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CONSUMER PERCEPTION AND SOLAR ENERGY PRODUCTS USE IN JOS SOUTH LOCAL GOVERNMENT AREA, PLATEAU STATE, NIGERIA

Emmanuel Musa Samdi 

Department of Marketing, Faculty of Management Sciences, University of Jos, Nigeria
musase@unijos.edu.ng

Samson Vincent Bot

Department of Marketing, Faculty of Management Sciences, University of Jos, Nigeria
samsonbot83@gmail.com

Abstract

This study examined consumer perception and solar energy products use in Jos South Local Government Area. A survey research design was used for the study. A total of four hundred (400) questionnaires were administered to the respondents whereas PLS-SEM technique was used to analyze the data collected. The findings of the study revealed that price has a significant influence on the use of solar energy in Jos South. Consumer safety has significant effect on the use of solar energy in Jos South. Further, reliability has a significant effect on the use of solar energy in Jos South. The study concluded that reliability is a critical consideration for consumers in Jos South evaluating the feasibility of solar energy adoption. Solar systems must demonstrate consistent performance and durability to justify the initial investment and provide reliable electricity supply over the long term. Issues such as the efficiency of solar panels, durability of batteries, and the ability to operate effectively under varying weather conditions are significant concerns for consumers. It is recommended among others that promoting quality assurance measures among solar energy providers and manufacturers. Encourage partnerships with reputable brands known for durable and efficient solar products. Provide consumer education on proper maintenance practices to prolong system lifespan and enhance reliability.

Keywords: Consumer, Perception, Solar energy use, Price, Reliability, Consumer safety



INTRODUCTION

The solar energy products are good options for energy generation as it is easily available and is a clean source of energy generation. So, to make solar products a reality, it is essential that different research development is done to innovatively reduce the cost of solar energy products to make it a viable energy option for all (Machado et al., 2018). According to Bhavna & Prajapat (2020) electricity is the versatile form of energy which can be transformed to other forms easily. But it is becoming expensive with each passing day. The price of electricity has consistently increased as the fossil fuel reserves are decreasing. The dependence on fossil fuel for energy is the main reason for environmental pollution and power cuts, making people go for more clean and better sources of energy. Renewable energy resources are suitable as they are environment friendly.

Akinboro, Adejumobi, & Makinde (2021) opined that solar energy plays a crucial role in the transition to a more sustainable and environmentally responsible energy landscape. It is widely used for residential and commercial electricity generation, water heating, and space heating applications, as well as in large-scale power plants to generate electricity for communities and industries. As technology continues to advance, solar energy is expected to become an increasingly important part of the global energy mix.

The technological costs used in manufacturing solar panels are still relatively high, but with the continuous development of manufacturing technology, the cost of production has decreased in by 36%, which may attract more investors and enhance the share of solar photovoltaic energy in the energy sector in the world (Shaaban & Petinrin, 2020). Solar energy is a renewable and sustainable source of power derived from the radiation of the sun. It is harnessed through various technologies to generate electricity and provide heat for various applications. Solar energy is clean, sustainable, and abundant (Sameti & Haghghat, 2019). Solar energy emerged as a prominent alternative energy source due to its potential to reduce greenhouse gas emissions, dependence on fossil fuels, and energy costs. In Nigeria, specifically in Jos South, the adoption of solar energy has been gaining traction as the government and private sector promote renewable energy solutions to address electricity shortages and environmental concerns (Pasqualetti, 2021). Understanding consumer perceptions and behaviors towards solar energy in Jos South is crucial for policymakers, energy providers, and businesses to design effective strategies for promoting its uptake.

