchase renewable energy technology (Masukujjaman *et al.* 2021). Previous empirical research (Abrahamse and Steg 2011; Ha and Janda 2012; Zainudin *et al.* 2014) shows that the intention to buy energy-efficient products is determined by attitudes towards these products which are formed by the perceived benefits and perceived costs of these products. Consumer intentions increase when a person has a positive attitude towards renewable energy caused by one's understanding that the product will reduce environmental problems (Wustenhagen *et al.* 2007), but it may decline as electricity prices rise (Hansla *et al.* 2008). Almrafee and Akaileh (2023) and Gardan *et al.* (2023) validated the positive relationship between consumer attitudes and intentions to use renewable energy. Guo *et al.* (2021) also discovered a positive effect of attitudes on consumer intentions to purchase renewable energy. The following hypothesis demonstrates the relationship:

H_8. Attitudes have a positive effect on intentions to use renewable energy.

Subjective norms are a social aspect that refers to perceived public pressure to engage in specific behaviors (Ajzen 1991; Yadav and Pathak, 2017). In general, others' actions and opinions have a significant impact on consumers' purchasing intentions. Subjective norms are an important aspect of understanding renewable energy adoption (Masrahi *et al.* 2021) as peer and family pressure plays a role in the development of intentions to use renewable energy (Chowdury *et al.* 2014). Significant positive perceptions of others toward green products have been reported in previous research to have a significant influence on purchase intentions toward green products (Jabeen *et al.* 2019). According to Jayaraman *et al.* (2017), subjective norms positively influence consumer intentions to purchase renewable energy. Therefore, they play a strong role in decision-making which leads to the following hypothesis:

H_9. Subjective norms have a positive effect on intentions to use renewable energy.

Intentions will not be realized if individuals lack the ability to carry out a behavior (Ajzen 2001). The apparent comfort or challenge of completing an activity is defined as perceived behavioral control, which is believed to convey experience as well as expected obstacles and impediments. (Ajzen 1991). Behavioral control operates in two dimensions, namely internal and external behavioral control. Purchase intentions are shaped by beliefs about the item or brand and its characteristics, preceded by a change in attitude toward the purchase itself, and are affected by internal and external factors (Wunder *et al.* 2008). This behavioral control has an immediate impact on individual intentions and an indirect impact on behavior. In terms of using new renewable energy, perceived behavioral control is associated with things that affect consumer confidence in using renewable

energy (Irfan *et al.* 2020). When a consumer believes in his capabilities to use renewable energy, he becomes more likely to adopt it (Ashinze 2021; Fatima *et al.* 2022). The final hypothesis tested is as follows:

H_{10}. Perceived behavioral control has a positive effect on the intention to use renewable energy.

2. Method

This research was a correlational study of the factors that influence consumer intentions to use renewable energy. It was conducted in Indonesia, one of the tropical countries with actual potential to develop and utilize solar energy to overcome the depletion of existing conventional fuel reserves. The renewable energy focused on in this research was in the form of rooftop solar panels or solar cells as new renewable energy to generate electricity. Rooftop solar panels are a power generation system whose energy comes from technology to generate electrical energy using the sun whereas rooftop solar panels operate with a grid aimed at saving electricity consumption (Yadav and Bajpai 2020).

Due to the high installation costs for renewable energy, data was collected from middle- and upper-class Indonesian people selected using a purposive sampling method with the criteria that they already knew about renewable energy and had monthly incomes above IDR 10 million. The minimum sample size was 210 based on the sample-to-item ratio method of 5:1 (Memon *et al.* 2020). Data collection was conducted by distributing questionnaires online through Google Forms. The questionnaires consisted of several sections, namely filter questions, respondent profiles, and items that measured each variable. Specifically, the research instrument consisted of 42 items: 6 items for environmental concerns were adopted from Abdullah *et al.*(2021), Irfan *et al.* (2020), and Wall *et al.* (2021); 7 items for perceived benefits items adopted from Ari and Yilmaz (2021), Masukujjaman *et al.* (2021), and Wall *et al.* (2021); 6 items for perceived costs were adopted from Irfan *et al.* (2020) and Park (2019); 6 items for attitude toward renewable energy were adopted from Abdullah *et al.* (2021), Irfan *et al.* (2020), Masrahi *et al.* (2021), and Wang *et al.* (2021); 6 items for subjective norms were adopted from Hojnik *et al.* (2021), Irfan *et al.* (2020), and Masrahi *et al.* (2021); and 6 items for perceived behavioral control and 5 items for consumer intention were adopted from Irfan *et al.* (2020) and Masrahi *et al.* (2021). A pre-test of 40 respondents resulted in the deletion of one indicator of perceived costs (switching to green electricity is not a cost-effective choice) due to low factor loading.

