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Research Article

Harnessing green energy: An analysis of indonesian consumers' adoption behaviors

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Abstract

As climate change intensifies and global electricity demand rises, this study explores the factors influencing Indonesian consumers' adoption of green electricity, which is vital for transitioning to sustainable energy. This research utilizes the Theory of Planned Behavior (TPB) as its theoretical foundation, supplemented by an extensive survey of 203 Indonesian consumers. Structural Equation Modeling (SEM) was employed to rigorously analyze the relationships between key variables, including attitudes, subjective norms, perceived behavioral control, knowledge, environmental concern, and religious beliefs. The findings demonstrate that consumers in Indonesia generally hold positive attitudes toward green electricity, which significantly drives their intention to adopt it. However, contrary to TPB's conventional assumptions, subjective norms and perceived behavioral control do not substantially impact their decision-making process. Knowledge and environmental concerns also fail to influence consumers' attitudes or intentions significantly. Interestingly, religious beliefs influence subjective norms but do not directly affect attitudes or intentions toward green electricity. This study contributes to the literature on sustainable energy adoption by highlighting the predominant role of consumer attitudes in the Indonesian context while challenging the relevance of other TPB constructs. The insights gained from this research can assist policymakers and industry stakeholders in designing more targeted strategies to promote green electricity adoption in Indonesia, emphasizing cultivating positive attitudes and the integration of culturally relevant motivators.

Keywords:
Consumer behavior;
Green electricity;
Theory of Planned Behavior;
Religious belief;
Government policy

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1. Introduction

According to the International Energy Agency (IEA) reports, global electricity demand increases by 2.4% per year, and it is predicted that by 2030, global electricity demand will reach about 30,600 terawatt-hours (TWh). The increment in global electricity demand is mainly impacted by population growth and global economic growth. Furthermore, the rising temperature of the Earth also increases the demand for air conditioning, which is one of the most significant contributors to global electricity demand. Regrettably, global electricity generation accounted for over one-third of the total CO_2 emissions from the world's energy industry (Agency, 2022). CO_2 emissions have caused the Earth's surface temperature to rise over the past four decades. This rise in temperature is expected to continue if there is no effort to address it, and it will lead to climate change. The adverse impacts of climate change include extreme weather changes, sea level rise, food crisis, water crisis, human health, and impacts on ecosystems and biodiversity (IPCC, 2021).

In Indonesia, the government's ambitious target to achieve 23% renewable energy in the national energy mix by 2024 underscores the urgency to adopt renewable energy. However, the country faces structural barriers that complicate this transition, including limited public engagement and technological adoption challenges. While many studies have explored the technical and policy aspects of renewable energy adoption, a notable gap exists in understanding the behavioral factors influencing consumer adoption of green electricity in the Indonesian context. This study addresses this gap by investigating the psychological and cultural factors that shape consumers' intentions to adopt green electricity using the TPB framework. By focusing on the role of attitudes, subjective norms, perceived behavioral control, knowledge, environmental concern, and religious beliefs, this research seeks to provide a deeper understanding of the drivers and barriers to green electricity adoption in Indonesia.

Green electricity refers to electricity generated from renewable energy sources that have minimal environmental impact, such as solar, wind, and hydroelectric power. This form of electricity is increasingly appealing to consumers who are motivated by environmental concerns (Adachi & Rowlands, 2010). n Indonesia, the government has prioritized these sources to reduce dependence on fossil fuels, improve air quality, and address climate change. Understanding consumer behavior toward these different types of green electricity can help policymakers and industry players design targeted strategies that encourage adoption and align with national sustainability goals.

TPB has been widely used to explain behavior in various disciplines and industry sectors. According to the original TPB, consumer behavior is influenced by attitudes, subjective norms, and perceived behavioral control (Ajzen, 1991). Several studies in the last decade provided empirical evidence about the desire to use new and renewable energy. Current developments in this theoretical framework mention that behavioral, normative, and control beliefs are the basis for the intention to engage in behavior. Behavioral belief is a mental state where individuals believe their behavior will produce specific outcomes. Normative beliefs are expectations that a person or group will approve of the behavior they view. Meanwhile, control beliefs refer to how much individuals believe that supporting or inhibiting factors will be present (Bosnjak et al., 2020). Although the factors that shape intentions have been explained, many critical factors, such as personal values, have not been included in TPB (Ajzen & Schmidt, 2020). It plays a crucial role in molding individuals' intentions by tapping into their beliefs and principles. These values serve as a compass for behaviors, decisions, and actions, reflecting the priorities and significance that individuals assign to them (Elizur & Sagie, 1999).

Religion is a fundamental source of personal values, impacting individuals' moral compass, decision-making processes, and behaviors across various domains of life. Ajzen and Fishbein explained that religiosity is a factor that influences consumer intentions through attitudes and subjective norms (Ajzen & Fishbein, 2021). Studies have demonstrated that religion provides moral codes that guide individual decision-making processes, impacting choices related to occupations and ethical judgments (Rietveld & Hoogendoorn, 2022). It becomes intrinsic to an individual's identity and significantly influences their values, motivating attitudes, and behaviors (Ramasamy et al., 2010). This research addresses the issue by investigating the effects of religious beliefs on behaviors toward renewable electricity. It is essential because religious beliefs potentially serve as a significant motivator for adopting sustainable practices (Bang et al., 2000; Ghazali et al., 2018; Greeley, 1993). It provides a framework for understanding and interacting with the world, including how they engage with environmental issues. People with faith believe that actions driven by their religious convictions possess divine significance and demonstrate their deep commitment to their god (Ghazali et al., 2018; Minton et al., 2015). It enables a deeper understanding of how religious values can be integrated into everyday decisions related to renewable electricity. A religious-based value system can offer individuals and societies an instrument for managing attitudes by providing legitimacy and reason.

This study provides several contributions to the literature on TPB, both theoretical and empirical. First, this study extends the boundaries of the TPB by integrating religious beliefs as a new antecedent that influences consumers' intention to adopt renewable electricity. It also will deepen the understanding of how religious beliefs influence consumer decision-making processes (Kasri & Chaerunnisa, 2022; Khan et al., 2021; Urbatsch & Wang, 2021). This integration not only enriches the theoretical understanding of the factors that influence consumer behavior in the context of sustainability but also offers a more comprehensive perspective by acknowledging the vital role of personal values shaped by religious beliefs (Arli et al., 2018). As such, this study offers new insights

into how individuals interpret and respond to renewable energy initiatives through the lens of religious values, making a significant contribution to the SDG and sustainable development literature (Duong et al., 2024). This study also provides empirical evidence regarding the impact of religious beliefs on the intention to use renewable electricity, which helps fill a gap in the existing literature. Religion can influence behavioral intentions through various predictors. The impact of religion suggests a potential connection between religious beliefs and environmentally conscious behaviors (Duong et al., 2024; Qian et al., 2022). Through this analysis, the study highlights the potential of religious beliefs as a powerful motivator for adopting sustainable practices. By understanding that religious values can motivate individuals toward greener energy solutions, the research paves the way for more focused and culturally sensitive efforts to increase the adoption of renewable energy.

Secondly, in the Indonesian context, this study will fill the gap in sustainable electricity by identifying the factors that influence people's adoption of renewable energy sources. This endeavor is particularly timely and critical, given the ambitious target set by the Indonesian government to incorporate at least 23% renewable energy into the national energy mix by 2024, as stated in the strategic plan by the Government of the Republic of Indonesia in 2014. The amount of sustainable electricity generation capacity required to achieve the target is not explicitly stated. However, the State Electricity Company is expected to increase its renewable energy capacity by 12 GW by 2025. This scenario underscores the urgent need for a strategic approach to accelerate the adoption of renewable energy among the Indonesian population. Considering its properties, TPB can determine factors influencing people's behavior in adopting sustainable electricity and then formulate appropriate policies to meet government targets on national energy (Choo et al., 2022; Sun et al., 2020). This study will leverage the insights provided by TPB to identify these key factors and enable the formulation of targeted and effective policies. Such policies will be instrumental in aligning consumer behavior with the government's renewable energy objectives, thereby facilitating Indonesia's transition toward a more sustainable and environmentally friendly energy paradigm.

2. Literature Review

The global emphasis on reducing carbon emissions has been a driving force behind many environmental policies and technological advancements, particularly in the energy sector. Studies have underscored the significance of emission reduction strategies (Lee & Hussain, 2024; Xu et al., 2022), which discuss approaches in supply chain management and national policies. Similarly, other research explored transportation sector strategies (Bai et al., 2023) and examined emission reduction in hydrogen supply chains under cap-and-trade policies (Peng et al., 2023). While these studies focus on systemic solutions to environmental challenges, understanding consumer behavior remains crucial as it influences adopting sustainable practices, including green electricity. This perspective helps bridge broader environmental goals with the psychological and cultural factors that guide individual decision-making.