Consumer perceptions of solar energy are influenced by various factors, including price, consumer safety, and reliability. Price is a crucial factor that affects consumers' decision-making processes when considering solar energy adoption. The initial investment cost, ongoing maintenance expenses, and payback period play significant roles in shaping consumers'

perceptions of solar energy affordability and cost-effectiveness. Consumer safety is another critical variable that influences consumer perceptions of solar energy. Concerns about the safety of solar energy systems, such as the risk of electrical hazards or malfunctions, can deter potential users from embracing this technology. Ensuring the safety of solar energy systems is essential to building consumer trust and confidence in the technology.

According to Oyedepo (2021) Reliability is a key factor that impacts consumer acceptance and use of solar energy. Consumers expect solar energy systems to provide a consistent and dependable source of electricity to meet their energy needs. Issues such as system downtime, performance variability, and energy storage capabilities can affect the perceived reliability of solar energy systems and influence consumer attitudes towards their adoption. The use of solar energy is a new development to the people residing in Jos South LGA and they are conversant with electricity which makes it difficult for people to make a change or begin to adapt to the new development. People in Jos South have not been able to adopt the new technology of solar energy; To some, they feel it is more demanding because they are not aware and they don't understand that's this technology can be a better source of power for their homes and businesses (Bhavna, 2022).

To some, they feel solar panels are expensive which makes them think that it is only meant for the wealthy people because the society and to some localities, it has made them believe that solar energy is only for the rich and not for them (Ebhotu & Tabakov 2018). Then when it gets to those who have little understanding/awareness on the importance of solar energy and how it works for the betterment of their living, they begin to complain on the cost of first installation of solar panels which is expensive (Dodondawa, 2019).

Despite the growing interest in solar energy as a sustainable and renewable energy source, there is a need to investigate how price, consumer safety, and reliability influence consumer perceptions and use of solar energy in Jos South, Nigeria. The paper is organized thus; the first section is introduction; the second section consists of the empirical literature review on solar energy and perceptions. While the third section includes the methodology, the fourth section includes the conclusion and recommendations.

LITERATURE REVIEW

Consumer Perception

The definition for consumer perceptions is very broad and there are a number of models and theories that describe consumer perception. Kotler, Armstrong, Brown and Adam (1998) explained that consumer perception is the acting reacting one what one sees. Another explanation by Wilson, Zeithaml, Bitner and Gremler (2008) viewed consumer perception as

customer experiences, view of the service and the satisfaction with their experience. As a result of these explanations, two models of perception were derived; the cognitive theory and affective theory (Liligeto, Singh & Naz, 2014).

The cognitive concept referred to the thought-related reactions generated by stimuli (Blackwell, Miniard & Engel, 2001). On the other hand, the affective concept referred to feelings and arousal induced by stimuli (Dubé, Cervellon, & Jingyuan 2003; Yoo & MacInnis, 2005). These two concepts showed that when a consumer is exposed towards a product, his or her response would be to cognitively conceptualize or think about what they see, and identify themselves with the product if they are affectionate about it, in which the chance for a positive reaction is high (Liligeto et al, 2014).

On the contrary, negative cognition or perception towards the product will cause disinterest and unfavorable self-identity, where the possibility of negative consumer reaction towards the product is high (Liligeto et al, 2014). By knowing customer's perception towards the product and service offered, customer's satisfaction and the success of a business can be affected (Aspfors, 2010).

Price

The solar energy market has seen huge growth in recent years with a vast increase in solar cumulative capacity worldwide. One of the key drivers behind this growth is the decline in solar module prices (Oseni, 2021). Thus, the price reduction mechanism in solar modules has become an important determinant to solar electricity in the overall energy supply and the market value of solar modules grows globally. Many empirical analyses have been carried out to unveil the mechanism behind this price reduction. However, the researches performed on the price reduction mechanism of solar modules over the years have focused purely on the technological aspect of the manufacturing. When analyzing price, the influence of economic factors such as interest rate and exchange rate must also be taken into consideration to achieve a precise analysis.