Due to the complexity of this research model which included many constructs and indicators, PLS-SEM was used to perform data analysis with SmartPLS version 3.3.9. The selection of this data analysis technique was intended to maximize the predictive ability of BRT antecedents in explaining the intention to adopt renewable energy.

3. Results and Discussion

There were 316 people who responded to the survey, but only 275 respondents met the criteria. The univariate and multivariate outlier testing to eliminate outliers by using a Z-score and Mahalanobis Distance resulted in 244 data items that could be used for hypothesis testing. As depicted in Table 1, most of the respondents reside on the island of Java, the most populous and economic center of Indonesia. About 70 percent of the respondents are from the middle and upper-middle classes with monthly incomes between IDR10,000,000 and IDR19,999,999 with monthly electricity bills ranging from IDR500,000 to IDR999,999. Almost all the respondents have an education level up to college level. Of the total 244 respondents, over 70 percent are male, and they are the main decision-makers in the family.

Table 1. Respondents' Profile

Characteristics		Frequency	Percentage
Gender	Male Female	174 70	71.31% 28.69%
Age	20-24 25-34 35-44 45-55	4 119 96 25	1.64% 48.77% 39.34% 10.25%
Domicile	Java island Outside Java Island	220 24	90.16% 9.84%

Characteristics		Frequency	Percentage
Latest Education	High school or equivalent Diploma Undergraduate (S1) Post-Graduate (S2/S3)	5 68 146 25	2.05% 27.87% 59.84% 10.25%
Monthly Income*	IDR10,000,000 – 14,999,999 IDR15,000,000 – 19,999,999 IDR20,000,000 – 24,999,999 IDR25,000,000 and above	96 89 34 25	39.34% 36.48% 13.93% 10.25%
Monthly Electricity Bills	Less than IDR500,000 IDR500,000 – 999,999 IDR1,000,000 – 1,499,999 IDR1,500,000 and above	14 155 63 12	5.74% 63.52% 25.82% 4.92%
The main decision-makers in the family	Yes No	217 27	88.93% 11.07%

*As of 29 March 2023, IDR 1 million equals USD65

The instrument had fulfilled the convergent validity criteria of the factor loading values above 0.7 and an AVE of more than 0.5 as well as the reliability requirements of Cronbach's alpha and composite reliability values above 0.7 (Table 2). The discriminant validity based on the Fornell-Larcker criterion (Table 3) reveals that the square root of the AVE of each latent construct was higher than its correlation with other constructs. Similarly, the discriminant validity requirement based on HTMT was met as all ratios were below 0.9 (Table 4).

Table 2. Convergent Validity and Reliability

	Item	Loading	AVE	Cronbach's Alpha	Composite Reliability
Environmental Concern (EC)	EC1 EC2 EC3 EC4 EC5 EC6	0.902 0.870 0.890 0.851 0.831 0.788	0.733	0.927	0.943
Perceived Benefits (PB)	PB1 PB2 PB3 PB4 PB5 PB6 PB7	0.712 0.758 0.830 0.841 0.856 0.790 0.775	0.634	0.903	0.923
Perceived Costs (PC)	PC1 PC2 PC3 PC4 PC5 PC6	0.966 0.967 0.969 0.976 0.969 0.962	0.937	0.987	0.989
Attitude (AT)	AT1 AT2 AT3 AT4 AT5 AT6	0.812 0.873 0.879 0.864 0.863 0.894	0.748	0.932	0.947

	Item	Loading	AVE	Cronbach's Alpha	Composite Reliability
Subjective Norms (SN)	SN1 SN2 SN3 SN4 SN5 SN6	0.860 0.883 0.892 0.873 0.891 0.913	0.784	0.945	0.956
Perceived Behavioral Control (PBC)	PBC1 PBC2 PBC3 PBC4 PBC5 PBC6	0.895 0.804 0.880 0.857 0.800 0.859	0.722	0.923	0.940
Consumer Intention (CI)	CI1 CI2 CI3 CI4 CI5	0.794 0.865 0.915 0.917 0.888	0.769	0.924	0.943