Homo economicus or Economic Man is an earlier theory that views a person's decision to consume goods and services is driven by satisfaction compared to the sacrifice it incurs (Persky, 1995). Consequently, price indirectly becomes the only explanatory factor of consumption after the utility (Nicholson & Snyder, 2014). This theory has been a basic premise in classical economics. However, criticisms state that this theory oversimplifies human behavior and does not consider social and psychological factors that influence economic behavior. Therefore, this theory has evolved into more complex economic theories like behavioral theory (Thaler, 2018). It is an approach that assumes behavioral factors influence consumer purchasing decisions. This theory studies how consumers process information, make choices among available alternatives, and consider and make product purchase decisions (Kotler & Keller, 2016). Bandura introduced a cognitive consumer behavior theory, which assumes that consumer behavior is influenced by cognitive processes such as thinking, perception, and decision-making (Bandura, 1977).

Furthermore, Fishbein's research enhanced this idea by asserting that their perceptions and beliefs impact customer behavior about a product or service (Fishbein, 1980). The expansion of the theory is carried out by including the perceived behavior control factor because it sees that other people can influence consumer actions by controlling or influencing their behavior. Thus, consumer behavior is influenced by attitudes, subjective norms, and perceived behavioral control, known as the TPB (Ajzen, 1991).

2.1. Theoretical framework

The variables in this study are grounded in the TPB, a well-established framework for predicting human behavior in various contexts, including environmental and energy-related decisions. Initially introduced in 1985, TPB has evolved through continued reflections and applications (Ajzen, 1985, 1991, 2011; Ajzen & Fishbein, 2021; Ajzen & Schmidt, 2020). It has been widely utilized in predicting and modifying behaviors related to technology use, entrepreneurship, agricultural practices, and even ethical consumption (Ajzen, 2020; Idrees et al., 2022; Istiasih, 2022; Khotimah et al., 2022). Researchers have applied TPB to diverse contexts such as educational settings, health promotion programs, and even in predicting cheating behavior among students (Anal & Singh, 2023; Duncan et al., 2012; Jones et al., 2017). The model has been instrumental in understanding factors influencing behaviors like job satisfaction, safety attitudes in the workplace, and adherence to treatment programs (Ajzen, 2011; Hebert et al., 2010; Jeffries, 2011). It has been successfully used in studies on entrepreneurial intentions, online learning behavior, and consumer buying behavior post-pandemic (Anh et al., 2022; Istiasih, 2022;

Ojwan'g, 2019). Moreover, TPB has also been integrated with other models and theories to enhance its explanatory power (Allini et al., 2017; Wang & Lin, 2016). The Theory of Planned Behavior by Ajzen has demonstrated its robustness and applicability in various fields, making it a cornerstone in behavioral research and interventions.

TPB posits that behavior is primarily influenced by three key factors: attitude, subjective norm, and perceived behavioral control. Previous studies have widely used these constructs to explain consumer behavior in adopting sustainable practices, including renewable energy.

1. Attitude reflects an individual's positive or negative evaluation of adopting green electricity. According to TPB, attitude is a critical predictor of intention, as consumers are more likely to engage in behaviors they view favorably. Prior studies on green electricity adoption have consistently demonstrated that positive attitudes toward environmental benefits strongly predict the intention (Ajzen, 2011; Ajzen et al., 2020; Waris et al., 2023).
2. Subjective Norm (SN) refers to the perceived social pressure to perform or not perform the behavior. TPB suggests that if consumers believe that significant others (such as family, friends, or society) expect them to adopt green electricity, they will be more likely to form an intention to do so. Previous research has shown mixed results regarding the influence of subjective norms on green energy adoption, which warrants further exploration in this study (Bhutto et al., 2022).
3. Perceived Behavioral Control (PBC) reflects the individual's perception of the behavior's ease or difficulty. TPB posits that when consumers feel they have control over the factors that enable or hinder their use of green electricity, they are more likely to form the intention to adopt it. PBC includes aspects such as access to green electricity options and financial ability. While some studies have shown a significant role of PBC in influencing intention, others have found it less impactful, especially in emerging markets (Ali et al., 2021).

The selection of these variables is based on their proven significance in numerous studies related to consumer behavior, particularly in renewable energy adoption. Attitude, subjective norm, and perceived behavioral control have been repeatedly shown to be strong predictors of intention in various behavioral domains, including environmental and energy-related decisions (Ajzen, 1991; Hua et al., 2019; Waris et al., 2023). The consistency of these findings across different contexts supports the robustness of these constructs in explaining consumer decisions to adopt sustainable technologies such as green electricity. In the specific context of Indonesia, these variables are particularly relevant given the growing public awareness of environmental issues and the government's push for renewable energy adoption. However, cultural and social dynamics may influence the relative importance of each factor, which is why this study seeks to explore the role of these variables within the Indonesian market. Using these well-established constructs from the TPB, this study aims to provide insights into the factors driving green electricity adoption and contribute to the broader understanding of consumer behavior in emerging markets.

The concept that attitudes can effectively predict a person's behavior was initially proposed by Ajzen (Ajzen, 1991). This concept has been widely applied and validated, including in the renewable energy field. Many studies in this area collectively reinforce Ajzen's theory by illustrating that attitudes are not just passive dispositions but strong consumer and corporate behavior predictors. These studies explain the significant correlation between consumer attitudes and subsequent behavior and intentions (Bhutto et al., 2022; Hua et al., 2019; Waris & Ahmed, 2020; Yee et al., 2022; Zulu et al., 2022). On the demand side of the renewable energy market, there is a clear positive correlation between consumers' attitudes toward renewable energy and their intentions to adopt such solutions. As highlighted in the study by Zulu, Zulu, and Chabala on solar energy, consumers' attitudes positively influence their desire to utilize solar energy solutions. Attitudes also play an essential role in shaping consumer preferences for energy-efficient appliances (Zulu et al., 2022). This phenomenon has been thoroughly explored in other studies to underline the predictive power of consumer attitudes in determining their choices for energy-efficient appliances and technologies (Bhutto et al., 2022; Hua et al., 2019; Waris et al., 2023). On the supply side, the influence of attitudes on intentions is also evident. Companies' attitudes toward renewable energy significantly determine investment decisions in this sector. Positive attitudes within firms toward renewable energy were strongly correlated with their intentions to invest in the emerging field. It highlights the broader impact of attitudes. In addition to impacting individual consumer behavior, attitudinal aspects also influence corporate investment strategies and the overall growth of the renewable energy sector (Yee et al., 2022).

Subjective norm is a concept that has its roots in social psychology and plays a vital role in influencing behavior. Several vital studies have explored the influence of subjective norms on consumer behavior in the renewable energy sector, highlighting how it can predict consumer actions and preferences. They collectively illustrate that individuals' perceptions and attitudes toward people in their social circle can significantly shape their behavior toward choosing renewable energy (Daiyabu et al., 2023; Nie et al., 2019; Yüzüak & Erten, 2018). Subjective norms were also found to be closely related to investment intentions in renewable energy. Individuals are strongly influenced by their perceptions of support and expectations from those around them when deciding to use renewable energy. It is also worth highlighting the potential for policies to encourage social support to influence individual intentions toward renewable energy investment positively (Daiyabu et al., 2023). Precaution or wisdom in energy use emerges as an essential

component in renewable energy studies. In particular, it has been found that subjective norms are a crucial driver of prudent behavior in the context of energy use. This finding emphasizes the importance of the power of societal expectations in encouraging individuals to adopt more responsible and sustainable energy practices (Nie et al., 2019). In addition, subjective norms have been identified as a significant explanatory factor for consumer behavior in energy conservation. Perceived social pressures and expectations have been shown to drive consumers toward more energy-efficient behaviors and choices (Yüzüak & Erten, 2018). Subjective norms are emerging as an essential determinant of consumer behavior and intentions in the renewable energy sector. These norms include societal expectations and perceived support. It not only influences individual choices in energy consumption and conservation and plays an important role in shaping investment decisions in renewable energy. It can thus foster the development and sustainability of the sector.

PBC is a concept integral to the theory of planned behavior, which refers to a person's belief in their ability to perform a particular action. This principle states that when a person believes they can act, it increases their likelihood of performing the behavior (Ajzen, 1991). This concept has been researched extensively in the context of renewable energy and shows its strong influence on consumer intentions and behavior. PBC is a marginal and important determinant in shaping consumer intentions toward renewable energy. The relationship between PBC and consumer behavior is underscored by the idea that when individuals feel empowered and in control of their actions, their intention to engage in a desired behavior, such as purchasing, is substantially strengthened. It implies that perceived control is not just a passive cognitive state but actively shapes decision-making (Srivastava & Mahendar, 2018). Research focusing on individual attitudes and feelings shows that PBC plays a significant role in developing positive intentions toward energy-efficient behaviors. Individuals can develop positive intentions by fostering confidence in their attitudes and feelings toward renewable energy, triggering certain pro-environmental behaviors. This approach underscores the transformative potential of PBC in encouraging more sustainable consumer choices and behaviors (Hamouri, 2023). PBC acts as a strong predictor in this domain. As individuals perceive a higher level of control over the installation and use of such systems, their intention to adopt solar energy increases significantly (Waris et al., 2023). Perceived Behavioral Control is emerging as essential in understanding and influencing consumer behavior in the renewable energy sector. Individuals are more likely to adopt renewable energy technologies by paying attention to and enhancing these perceptions.