Solar energy pricing is regarded as primary sign of growing economic activity. The price of round-the-clock solar energy had become comparable to the average price of electricity generated from thermal power (Ebhotu & Tabakov, 2018). As a vital component of the solar system, cost of solar energy module found in many studies is one of the major costs contributing the solar energy pricing, and other factors included operations and maintenance cost and cost of other equipment like inverters and batteries used in the solar generation system. For instance, cost decreased in various components of large-scale solar due to factors such as increased demand, government subsidies, and increasing environmental concerns. In

fact, in the recent time, some markets generate renewable energy more cheaply than fossil fuels.

The solar energy price is also experienced by and vulnerable to many other factors related to social and environmental conditions. They also introduce risks and inherent uncertainties in the energy sector. The risks associated in solar segment of energy sector depend on various cost components and size of projects.

Consumer Safety

Solar power is energy from the sun and it is seen as a good source of energy for many years because of the vast amounts of energy that are made freely available, and because the conventional sources of energy are finite in nature and pose severe threats to man's environment. Rochell (2010) stated that solar energy is a more sustainable alternative for the supply of electricity if harnessed by modern technology. Sambo (2009) noted that environmental degradation due to energy use and exploitation is already prevalent in Nigeria hence solar energy is a promising renewable energy sources in view of its apparent limitless potential. Also, Sambo (2012) believed that the massive load shedding experienced all over the nation had made electricity supply only for a few hours a day, implying that the energy supply all over the nation is not adequate for the teaming number of consumers regardless of the enormous potentials presented by the earth's resource system.

Since energy received directly from the sun is silent, inexhaustible, and non-polluting, Nasir (2016) believed that the utilisation of such energy (solar) using the appropriate technologies such as the solar technologies will lead to a more sustainable living and productivity. In addition to electricity generation, solar power is employed to produce thermal energy (heating or cooling, either through passive or active means), to meet direct lighting needs and, potentially, to produce fuels that might be used for transport and other purposes. Since this renewable energy (solar) can be used to generate electricity or be stored in batteries or thermal storage, raising awareness on its enormous potential will have positive feedback on the larger population to the people especially, those in Jos South.

Reliability

Solar panels are a highly reliable technology that provides clean, renewable energy for many years. As long as you properly maintain your Photovoltaic panels and have them installed by a qualified professional, you can expect them to last for decades without significant issues. Photovoltaic panels are a vital component of any solar power system (Oyedepo, 2021). The technology consists of photovoltaic cells that convert sunlight into electricity. This type of energy

capture is incredibly reliable, and quality solar panels can last for decades with minimal maintenance.

In addition to photovoltaic panels, solar power systems contain components like inverters, solar batteries and a battery management system (BMS), and charge controllers. These components are crucial for converting the solar energy captured by solar panels into usable electricity and for the overall reliability of your solar power system.

Inverters are responsible for converting the Direct Current (DC) electricity your PV panels produce into Alternating Current (AC) electricity to power home appliances and small electronics. While inverters are generally reliable, they can sometimes fail due to age or other factors. Most inverters come with a warranty period of around ten years, but it's essential to buy a trusted brand inverter. Solar batteries are another vital component of off-grid solar power systems. Solar batteries store the energy created by the photovoltaic panels. Solar panels only capture energy during daylight hours. Solar batteries ensure the system can operate 24/7.

Solar batteries vary considerably in efficiency, lifespan, and reliability — primarily based on their chemistry. Lead acid batteries are the oldest and cheapest option for solar batteries. Their low price may make them seem like an attractive option. But their relatively short lifespan — a few hundred cycles — makes them a short-term solution at best. Lead acid batteries also require considerable maintenance to operate effectively.

By comparison, lithium-ion (Li-ion) batteries can last for thousands of cycles. A cycle occurs each time a battery is discharged and recharged and is the most efficient measure of a battery's lifespan. The more cycles a battery is capable of before losing efficiency, the longer it will last. Unlike fossil fuels, solar energy is a renewable energy source that will never run out. The energy produced by the sun far exceeds the electricity needs of the whole world. Homeowners can rely on this renewable energy source to meet their electricity needs as long as the sun shines — and the solar power system is sufficient to meet household power consumption requirements.