Table 3. Discriminant Validity based on the Fornell and Larcker Criterion

	AT	CI	EC	PB	PBC	PC	SN
AT	**0.865**						
CI	0.789	**0.877**					
EC	0.453	0.463	**0.856**				
PB	0.614	0.584	0.614	**0.796**			
PBC	0.718	0.821	0.469	0.617	**0.850**		
PC	-0.229	-0.291	-0.289	-0.366	-0.370	**0.968**	
SN	0.743	0.776	0.424	0.659	0.820	-0.342	**0.885**

Table 4. Discriminant Validity based on HTMT

	AT	CI	EC	PB	PBC	PC	SN
AT							
CI	0.849						
EC	0.482	0.495					
PB	0.665	0.635	0.672				
PBC	0.774	0.888	0.498	0.671			
PC	0.237	0.303	0.301	0.392	0.386		
SN	0.782	0.829	0.444	0.706	0.879	0.352	

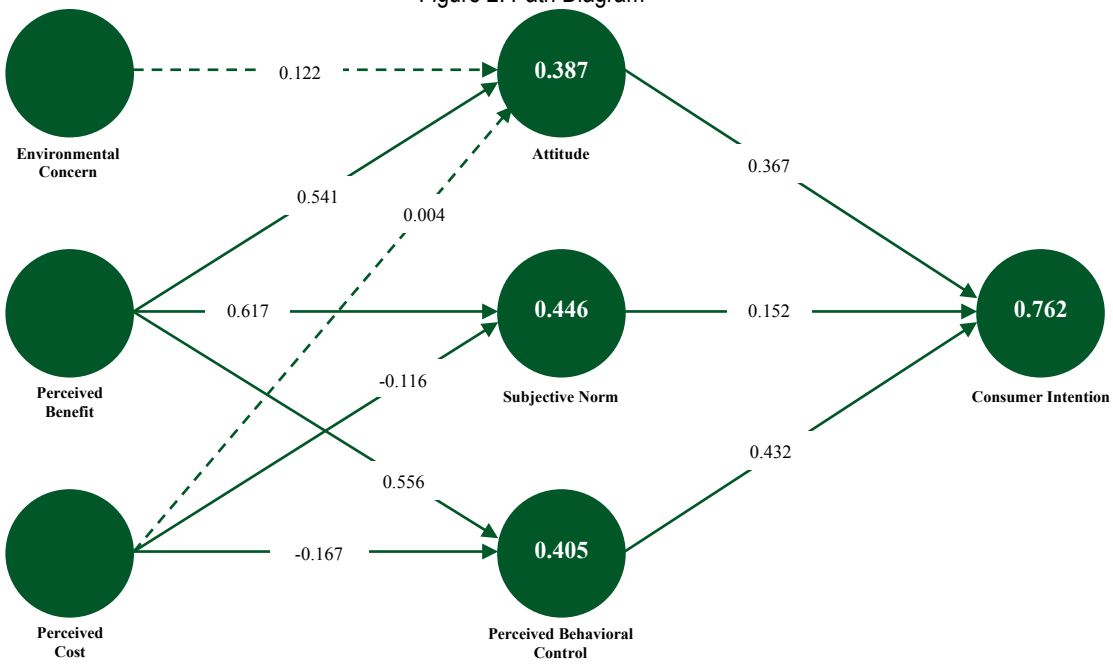
The bootstrapping procedure with 5,000 sub-samples in Table 5 and Figure 2 shows that 8 out of 10 hypotheses were supported. Environmental concern, perceived benefits, and perceived costs were able to predict