H1: Attitude has a positive impact on intention.
H2: Subjective Norm has a positive impact on intention.
H3: Perceived Behavioral Control has a positive impact on intention.

2.2. Additional construct of TPB

In addition to the core variables of attitude, subjective norm, and perceived behavioral control as posited by TPB, this study includes knowledge, environmental concern, religious belief, and government policy. These constructs are incorporated based on their relevance to consumer behavior, particularly in the context of renewable energy adoption. Knowledge is included to capture the role of consumer awareness about green electricity, as more informed individuals tend to exhibit stronger intentions to adopt renewable energy (Hamouri, 2023). Environmental concern reflects individuals' general awareness and care for environmental issues, which can drive pro-environmental behavior (Bang et al., 2000). In the Indonesian context, religious belief is added to explore the potential influence of religious values on sustainable practices (Minton et al., 2015), while government policy is included to assess how external regulatory and promotional factors shape consumer behavior (Ali et al., 2021). By incorporating these additional constructs, this study aims to provide a more comprehensive understanding of the factors influencing green electricity adoption. The detailed explanation and rationale for incorporating each of these additional variables are provided in the following sub-sections

Knowledge and Intention

Individuals who are well-informed about a particular behavior are more likely to develop the intention to perform that behavior. This principle highlighted the power of information awareness in shaping attitudes and abilities, thereby influencing behavior (Ajzen, 1991). In the field of renewable energy and sustainable practices, the correlation between knowledge and behavior has been demonstrated through various studies. These studies highlight how sufficient knowledge will foster positive attitudes toward behavior and also increase an individual's sense of ability to perform it. As a result, increased knowledge and positive attitudes significantly increase the likelihood of the behavior being performed. The study in China provides strong evidence of this dynamic. It was found that environmental knowledge markedly increased the intention to purchase solar energy products. This finding illustrates that when individuals are better informed about solar energy's environmental impacts and benefits, their propensity to invest in solar solutions increases significantly (Asif et al., 2023).

Similarly, research by Xin and Long delved into the realm of consumer product knowledge, primarily focusing on ecological labels. Their findings revealed that knowledge of ecological labels positively influences consumers' beliefs in sustainable product consumption and shapes their eco-friendly attitudes. It suggests that when consumers understand the importance of ecological labels and their implications, they are more likely to engage in environmentally responsible consumption behavior (Xin & Long, 2023). These studies collectively underline the importance of continuously raising consumer awareness

to drive the successful development of renewable energy. A more informed and environmentally conscious consumer base can be developed by improving the general public's understanding of environmental issues, renewable energy technologies, and sustainable practices. In turn, the public will be more likely to make choices aligned with environmental sustainability.
H4: Knowledge has a positive impact on intention

Environmental concerns and attitude

Environmental awareness is a concept that encompasses an individual's awareness, concern, and understanding of environmental issues and their associated impacts. The concept plays an essential role in shaping attitudes and behaviors, particularly in the context of environmental responsibility and sustainability. Individuals with a high sense of environmental stewardship often exhibit a strong sense of responsibility toward the environment, which influences their behavioral choices, especially regarding the use of renewable energy. Several studies collectively show that individuals with high environmental concerns are more aware of environmental issues and more likely to take proactive steps in addressing these issues, such as adopting renewable energy. The relationship between environmental concerns and renewable energy adoption has been well documented in various studies. For example, the study conducted by Bang, Alexander, and Patrick establishes a direct correlation between environmental concern and increased consumer willingness to use renewable energy. This finding underlines the importance of environmental awareness in motivating individuals to choose more sustainable energy sources (Bang et al., 2000). A comprehensive study in Lithuania by Liobikienė, Dagiliūtė, and Juknys investigated the determinants of intention to use renewable energy. Their research convincingly found that environmental concern and attitude significantly contributed to the intention to use renewable energy. This study reinforces that environmental concern is not just a passive state of awareness but actively influences individuals' decisions to embrace renewable energy solutions (Liobikienė et al., 2021). In addition, research by Arısal and Atalar highlighted the social dimension of environmental concern. They found that individuals who value group goals and collaboration are more likely to make ecological or environmentally friendly decisions. This belief stems from the perception that individual actions can significantly impact environmental issues. This perspective underscores the communal nature of environmental concerns, emphasizing the importance of collective values and collaborative efforts in promoting sustainable environmental practices (Arısal & Atalar, 2016). Thus, environmental concern is vital in shaping individual attitudes and behaviors toward environmental sustainability and renewable energy adoption. Thus, fostering environmental stewardship is critical to promoting sustainable behavior and accelerating the adoption of renewable energy technologies.
H5: Environmental Concern has a positive impact on attitude

Religious *belief, attitude, and subjective norm*

Religious beliefs are a fundamental aspect of personal identity and often influence decision-making in various domains, including environmental behavior. Previous studies have shown that religiosity can impact consumer choices, particularly when religious teachings align with ethical and sustainable practices (Ghazali et al., 2018; Minton et al., 2015). However, much of the religious beliefs and consumer behavior literature has focused on specific contexts, such as halal food consumption or digital piracy (Amalia et al., 2020; Arli et al., 2018). While these studies offer valuable insights, they have largely overlooked the potential influence of religious beliefs on environmentally responsible behaviors, such as adopting green electricity. This oversight represents a critical gap in the literature, particularly in countries like Indonesia, where religion plays a significant role in shaping social norms and everyday behavior. By addressing this gap, our study explores how religious values might influence personal attitudes and broader social expectations (subjective norms) regarding green energy adoption.
Furthermore, although the TPB has been widely used to explain consumer behavior in various contexts, few studies have explicitly integrated religious beliefs into the TPB framework when examining sustainable energy adoption. Including religious beliefs as a factor influencing attitudes and subjective norms adds a new dimension to the TPB model, offering a more comprehensive understanding of the motivations behind green electricity adoption. This extension of TPB allows us to explore whether religious individuals are more likely to adopt green electricity due to perceived moral obligations, as suggested by previous research on religious values and pro-environmental behavior (Ramasamy et al., 2010). However, it is also essential to consider the potential limitations of this approach. While previous studies have demonstrated a strong connection between religiosity and certain consumer behaviors, the influence of religious beliefs on energy-related decisions may vary depending on the level of environmental awareness within religious communities (Ghazali et al., 2018). Thus, our research seeks to critically assess whether religious beliefs significantly predict green electricity adoption in Indonesia, filling a notable gap in the existing literature.
H6: Religious Belief has a positive impact on Attitude
H7: Religious Belief has a positive impact on Subjective Norm

Government policy, perceived behavioral control, and knowledge

The collective views and attitudes of the public can significantly influence the direction, implementation, and success of various policies, including those related to energy. Public opinion plays a vital role in shaping policy, especially in democratic societies, as it can act as both a driver and a constraint (Drews & Bergh, 2015). Energy policy analysis requires a thorough understanding of the

factors that shape public opinion on energy choices. It includes environmental concerns, economic considerations, and socio-cultural influences. The interaction of these factors contributes to the formation of public opinion, which then impacts the development and adoption of energy policies (Stokes & Warshaw, 2017).
Several studies have recognized that many factors directly correlate with energy and the environment. These factors are critical in shaping public perceptions and attitudes toward energy policies and environmental initiatives. The government is crucial in increasing public engagement and support for renewable energy-related initiatives. A comprehensive marketing strategy is needed to improve the understanding and accessibility of information on energy policy and environmental issues. This plan should include broad measures to make the information affordable and accessible to all users. One effective strategy is to increase the accessibility of information on energy policies and environmental issues (Alam et al., 2021). Government policy is an influential factor in predicting and explaining behavior. Government actions and policies can determine public behavior directly through regulations and incentives and indirectly through shaping societal norms and expectations (Ali et al., 2021).

H8: Government Policy has a positive impact on Perceived Behavioral Control.

H9: Government Policy has a positive impact on knowledge.

2.3. The complete construct

Exploring additional constructs within the TPB in this study highlights the incorporation of Knowledge, Environmental Concern, Religious Belief, and Government Policy as significant factors influencing consumer behavior toward green electricity. Knowledge about renewable energy and its benefits is posited to enhance individuals' attitudes and perceived behavioral control, thereby increasing their intention to use green electricity. Environmental concern, reflecting individuals' awareness and worry about environmental issues, is expected to positively influence their attitudes toward sustainable energy practices. Religious belief is essential, as it can shape individuals' attitudes and subjective norms through moral and ethical values derived from religious teachings. The study posits that solid religious beliefs can motivate pro-environmental behavior and support for renewable energy adoption. Government policy is another critical construct influencing perceived behavioral control and knowledge by providing incentives, regulations, and informational campaigns to promote green electricity usage. These additional constructs enrich the TPB framework by acknowledging the broader socio-cultural and policy-related factors that can drive consumer behavior in the context of sustainable energy adoption. The complete construct of this study is presented in Figure 1.

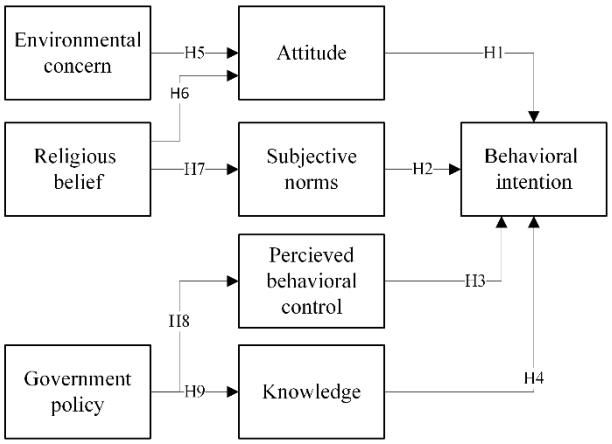

Fig.1. Research model

The inclusion of these variables is directly reflected in the formulation of the study's nine hypotheses, each grounded in the core constructs of TPB and the additional variables integrated into the model. The first three hypotheses are based on the core constructs of TPB:

- Attitude (H1) is hypothesized to positively impact intention, as consumers with favorable attitudes toward green electricity are likelier to adopt it. It is supported by extensive literature linking positive attitudes to behavioral intentions.
- Subjective norm (H2) is included to test the influence of perceived social pressure on intention. It hypothesizes that individuals who feel that significant others (family, friends, or society) support the adoption of green electricity will be more likely to form an intention to adopt it.
- Perceived behavioral control (H3) is hypothesized to positively affect intention, reflecting the belief that when consumers perceive ease or control over adopting green electricity, they will be more inclined to do so.

In addition to the core TPB constructs, this study incorporates several additional variables:

- Knowledge (H4) is hypothesized to positively influence intention, assuming that consumers who are more informed about the benefits and availability of green electricity will have stronger intentions to adopt it.
- Environmental concern (H5) posits that individuals with a higher concern for environmental issues are more likely to form intentions to adopt renewable energy solutions.
- Religious belief (H6) is included to examine the potential influence of religious values on consumer intention, particularly in Indonesia, where religious teachings may promote pro-environmental behavior.
- Government policy (H7) is hypothesized to positively influence intention by providing external support through financial incentives, regulations, or

promotional campaigns that facilitate the adoption of green electricity.

Further, the study also considers how government policy interacts with other constructs:

- Government policy and perceived behavioral control (H8) explore whether government policies enhance consumers' perceptions of control over green electricity, making it easier for them to adopt renewable energy.
- Government policy and knowledge (H9) investigates whether government efforts to promote green electricity increase consumer knowledge, influencing their adoption behavior.

This study provides a comprehensive framework for examining the factors influencing green electricity adoption in Indonesia by linking these variables to specific hypotheses. The hypotheses are designed to test these variables' direct and interactional effects on consumer intention, contributing to a broader understanding of consumer behavior in renewable energy adoption.

The Theory of Planned Behavior (TPB) is applied to various disciplines, but in the Indonesian context, there is still a gap in understanding how socio-cultural and environmental factors influence green electricity adoption behavior. Many studies have applied the core constructs of the TPB to model consumer intentions. However, recent research suggests that consumer behavior in adopting renewable energy is shaped by more complex influences. These include personal knowledge, environmental concerns, religious beliefs, and government policies. Many studies have investigated the environmental concern and government policy factors separately, but few have integrated them within the SDG framework. This is especially true in developing countries like Indonesia, where socio-cultural factors still play an important role.

This research aims to close that gap by including additional constructs that are less explored in the current literature. Particularly, in developing emerging economies such as Indonesia where such additional factors are seen as an integral part of consumer behavior. Thus, this research framework provides a more comprehensive approach to understanding green electricity adoption by considering psychological and socio-cultural factors and bridges the gap in the theoretical and empirical literature on renewable energy adoption in Indonesia.

3. Methodology

Naturally, this research uses Structural Equation Modeling (SEM) to analyze the TPB for several reasons. TPB aims to find the relationship between the complex constructs of attitude, subjective norm, perceived behavioral control, and knowledge. Meanwhile, SEM is a multivariate hypothesis-based technique on structural models representing hypotheses about causal relationships among several variables (Harrison et al., 2007). SEM allows researchers to model and explain latent variables that cannot be observed directly through observable variables or indicators. It allows us to test and understand the relationships between complex psychological constructs in a more comprehensive theory or model (Hua et al., 2019). In addition, SEM is also used to build statistical models that can be accounted for theoretically and statistically (Lopes et al., 2019).

Simple linear regression and route analysis are two other techniques that researchers often use when doing TPB analyses. A test of the correlation between independent factors, such as a set of attitude variables, personal norms, and perceived behavioral control, and dependent variables, such as the purchase intention of organic customers, is performed with the use of a technique known as simple linear regression (Santos et al., 2021). Meanwhile, path analysis is used to model the relationship between variables in the TPB and test hypotheses regarding the causal paths involved. As shown by Elahi's research, there was a favorable correlation between the coefficients of attitude toward environmental protection, subjective norms of sustainable behavior, lack of power availability, perceived behavior control, and relative benefits and the desire to install a PV water pump (Elahi et al., 2022). Both approaches look for a linear correlation between the dependent and independent variables and use inferential statistics to determine the link's significance. Path analysis, as opposed to linear regression, may often provide a better explanation of the TPB in models that include simultaneous linkages. When the construct model gets more complicated because it contains feedback between variables, SEM is more suitable to utilize when attempting to understand TPB.

The integration of the Theory of Planned Behavior (TPB) with Structural Equation Modeling (SEM) provides a powerful framework for examining consumer intentions toward green electricity. TPB offers a well-established theoretical foundation to explore how attitudes, subjective norms, and perceived behavioral control influence behavior, while SEM enables the testing of complex relationships among these constructs, including direct and indirect effects. As illustrated in Figure 1, the path diagram represents these hypothesized relationships within the SEM framework, visually mapping how each construct—such as attitudes, subjective norms, and additional factors like environmental concern and government policy—contributes to the intention to adopt green electricity.Compared to simpler methods like regression analysis, SEM allows for a more comprehensive analysis by modeling latent variables and accommodating multiple predictors simultaneously. This approach is particularly valuable in the context of this study, as it enables a nuanced understanding of the cultural and behavioral dynamics influencing green electricity adoption in Indonesia.

This research used an anonymized survey that did not collect personal information that could identify respondents and focused on collecting public opinion data on non-sensitive general attitudes, such as consumer preferences for green energy. Therefore, according to the American Psychological Association (APA) ethical principles and code of conduct article 45 CFR 46.104(d),

the survey did not require ethical approval from the relevant ethics committee. However, the study upheld ethics by adhering to general ethical principles, including providing complete information on the purpose of the study and the role of respondent involvement and obtaining full written consent from each participant. Before answering the questionnaire, potential respondents were informed that their information would be kept confidential. The form and list of questions of the questionnaire used are shown in Table 1. Each construct will have more than one question, according to Azjen's suggestion (Ajzen, 1985)The questionnaire has been consulted with other researchers and experts to determine its appropriateness. It is measured using a Likert scale with a range of one to seven.

4. Data

The data used in this study was obtained through a questionnaire survey distributed to the general public in Indonesia. The questionnaire was designed based on the TPB. It included questions measuring attitude, subjective norms, perceived behavioral control, knowledge, environmental concerns, religious beliefs, government policies, and intention to use green electricity. TPB-related research has also used convenience sampling (Dörnyei & Griffee, 2010). Respondents were selected using the Non-probability Convenience Sampling technique, which means they were selected based on their availability and willingness to participate. The selected sample is based on the study's objectives by setting specific practical criteria such as ease of access and willingness to participate in answering questions (Etikan, 2016). The primary purpose of convenience sampling is to collect information from participants who are easily accessible to researchers (Dörnyei & Griffee, 2010).

The survey involved 203 respondents above 18 years old working full-time in Indonesia. In addition to reaching the age of majority, respondents must be employed full-time in a position that enables them to become customers of the state energy company and independently pay their electricity bills. Data is obtained by giving questionnaires to the general public residing in Indonesia. The data was collected between October and November 2022 and consisted of various demographic characteristics of the respondents, such as age, gender, occupation, domicile, and whether they were already using renewable energy. This data shows a varied distribution of respondents, with the majority coming from Yogyakarta, West Java, Jakarta, and Central Java. The information collected from this questionnaire is available upon request and remains anonymized to protect the privacy of respondents. No funding was received for this study, and the data is available to other researchers who wish to conduct further analyses on maintaining the confidentiality of respondents' identities and using the data per the stated research objectives.