the variability of attitudes towards renewable energy use by 38.7 percent. Even though environmental concerns had a statistically significant influence on attitude, their effect was not substantial (β = 0.122, p<0.05, f^2 = 0.015), which led to the rejection of H1. Perceived benefits were the only significant antecedent of attitude either statistically or substantially (β = 0.541, p<0.001, f^2 = 0.279), which supports H2. The effect of perceived costs on attitudes toward renewable energy was insignificant (β = 0.004, p = 0.470, f^2 = 0.000). Perceived benefits and perceived costs were able to predict subjective norms and perceived behavioral control by 44.6 percent and 40.5 percent, respectively. Perceived benefits had a significant and substantial positive effect on subjective norms (β=0.617, p<0.001, f^2 = 0.596) and perceived behavioral control (β = 0.556, p<0.001, f^2 = 0.450). In contrast, perceived costs had a small significant negative influence on subjective norms (β =-0.116, p< 0.05, f^2 = 0.021) and perceived behavioral control (β=-0.167, p<0.001, f^2 = 0.041). In line with TPB, attitudes (β=0.367, p<0.001), subjective norms (β=0.152, p<0.05), and perceived behavioral control (β=0.432, p<0.001) significantly determined consumer intention to use renewable energy and could explain its variability by 76.2 percent.

Table 5. Hypothesis Testing

Path	β	S.E.	t-value	p-value	f^2	Decision
H1: EC → AT	0.122	0.056	2.179	0.015	0.015	Not Supported
H2: PB → AT	0.541	0.069	7.831	0.000	0.279	Supported
H3: PB → SN	0.617	0.050	12.331	0.000	0.596	Supported
H4: PB → PBC	0.556	0.055	10.063	0.000	0.450	Supported
H5: PC → AT	0.004	0.053	0.075	0.470	0.000	Not Supported
H6: PC → SN	-0.116	0.047	2.471	0.007	0.021	Supported
H7: PC → PBC	-0.167	0.051	3.304	0.000	0.041	Supported
H8: AT → CI	0.367	0.066	5.579	0.000	0.238	Supported
H9: SN → CI	0.152	0.070	2.173	0.015	0.027	Supported
H10: PBC → CI	0.432	0.080	5.397	0.000	0.235	Supported

Figure 2. Path Diagram



This study applied the BRT framework to examine factors leading to the intentions of consumers in using renewable energy. In addition to validating the reasons that support global motives and consumer intentions as has been widely researched before, this research also intended to know the opposing reasons that negatively affect the global motives and consumer intentions to use renewable energy. The findings generally validate BRT that behind the global motives that influence consumer intentions, there are reasons that support and are against an individual's global motives.

Perceived benefits and perceived costs are often a consideration in decision-making. This research found that perceived benefits have the greatest influence on global motives. The higher the perceived benefits, the higher the attitudes, subjective norms, and behavioral control felt by someone to use renewable energy will be (Schulte *et al.* 2022). A person will be more interested in utilizing renewable energy and tell others closest to him about the benefits he perceives that using renewable energy has more advantages than disadvantages. Perceived benefits are also one of the important predictors of consumer attitudes (Bozorgparvar *et al.* 2018). This finding is supported by various previous research, where if someone has felt the benefits of technology, they will be more ready to use the technology (Chen *et al.* 2019). Zervas *et al.* (2021) claimed that the perceived benefits can guarantee that a household will replace the previous technology with the latest technology, or in the case of this research, replace conventional energy with renewable energy.

Perceived costs as an opposing reason have no influence on consumer attitudes toward the use of renewable energy, which is not in line with Ashinze (2021) who reported a negative correlation between perceived costs and their attitudes regarding the use of renewable energy. This study involved middle and upper-class consumers who have the financial ability to use renewable energy. It might cause perceived costs of attitudes to use renewable energy to be irrelevant to these segments. This is in line with an argument by Kumar *et al.* (2020) that a customer's impression of the product costs depends on one's finances. On the other hand, perceived cost negatively affects subjective norms and perceived behavioral control. Renewable energy, especially solar panels, is relatively new so many Indonesians are not familiar with it. Indonesian people have less knowledge and lack an understanding of renewable energy compared to those in developed countries. They need evidence and affirmation from those closest to them regarding the use of renewable energy. The belief of individuals or groups to use renewable energy that is driven by those closest to them will affect their subjective norms with little knowledge to adopt renewable energy (Chow and Chan, 2008). When the individuals in their immediate social circle perceive that the costs of using renewable energy are expensive, they will be less likely to advocate for the use of renewable energy. This lack of understanding will affect a person's confidence in his ability to use renewable energy, especially when the costs involved are quite high. However, if consumers have enough money to invest in renewable energy, they will be able to take advantage of these advancements in renewable energy to boost their self-efficacy and confidence (Ashinze *et al.* 2021).