Table 1
Questionnaire Questions Used

Constructs		Inquiry
Intention (I)	VAR00001	I plan to use electricity generated from renewable energy as opposed to coal, oil, or gas.
	VAR00002	I am willing to pay to use electricity generated from renewable energy.
Attitude (A)	VAR00003	Electricity sourced from renewable energy contributes to pollution reduction.
	VAR00004	I plan to recommend to others to use electricity generated from renewable energy.
Subjective Norm (SN)	VAR00005	People I respect support me to choose electricity sourced from renewable energy.
	VAR00006	I use electricity sourced from renewable energy because of the influence of people around me.
	VAR00007	I use renewable energy electricity because my religious leaders also use it.
Perceived Behavioral Control (PCB)	VAR00008	I will easily get electricity from renewable energy
	VAR00009	I can afford to buy electricity generated from renewable energy.
Knowledge (K)	VAR00010	I know where to find information on renewable energy-generated electricity.
	VAR00011	I am aware of bank financing opportunities for electricity installations generated from renewable energy.
	VAR00012	I know that electricity generated from renewable energy is good for the environment.
Environmental Concern (EC)	VAR00013	I am concerned about pollution issues
	VAR00014	I care about global warming.
	VAR00015	I care about waste issues.
Religious Belief (RB)	VAR00016	My religious beliefs influence my actions
	VAR00017	My religious beliefs encourage me to use electricity sourced from renewable energy.
Government Policy (GP)	VAR00018	Government incentives support the choice of electricity sourced from renewable energy.
	VAR00019	The government's renewable electricity campaign encourages people to choose renewable electricity.

5. Result

5.1. Respondent Characteristics

The total number of respondents in this study is 203 people and had several characteristics, including age, gender, occupation, domicile of residence, and whether they were renewable energy users. The respondents ranged from 19-56 years, with most respondents aged 44 years (16.26%). There were 138 (67.98%) male respondents and 65 (32.02%) female respondents. The types of jobs held by the respondents varied, with the majority of respondents working as employees (24.63%) and lecturers (24.14%). The place of residence of the respondents is divided into 29 regions, with Yogyakarta (21.67%), West Java (14.29%), Jakarta (13.79%), and Central Java (13.30%) being the residence of the majority of respondents. Regarding knowledge of the source of electrical energy used, 150 (73.89%) respondents did not use renewable energy, 21 (10.34%) respondents used renewable energy, and 32 (15.76%) respondents did not know the source of energy used.

5.2. Validity Test

The validity test is carried out by calculating the r value and compared with the r table value. The questionnaire is considered valid if the value of r count > r table. With 203 respondents, the r table value will be 0.138 with a significance level of 5%. The calculated r value was calculated using SPSS software by looking at the total value of each question indicator. These calculations show that all indicators have a calculated r value greater than 0.138, so it can be concluded that the questionnaire made can be valid if used for the intended research. The calculated r values of all constructs are shown in Table 2.

Table 2
Pearson Product Moment Results

Variable	Table r value	Calculated r value	Conclusion
VAR00001	0.138	0.576	Valid
VAR00002	0.138	0.516	Valid
VAR00003	0.138	0.456	Valid
VAR00004	0.138	0.634	Valid
VAR00005	0.138	0.603	Valid
VAR00006	0.138	0.489	Valid
VAR00007	0.138	0.421	Valid
VAR00008	0.138	0.542	Valid
VAR00009	0.138	0.519	Valid
VAR00010	0.138	0.440	Valid
VAR00011	0.138	0.500	Valid
VAR00012	0.138	0.424	Valid
VAR00013	0.138	0.466	Valid
VAR00014	0.138	0.466	Valid
VAR00015	0.138	0.434	Valid
VAR00016	0.138	0.431	Valid
VAR00017	0.138	0.551	Valid
VAR00018	0.138	0.408	Valid
VAR00019	0.138	0.541	Valid

Pearson's product moment analysis evaluates construct validity based on their correlation values. Table 2 shows that each variable has a high significance value, which tells us that the variables are worthy of being included in the construct. This study saw that the significant correlation value was between 0.05 to 0.01. This indicates that the relationship between the variables is statistically strong thus increasing confidence in using the variables in this study.

5.3. Reliability Test

Most of the Cronbach's Alpha values of the TPB constructs created are greater than 0.7 or acceptable, but some constructs show values below this limit. Acceptable constructs are constructs for Intention, Attitude, Environmental Concern, Religious Belief, and Government Policy for constructs with low alpha values: Subjective Norm, Perceived Behavioral Control, and Knowledge. In some previous studies, low alpha values were also found. Although there is a low construct value, considering the internal consistency of the entire construct or the value of 0.815, this value is still acceptable. However, the interpretation of the final results of the questionnaire will need to be done carefully. The overall results of the reliability test can be seen in Table 3.

Cronbach's Alpha value indicates the reliability of each construct. In Table 3, it is observed that some constructs have values slightly below 0.7. However, figures above 0.6 have proven to be good enough in social science research, especially in exploratory research. This small difference often occurs in studies with complex constructs. This does not have a major effect on the reliability of the research so that the construct is considered stable enough to be studied further in this research model.

Table 3
Results of Conbach's Alpha Questionnaire

Construct		Cronbach's Alpha	Mean	SD.
Intention	VAR00001	0.772	5.77	1.297
	VAR00002		5.56	1.274
Attitude	VAR00003	0.735	6.31	1.093
	VAR00004		5.79	1.247
Subjective	VAR00005	0.580	5.39	1.425
Norm	VAR00006		4.07	1.734
	VAR00007		2.93	1.742
Perceived Behavioral	VAR00008	0.511	4.11	1.758
Control	VAR00009		5.06	1.375
Knowledge	VAR00010	0.526	4.09	1.862
	VAR00011		3.4	1.889
	VAR00012		6.24	0.997
Environmenta	VAR00013	0.924	6.46	0.81
l Concern	VAR00014		6.36	0.909
	VAR00015		6.51	0.773
Religious	VAR00016	0.832	5.44	1.797
Belief	VAR00017		4.63	1.869
Government	VAR00018	0.840	5.2	1.764
Policy	VAR00019		5.22	1.68

5.4. Goodness of Fit Test

The constructed model shows a Goodness-of-Fit (GoF) value or an acceptable fit. The GoF value is measured

using six criteria, namely CMIN/DF shows a value of 1.463, RMSEA shows a value of 0.046, CFI shows a value of 0.968, TLI shows a value of 0.955, PGFI shows a value of 0.583, and PNFI shows a value of 0.641. All criteria used to measure suitability showed acceptable values. The results of the calculated values and their comparison with the cutoff values of each criterion are shown in Table 4. This fit also confirms that the model is valid and can explain the relationship between the variables accurately.

Table 4
Goodness-of-Fit Calculation Results

GOF Category	Measure	Accept Values	Values	Conclusion
Absolute Fit	CMIN/DF	≤ 3	1.436	Fit
	RMSEA	≤ 0.05	0.046	Fit
Incremental Fit	CFI	≥ 0.90	0.968	Fit
	TLI	≥ 0.90	0.955	Fit
Parsimony Fit	PGFI	≥ 0.50	0.583	Fit
	PNFI	≥ 0.50	0.641	Fit

5.5. Confirmatory analysis hypothesis testing

Modifications were made to the model to improve the final results of the confirmatory analysis. The modification is done by following the recommendations of the AMOS 21 application in Modification Indices. Table 5 shows the value of the loading factor results from the model created. Based on these results, the constructs or variables that show a positive relationship consist of religious beliefs affecting subjective norms and attitudes affecting intention. Other variables show no significant relationship based on the loading factor value. Table 5 also confirms the hypothesized relationships and shows the strength of each construct's contribution. Therefore, providing critical insight into how each variable influences intention and behavior.

Table 5
Confirmatory Analysis Result Value

			Estimate	Cutoff
A	<---	EC	.210	≥ 0.4
K	<---	GP	.174	≥ 0.4
A	<---	RB	.211	≥ 0.4
SN	<---	RB	.423	≥ 0.4
PCB	<---	GP	.170	≥ 0.4
I	<---	A	.823	≥ 0.4
I	<---	SN	-.016	≥ 0.4
I	<---	PBC	.190	≥ 0.4
I	<---	K	-.012	≥ 0.4

6. Discussion and Implication

Attitude has a positive impact on Intention (H1 accepted). Respondents believe that the use of green electricity will reduce pollution. They have enough confidence to recommend using green electricity. This conclusion is consistent with several research findings. The impact comes from altruistic attitudes, where consumers feel better after using specific products (Bhutto et al., 2022). These products are believed to improve consumers' quality of life (Hua et al., 2019), reduce electricity from conventional sources, and minimize carbon emissions (Waris et al., 2023). This conclusion confirms that attitude strongly predicts green energy use (Zulu et al., 2022).

Subjective Norms do not positively impact intention (H2 rejected). This result contrasts with many TPB studies where the subjective norm is an explanatory factor for Intention (Daiyabu et al., 2023; Nie et al., 2019; Yüzüak & Erten, 2018). However, this finding is consistent with the research (Du et al., 2021; Pollard, 2015). This difference in findings could be due to many factors, such as demographic, social, educational, or economic differences. This study was conducted broadly with respondents coming from various provinces in Indonesia. They ranged in age from 19-56 years old, resided in 29 regions in Indonesia, and had different educational and occupational backgrounds. Respondents have diverse social preferences (Du et al., 2021). The results of this study can also indicate that respondents have complete control over their behavior, or in other words, the people around the respondents do not significantly influence the behavior of the respondents.

This study also found that Perceived Behavioral Control does not positively impact Intention (H3 rejected). These findings contradict previous research, which suggested that PBC significantly influences consumers' intention to adopt renewable energy (Hamouri, 2023; Srivastava & Mahendar, 2018; Waris et al., 2023). However, the results of this study are consistent with findings that PBC does not significantly affect consumer intention in the context of renewable energy adoption (Bhutto et al., 2021). PBC is not a determining factor of intention that the factor of collectivism can cause. Socio-culturally, Indonesia generally has a more collectivist approach emphasizing the values of cooperation and solidarity. However, people from collectivist countries highly value the opinions of others and are willing to set aside their own opinions or perceptions. As a result, they tend to lack autonomy and confidence in making decisions.

Knowledge does not have a positive impact on Intention (H4 rejected). The results of this study indicate that although people know information related to green electricity, it does not mean that it is a driving factor to use it. On the contrary, knowledge of environmental impacts has been found to affect energy purchase intentions (Asif et al., 2023; Xin & Long, 2023). This is because people's understanding of renewable energy is still low. People with less knowledge about renewable energy tend to find it challenging to change their habits (Bang et al., 2000). However, although knowledge does not affect intention directly, it can influence intention through attitude (Wang et al., 2014).

This study suspects that Environmental Concern has a positive impact on attitude. However, environmental concerns did not significantly correlate with attitude (H5 was rejected). This finding contradicts previous studies

showing a significant relationship between environmental concern and attitude (Arısal & Atalar, 2016; Bang et al., 2000; Liobikienė et al., 2021). It indicates that great environmental concern is not necessarily a shaper of attitude. Great concern for the environment but not followed by a positive attitude can occur due to a lack of public knowledge about green electric energy. A lack of understanding of renewable energy concepts and technologies can hinder the formation of a positive attitude toward its use.

Religious belief does not positively correlate with Attitude (H6 rejected). This finding is inconsistent with prior research, which found that religious belief can affect attitude and Intention (Amalia et al., 2020). It is very likely because the research investigated the consumption behavior of halal products. Islamic law (fiqh) related to halal food has matured and has more severe consequences. In contrast, energy fiqh, especially the use of renewable energy, has not been widely discussed. It makes people lack appreciation and a positive attitude toward this issue.

Religious belief has been proven to impact subjective norms positively (H7 accepted). Religious belief can strengthen beliefs and values that encourage people to follow necessary norms in their religious environment. It should affect their attitudes and intentions in adopting certain behaviors, including using renewable energy. However, this study did not find strong enough evidence to accept that religious belief encourages people to use green electricity.

Government Policy has no positive impact on Perceived Behavioral Control and Knowledge (H8 & H9 rejected). In other words, policies made by the government regarding financial assistance and ease of information do not necessarily have an impact on PBC and Knowledge. The government must find ways to review the factors shaping PBC and Knowledge. If the government can do this, it will positively impact the transformation of energy to renewable energy, and the policies taken can be right on target.

No positive relationship was found between Government Policy and Perceived Behavioral Control (H8 rejected). This finding contradicts research arguing that government policies in campaigns and information provision affect consumer intentions (Ali et al., 2021). It means that the government policy factor does not affect individual perceptions of their behavioral control related to the use of renewable energy. Government policies related to renewable energy do not directly affect how individuals control their behavior related to using renewable energy. It could be due to the low awareness or understanding of individuals of government policies related to renewable energy or the lack of information available about the benefits and implications of these policies.

Government policy does not significantly impact the increase in personal knowledge related to renewable energy (H9 rejected). It means that government policies related to renewable energy do not directly affect the increase in personal knowledge about renewable energy. It could be due to the less effective implementation of government policies and appropriate programs to increase individual knowledge about renewable energy. In addition, individual factors such as individual interest or motivation to seek knowledge about renewable energy can also affect the relationship between Government Policy and personal knowledge.

6.1. Positioning within the literature

The results of this study align with several recent studies in the field of renewable energy adoption, particularly those exploring the application of the TPB. The finding that attitude has a significant positive effect on behavioral Intention (H1) is consistent with previous studies, which demonstrated that consumers' attitudes toward environmental benefits are a strong predictor of their intention to adopt green electricity (Hua et al., 2019; Waris et al., 2023). Both demonstrated that consumers' attitudes toward environmental benefits strongly predict their intention to adopt green electricity. It underscores the role of favorable attitudes in driving the adoption of renewable energy, as individuals who perceive green electricity as beneficial are more likely to adopt it.

However, this study's findings diverge somewhat from other research regarding the influence of subjective norms and perceived behavioral control (H2 and H3). For instance, studies have found that subjective norms influence green energy adoption through social pressure (Bhutto et al., 2022; Daiyabu et al., 2023). In contrast, this study did not find subjective norm a significant predictor, reflecting cultural differences in the Indonesian context, where social pressures may be less pronounced than in other regions. Similarly, while perceived behavioral control has been vital (Hamouri, 2023), our findings suggest that perceived ease or control over adopting green electricity may not be as influential, possibly due to infrastructure challenges or the limited availability of renewable energy options in Indonesia.

Additionally, including environmental concerns, religious beliefs, and government policy as additional variables adds a unique dimension to this study. Consistent with previous findings, environmental concern shapes attitudes toward green electricity (Minton et al., 2015). Furthermore, religious belief, less frequently studied in the context of renewable energy, influenced subjective norms, particularly in a region where religious values strongly impact social behavior. Although included in previous research, government policy showed a limited direct impact on perceived control and knowledge in this study, aligning with findings that suggested policy effects are often mediated through other channels, such as financial incentives or public awareness campaigns (Ali et al., 2021).

6.2. Implications

Policymakers should focus on shaping public attitudes toward green electricity by implementing awareness campaigns that communicate its use's environmental and health benefits. While this study found that government policies do not significantly impact PBC or consumer knowledge (H8 & H9 rejected), it does confirm that

positive attitudes strongly influence the intention to adopt green electricity (H1 accepted). Therefore, campaigns should be designed to enhance consumer attitudes by emphasizing the long-term environmental benefits. Research has shown that public education campaigns can significantly influence consumer attitudes and behaviors, mainly when they highlight the positive outcomes of adopting sustainable practices (Steg et al., 2014). For green electricity, campaigns should emphasize the role of renewable energy in reducing pollution, improving air quality, and mitigating the impacts of climate change. Additionally, policies that offer financial incentives, such as subsidies or tax credits for adopting green electricity, can further reinforce positive consumer attitudes, making the switch to renewable energy sources more appealing (Stern, 2011). By focusing on these strategies, policymakers can align consumer attitudes with national sustainability goals and accelerate the transition to cleaner energy.

Although this study found that government policies related to financial assistance do not significantly impact PBC and knowledge, financial incentives such as subsidies or tax credits can still play a crucial role in shaping consumer attitudes. Financial incentives operate differently from PBC and knowledge. They do not directly improve consumers' perceived control over their behavior or enhance their understanding of renewable energy. However, these incentives can foster positive attitudes by making green electricity more economically appealing. When consumers perceive that using green energy offers financial benefits, such as cost savings or tax reductions, they are more likely to develop favorable attitudes toward the technology (Coad et al., 2009). Additionally, financial incentives can reduce perceived risks and uncertainties associated with the initial costs of adopting renewable energy technologies, further contributing to positive attitudes toward green energy (Steg et al., 2014). Therefore, while financial policies may not enhance PBC or knowledge, they can effectively shape positive attitudes, which have been shown to predict intentions to adopt green electricity firmly.

Industry players, particularly energy providers, can enhance positive consumer attitudes toward green electricity by providing transparent and accessible information on its benefits. Studies suggest that clear communication regarding the advantages of green products helps build consumer trust and strengthens their positive attitudes toward these products (Delmas & Burbano, 2011). Energy companies should focus on simplifying the process of switching to green electricity by offering user-friendly interfaces and accessible customer support, which can minimize perceived barriers and enhance consumer confidence. Additionally, offering competitive pricing or bundled green energy plans can make the switch more attractive to consumers, further reinforcing their intention to adopt green electricity (Wüstenhagen et al., 2007). Industry players can shift consumer attitudes toward renewable energy by addressing informational and financial concerns.