Against the prediction, environmental concerns do not have a significant effect on attitudes toward using renewable energy. This finding contradicts previous research by Wei *et al.* (2021) that environmental concerns affect attitudes, which in turn influence consumer purchase intentions toward green products. The lack of human concern and knowledge of the environment will affect the balance of nature (Khan *et al.* 2019). Therefore, the greater one's knowledge of the environment is, it will lead to greater environmental concern. Individuals who are highly concerned about the environment are more likely to use renewable energy. Nevertheless, cultural values and the social environment may influence the impact of environmental concerns on customer purchasing behavior (Kaufmann *et al.* 2012). As such, even though Indonesians are aware of environmental issues, it does not necessarily direct them to hold a favorable attitude toward renewable energy unless their sociocultural group encourages them to do so.

The global motives that form the basis of TPB, namely attitudes, subjective norms, and perceived behavioral control are found to have a positive effect on consumers' intentions to use renewable energy. These findings confirm research by Vantamay (2018) and Sharifuddin *et al.* (2022), who discovered that perceived behavioral control has the greatest influence, followed by attitudes and subjective norms. Most respondents are the main decision-makers in their families and come from middle- and upper-class segments. Thus, they have confidence in their financial capabilities and power in decision-making, which makes perceived behavioral control becomes the biggest predictor of intentions to use renewable energy. Attitudes also have a strong effect on the intention to use renewable energy. When someone already believes that renewable energy provides positive benefits, the person will be more likely to use renewable energy. As a collectivistic society, Indonesians are also influenced by those who are deemed significant in their social environment. When one's nuclear family and closest relatives support the use of renewable energy, it will affect one's intention to use renewable energy.

Conclusion and Future Research

This research verifies the behavioral reasoning theory proposed by Westaby (2005) that there are reasons that connect global motives and a person's intentions. While previous research has addressed the obstacles to implementing sustainable energy sources, it has not specifically focused on the effects of adopting solar energy technologies. As a result, the instrument set up in this study captures six key factors influencing the adoption of solar energy technology. The new instrument improves guidelines for researchers investigating renewable energy issues and can thus be regarded as a strategic management tool.

All the hypotheses tested, except for the effect of environmental concern and perceived costs on attitudes, are proven to affect consumer intentions to use renewable energy. This research also found that perceived benefits are the reasons that support the three global motives of consumer intentions to use renewable energy. Since this research involved middle- and upper-class consumers in developing countries, perceived behavioral control is found to have the strongest influence compared to attitudes and subjective norms. It was found that perceived costs are the reason that hinders a person's global motive to use renewable energy. These findings improve our knowledge and understanding of consumer behavior towards solar energy use and provide a suggestion for solar energy equipment manufacturers to redesign their products.

This research also helps marketing practitioners comprehend the theoretical underpinnings of decision-making in different contexts. Practitioners can take advantage of BRT to understand the decision-making process because it is more robust and effective than studies that do not rely on theory. Perceived benefits have been shown to have a greater influence on global motives than the perceived costs of renewable energy. For this reason, by further increasing public education regarding the benefits of using renewable energy, people can understand and be more interested in using it. Renewable energy can also be obtained for free, such as solar resources or continuously flowing water. No large investment is required to process these renewable resources into energy that can be used daily. Renewable energy such as solar cells and photovoltaic cells are highly coveted by all countries as it is environmentally friendly and does not cause any pollution compared to other energy sources, such as coal and fossil fuels. The use of renewable energy may also reduce monthly electricity bills. The research and development of renewable energy, especially photovoltaics, should be continuously pursued to lower its installation and maintenance costs and enlarge market opportunities for photovoltaic or solar cells. In addition, the government and renewable energy-related groups should do more campaigns to provide an educational understanding to the public regarding the cost of renewable energy, where the incurred costs of using renewable energy can provide more significant benefits in the long-run. To achieve renewable energy targets, the government also needs to provide intensive support, not only in the form of directives and plans but also in policies and regulations, as well as support from natural resources.