Collaborative efforts between policymakers and industry players are crucial to fostering a positive shift in consumer attitudes and increasing the adoption of green electricity. Research has shown that partnerships between governments and private sectors in promoting sustainable energy solutions can lead to more effective outcomes (Jänicke, 2012). For instance, government-led certification programs that involve industry players can enhance consumer trust in green electricity products by ensuring transparency and credibility. Additionally, joint initiatives that combine public awareness campaigns with practical, industry-driven incentives—such as reduced costs or simplified access to green energy plans—can significantly increase the likelihood of consumer adoption (Geels et al., 2017). These collaborative strategies improve the visibility of green electricity and align consumer, industry, and policy goals in the pursuit of sustainability.

7. Conclusion, Limitation, and Future Research Direction

This study investigated the factors influencing consumer intentions to adopt green electricity using the TPB. Among the factors tested, only attitude had a significant positive impact on Intention (H1 accepted). At the same time, subjective norms, perceived behavioral control, and knowledge did not show a significant relationship with intention (H2-H4 rejected). These findings highlight the importance of consumer attitudes in shaping the adoption of renewable energy, especially in Indonesia. Respondents in this study viewed green electricity as a means to reduce pollution and improve quality of life, aligning with prior research that emphasizes the impact of altruistic attitudes on consumer behavior.

Conversely, the results indicate that subjective norms, perceived behavioral control, and knowledge were not significant predictors of intention, which opens questions for further exploration. One possibility is that respondents may not rely heavily on the opinions of others when deciding to adopt green electricity, or they may feel that external factors, such as policies, do not give them enough control over their behavior. These findings call for further research to explore the contextual factors influencing renewable energy consumption, particularly those related to cultural and social dynamics in Indonesia.

The study highlights the importance of targeted strategies for policymakers and industry players to increase demand for electricity from renewable sources. Policymakers should focus on public awareness campaigns and provide financial incentives to motivate consumers. Meanwhile, industry players can increase public trust by providing clear information and easy access to green electricity. In addition, collaborative efforts among stakeholders can increase positive public sentiment towards green electricity.

One limitation of this study is convenience sampling, which may result in a sample not fully representative of the broader population. While the sample size of 203 participants is acceptable, the reliance on convenience sampling limits the generalizability of the findings. This

method may introduce biases, as participants are selected based on accessibility rather than through random or stratified sampling. To enhance the reliability and applicability of future studies, employing more robust sampling techniques, such as random or stratified sampling, is recommended. These methods would ensure a more representative sample, allowing the conclusions to be drawn with greater confidence and relevance to a broader population. Despite this limitation, the findings of this study provide valuable insights into consumer behavior in the context of green electricity adoption, particularly within the Indonesian setting.

Overall, the results emphasize the need for targeted policies and industry strategies that focus on shaping positive consumer attitudes toward green electricity, which could significantly accelerate the adoption of renewable energy technologies in Indonesia.

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References

Adachi, C., & Rowlands, I. H. (2010). The role of policies in supporting the diffusion of solar photovoltaic systems: Experiences with Ontario, Canada's renewable energy standard offer program. In (Vol. 2, pp. 30-47).

Agency, I. E. (2022). International Energy Agency (IEA) World Energy Outlook 2022. In (pp. 524).

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In (pp. 11-39): Springer.

Ajzen, I. (1991). The Theory of Planned Behavior. In (pp. 179-211).

Ajzen, I. (2011). The Theory of Planned Behaviour: Reactions and Reflections. In.

Ajzen, I. (2020). The Theory of Planned Behavior: Frequently Asked Questions. In.

Ajzen, I., , Schmidt, P., & (2020). Changing Behavior Using the Theory of Planned Behavior. In (pp. 17–31).

Ajzen, I., & Fishbein, M. (2021). The Influence of Attitudes on Behavior. In (pp. 187-236).

Ajzen, I., & Schmidt, P. (2020). Changing Behavior Using the Theory of Planned Behavior. In (pp. 17–31).

Alam, S. S., Ahmad, M., Othman, A. S., Shaari, Z. B. H., & Masukujjaman, M. (2021). Factors affecting photovoltaic solar technology usage intention among households in Malaysia: Model integration and empirical validation. In (Vol. 13, pp. 1-20).

Ali, M. R., , Shafiq, M., , Andejany, M., & (2021). Determinants of consumers' intentions towards the purchase of energy efficient appliances in pakistan: An extended model of the theory of planned behavior. In.

Allini, A., Ferri, L., Maffei, M., & Zampella, A. (2017). The Effect of Perceived Corruption on Entrepreneurial Intention: Evidence From Italy. In.

Amalia, F. A., , Sosianika, A., , Suhartanto, D., & (2020). Indonesian Millennials' Halal food purchasing: merely a habit? In (Vol. 122, pp. 1185-1198).

Anal, D. P., & Singh, K. T. (2023). Entrepreneurial Intention Theories. In.

Anh, N. T. V., Tung, H. T., & Uyen, T. P. C. (2022). The Factors Affect the Online Learning Behaviour of Students. In.

Arısal, İ., & Atalar, T. (2016). The Exploring Relationships between Environmental Concern, Collectivism and Ecological Purchase Intention. In (Vol. 235, pp. 514-521).

Arli, D., Tjiptono, F., Casidy, R., & Phau, I. (2018). Investigating the impact of young consumers' religiosity on digital piracy. In (Vol. 42, pp. 792-803).

Asif, M. H., Zhongfu, T., Ahmad, B., Irfan, M., Razzaq, A., & Ameer, W. (2023). Influencing factors of consumers' buying intention of solar energy: a structural equation modeling approach. In (Vol. 30, pp. 30017-30032): Springer Berlin Heidelberg.

Bai, C., Chen, Z., & Wang, D. (2023). Transportation carbon emission reduction potential and mitigation strategy in China. *Science of The Total Environment*, *873*, 162074.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. In (Vol. 84, pp. 191-215).

Bang, H.-k., , Alexander, E., , Patrick, A., & (2000). Consumer concern , knowledge , belief , and attitude toward renewable ... In.

Bhutto, M. Y., , Soomro, Y. A., , Yang, H., & (2022). Extending the Theory of Planned Behavior: Predicting Young Consumer Purchase Behavior of Energy-Efficient Appliances (Evidence From Developing Economy). In.

Bhutto, M. Y., Liu, X., Soomro, Y. A., Ertz, M., & Baeshen, Y. (2021). Adoption of energy- efficient home appliances: Extending the theory of planned behavior. In.

Bosnjak, M., Ajzen, I., & Schmidt, P. (2020). The theory of planned behavior: Selected recent advances and applications. In (Vol. 16, pp. 352-356).

Choo, P., , Krishnaswamy, J., , Ho, R. C., , Fauzan, M. F. B., & (2022). Review on Determinants Influencing Solar PV Adoption in Malaysia: A Conceptual Framework. In (Vol. 18, pp. 1340 – 1351).

Coad, A., De Haan, P., & Woersdorfer, J. S. (2009). Consumer support for environmental policies: An application to purchases of green cars. *Ecological Economics*, *68*(7), 2078-2086.

Daiyabu, Y. A., , Manaf, N. A. A., , Mohamad Hsbollah, H., & (2023). Extending the theory of planned behaviour with application to renewable energy investment: the moderating effect of tax incentives. In.

Delmas, M. A., & Burbano, V. C. (2011). The drivers of greenwashing. *California management review*, *54*(1), 64-87.

Dörnyei, Z., & Griffee, D. T. (2010). Research Methods in Applied Linguistics. In (Vol. 1, pp. 181-183).

Drews, S., & Bergh, J. C. J. M. V. D. (2015). What explains public support for climate policies ? A review of empirical and experimental studies. In.

Du, J., , Pan, W., & (2021). Examining energy saving behaviors in student dormitories using an expanded theory of planned behavior. In.

Duncan, E., Forbes-McKay, K., & Henderson, S. (2012). Alcohol Use During Pregnancy: An Application of the Theory of Planned Behavior¹. In.

Duong, C. D., Nguyen, B. N., Doan, X. H., Nguyen, V. H., & Vu, A. T. (2024). "I do believe in karma": understanding consumers' pro-environmental consumption with an integrated framework of theory of planned behavior, norm activation model and self-determination theory. In (Vol. 35, pp. 270-298): Emerald Publishing Limited.

Elahi, E., Khalid, Z., & Zhang, Z. (2022). Understanding farmers' intention and willingness to install renewable energy technology: A solution to reduce the environmental emissions of agriculture. In (Vol. 309).

Elizur, D., & Sagie, A. (1999). Facets of personal values: A structural analysis of life and work values. In (Vol. 48, pp. 73-87).

Etikan, I. (2016). Comparison of Convenience Sampling and Purposive Sampling. In (Vol. 5, pp. 1).

Fishbein, M. (1980). A theory of reasoned action: some applications and implications. In (Vol. 27, pp. 65-116).