Despite the findings of this study being consistent with the behavioral reasoning theory, this study has limitations. This study only looked at consumer intention, while the actual behavior may be different. Future research may extend the model by examining customer willingness to pay for renewable energy. The use of renewable energy faces several challenges, one of which is the relatively high cost but with significant benefits, especially for the environment. Therefore, future research can consider enriching BRT in the context of renewable energy by including customer characteristics, product purchasing frequency, and price sensitivity in the model. A comparative analysis of renewable energy product models for various other types of benefits is also needed.

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Credit Authorship Contribution Statement

Tessy Fitriyani Gobel: Writing – original draft, Writing – review and editing, Methodology, Data analysis.
Medya Ramadhan: Writing – original draft, Writing – review and editing.
Iden Aksana Putra Pratama: Writing – original draft, Writing – review and editing.
Evelyn Hendriana: Conceptualization, Writing – review and editing, Supervision.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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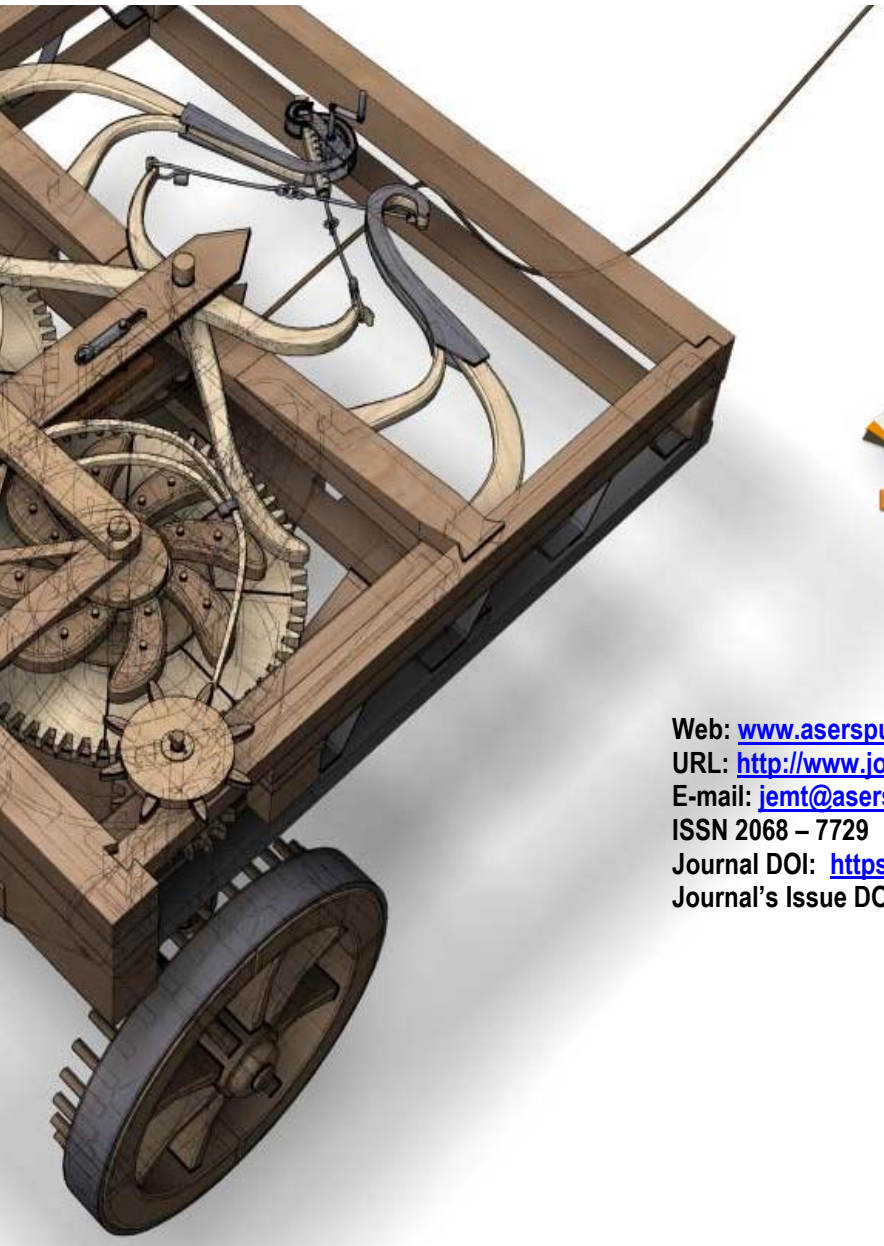

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