Geels, F. W., Sovacool, B. K., Schwanen, T., & Sorrell, S. (2017). The socio-technical dynamics of low-carbon transitions. *Joule*, *1*(3), 463-479.

Ghazali, E. M., , Mutum, D. S., , Ariswibowo, N., & (2018). Impact of religious values and habit on an extended green purchase beh aviour model. In (Vol. 42, pp. 639-654).

Greeley, A. (1993). Religion and Attitudes toward the Environment. In (Vol. 32, pp. 19).

Hamouri, B. M. (2023). Predicting energy-saving behavior in Saudi Arabia using theory of planned behavior. In.

Harrison, L., Stephan, K., & Friston, K. (2007). CHAPTER 38 - Effective Connectivity. In K. FRISTON, J. ASHBURNER, S. KIEBEL, T. NICHOLS, & W. PENNY (Eds.), (pp. 508-521): Academic Press.

Hebert, E. A., Vincent, N., Lewycky, S., & Walsh, K. T. (2010). Attrition and Adherence in the Online Treatment of Chronic Insomnia. In.

Hua, L., , Wang, S., & (2019). Antecedents of Consumers ' Intention to Purchase Energy-E ffi cient Appliances : An Empirical Study Based on the Technology Acceptance Model and Theory of Planned Behavior. In.

Idrees, F., Hassan, H., Syed, T., Ahmad, S. N., & Khan, M. M. (2022). Perceived Behavioral Control Mediates the Relationship Between Personal Characteristics and Psycho-Sociological Factors, and Entrepreneurial Inten-Tions. In.

IPCC. (2021). Summary for Policymakers. In V. Masson-Delmotte, P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K., Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (Ed.): Cambridge University Press.

Istiasih, H. (2022). Ethics of Halal and Thayyib Food Consumption Behavior: The Era of Post Pandemic COVID-19. In.

Jänicke, M. (2012). "Green growth": From a growing eco-industry to economic sustainability. *Energy policy*, *48*, 13-21.

Jeffries, F. L. (2011). Predicting Safety Related Attitudes in the Workplace: The Influence of Moral Maturity and Emotional Intelligence. In.

Jones, W. M., Smith, S., & Cohen, J. (2017). Preservice Teachers' Beliefs About Using Maker Activities in Formal K-12 Educational Settings: A Multi-Institutional Study. In.

Kasri, R. A., & Chaerunnisa, S. R. (2022). The role of knowledge, trust, and religiosity in explaining the online cash waqf amongst Muslim millennials. In (Vol. 13, pp. 1334-1350).

Khan, N., Sarwar, A., & Tan, B. C. (2021). Determinants of purchase intention of halal cosmetic products among Generation Y consumers. In (Vol. 12, pp. 1461-1476).

Khotimah, S. K., Prasetyo, K., Prasetya, S. P., & Nasution, N. (2022). Housewives' Lifestyle and Behavior of Debt Dependency on Bank Thitil. In.

Kotler, P., & Keller, K. L. (2016). Marketing management. In (15th ed., ed., pp. 118): Pearson Education Limited.

Lee, C.-C., & Hussain, J. (2024). A carbon neutral supply chain management by considering emission-risk minimization and green purchasing through optimal decision-making. *Environmental Research*, *251*, 118662.

Liobikienė, G., Dagiliūtė, R., & Juknys, R. (2021). The determinants of renewable energy usage intentions using theory of planned behaviour approach. In (Vol. 170, pp. 587-594).

Lopes, J. R. N., Kalid, R. d. A., Rodríguez, J. L. M., & Ávila Filho, S. (2019). A new model for assessing industrial worker behavior regarding energy saving considering the theory of planned behavior, norm activation model and human reliability. In (Vol. 145, pp. 268-278): Elsevier.

Minton, E. A., , Kahle, L. R., , Kim, C.-H., & (2015). Religion and motives for sustainable behaviors: A cross-cultural compa rison and contrast. In (Vol. 68, pp. 1937-1944).

Nicholson, W., & Snyder, C. M. (2014). Intermediate microeconomics and its application. In: Cengage Learning.

Nie, H., Vasseur, V., Fan, Y., & Xu, J. (2019). Exploring reasons behind careful-use, energy-saving

behaviours in residential sector based on the theory of planned behaviour: Evidence from Changchun, China. In.

Ojwan'g, M. A. (2019). Demographics of Students in Their Perspectives on Examination Cheating in Basic Education in Kenya. In.

Peng, W., Xin, B., & Xie, L. (2023). Optimal strategies for production plan and carbon emission reduction in a hydrogen supply chain under cap-and-trade policy. *Renewable energy*, *215*, 118960.

Persky, J. (1995). The Ethology of Homo Economics. In (Vol. 9, pp. 221-231).

Pollard, C. E. (2015). Applying the Theory of Planned Behavior to Computer Energy Saving Behavioral Intention and Use at Work Americas Conference on Information Systems Applying the Theory of Planned Behavior to Individual Computer Energy Saving Behavioral Intention and Use at. In.

Qian, L., Li, F., Zhao, X., Liu, H., & Liu, X. (2022). The Association between Religious Beliefs and Food Waste: Evidence from Chinese Rural Households. In (Vol. 14, pp. 1-15).

Ramasamy, B., Yeung, M. C. H., & Au, A. K. M. (2010). Consumer Support for Corporate Social Responsibility (CSR): The Role of Religion and Values. In (Vol. 91, pp. 61-72).

Rietveld, C. A., & Hoogendoorn, B. (2022). The mediating role of values in the relationship between religion and entrepreneurship. In (Vol. 58, pp. 1309-1335): Small Business Economics.

Santos, V., Gomes, S., & Nogueira, M. (2021). Sustainable packaging: Does eating organic really make a difference on product-packaging interaction? In (Vol. 304).

Srivastava, C., & Mahendar, G. (2018). Intention to adopt sustainable energy: Applying the theory of planned behaviour framework. In.

Steg, L., Bolderdijk, J. W., Keizer, K., & Perlaviciute, G. (2014). An integrated framework for encouraging pro-environmental behaviour: The role of values, situational factors and goals. *Journal of Environmental psychology*, *38*, 104-115.

Stern, P. C. (2011). Contributions of psychology to limiting climate change. *American psychologist*, *66*(4), 303.

Stokes, L. C., & Warshaw, C. (2017). influence public support in the United States. In (Vol. 17107, pp. 1-6).

Sun, P. C., Wang, H. M., Huang, H. L., & Ho, C. W. (2020). Consumer attitude and purchase intention toward rooftop photovoltaic installation: The roles of personal trait, psychological benefit, and government incentives. In (Vol. 31, pp. 21-39).

Thaler, R. H. (2018). Behavioral economics: Past, present, and future [Economia do comportamento: Passado, presente e futuro] [Economía del comportamiento: Pasado, presente y future]. In (Vol. 20, pp. 9-43).

Urbatsch, R., & Wang, Y. (2021). Are religious individuals against renewables? Exploring religious beliefs and support for government investment in energy transitions in the United States. In (Vol. 81): Elsevier Ltd.

Wang, Y., & Lin, Y.-S. (2016). Determinants of Internet Entrepreneurship Intentions Among Business School Students. In.

Wang, Z., Zhang, B., & Li, G. (2014). Determinants of energy-saving behavioral intention among residents in Beijing: Extending the theory of planned behavior. In.

Waris, I., , Hameed, I., , Ali, R., & (2023). Predicting household sign up for solar energy: an empirical study based on the extended theory of planned behavior. In.

Waris, I., & Ahmed, W. (2020). Empirical evaluation of the antecedents of energy-efficient home appliances: application of extended theory of planned behavior. In.

Wüstenhagen, R., Wolsink, M., & Bürer, M. J. (2007). Social acceptance of renewable energy innovation: An introduction to the concept. *Energy policy*, *35*(5), 2683-2691.

Xin, Y., & Long, D. (2023). Linking eco-label knowledge and sustainable consumption of renewable energy: A roadmap towards green revolution. In.

Xu, T., Kang, C., & Zhang, H. (2022). China's efforts towards carbon neutrality: does energy-saving and emission-reduction policy mitigate carbon emissions? *Journal of Environmental Management*, *316*, 115286.

Yee, C. H., Al-Mulali, U., & Ling, G. M. (2022). Intention towards renewable energy investments in Malaysia: extending theory of planned behaviour. In.

Yüzüak, A. V., & Erten, S. (2018). An evaluation of science teacher canditates' energy saving behavior intention based on the theory of planned behaviour [Fen bilimleri öğretmen adaylarının enerji tasarrufu yapma davranış amaçlarının planlanmış davranış teorisi temelinde değerlendirilmesi]. In.

Zulu, S., Zulu, E., & Chabala, M. (2022). Factors influencing households' intention to adopt solar energy solutions in Zambia: insights from the theory of planned behaviour. In.

Supplementary material (Appendix)

The data supporting this study's findings are available on reasonable request from the corresponding author.