Solar Energy Use

Solar energy relies on nuclear fusion that emits from the sun's core. Nigeria is situated in the equatorial region, which exposes it to too much solar radiation. According to reports, Nigeria is endowed with intensive sunshine, with an average of 6.25 h per day, ranging between 9.0 h in the far Northern boundary and about 3.5 h in the coastal areas, meaning that Nigeria receives average solar radiation of about 12.6 MJ/m^2 /day at the Southern coastal latitudes and about 25.2 MJ/m^2 /day in the far Northern part of the country, giving the mathematical average as

18.9 MJ/m² /day (Gaglia et al., 2017; Ilenikhena & Ezemonye, 2010; Nnaji et al., 2010; Ohunakin, 2010).

This is equivalent to 229.1667 W/m² in power terms. Global Solar Atlas (GSA) (2021) provided the details of direct normal irradiation across Nigeria, with an average of about 724 kWh/m² in the far Southern part and 1653 Wh/m² in the far Northern region. This translates into a PV power potential of 1248 kWh/kWp in the South and 1756 kWh/kWp.

Theoretical Review

Theory of Reason Action (TRA)

The theoretical underpinning of this study is Theory of Reason Action. The theory of Reasoned Action has its roots in the study of social psychology. The relationships between a person's beliefs, attitudes, intentions, norms, and behaviors are described by the Fishbein and Ajzen (1975) model. This paradigm stated that a person's behaviour is influenced by their behavioral intention to carry it out.

The individual's views and subjective norms regarding the behaviour shape this intention in and of themselves. According to the theory, subjective norms are a person's perception of what the majority of people in his life who are important to him believe he should or should not do. Attitude plus subjective norms equals behavioral intention. As per TRA, a person's attitude toward a behavior is steadfast based on his expectations for its results, amplified by his assessment of those results. The subjective likelihood that a particular behavior would result in a given outcome is what defines a person's beliefs. Consequently, according to this paradigm, environmental factors can affect a person's attitudes through altering the way they believe. Additionally, the subjective norms which are in turn defined by a person's normative ideas and by his drive to adhere to the norms certain behavioral intention.

The theory is crucial to the study because it explains why certain background conditions are connected to certain behaviors or not. According to the reasoned action theory, people's intentions influence their actions, while their behaviors foretell their intentions. Intentions are determined by attitudes toward the conduct, perceived norms, and perceived behavioral control.

Empirical Review

Abraham, Owodunni, Audu (2022) investigated consumer's utilization of solar energy technologies for electricity generation in Kogi state, Nigeria. Specifically, the study assessed the level of awareness of consumers, the factors affecting the effective utilization and the interventional strategies for effective utilization of solar energy technologies for electricity

generation. A sample of 394 comprised of 222 household heads, 108 MSEs operators and 64 licensed electrician was used for the study. 30 respondents were used for trial test of the instrument and the reliability coefficient of the instrument was found to be 0.76 using cronbach alpha. Mean, standard deviation, ANOVA were used for testing the research questions and hypothesis respectively. The findings revealed that consumers are aware of solar energy technologies and believe that lack of manpower and the desired technological skills to manage solar energy technologies efficiently among others are factors affecting effective utilization of solar energy technologies.

Pi-Chuan Sun, Hsueh-Mei Wang, Hsien-Long Huang and Chien-Wei Ho (2020) investigated consumer attitude and purchase intention toward rooftop photovoltaic installation: The roles of personal trait, psychological benefit, and government incentives present study aimed to examine the relationship among personal traits (including environmental concern, an ecological lifestyle, and consumer innovativeness), psychological benefits (including a warm glow and a “nature experience”), attitudes toward rooftop photovoltaic, government incentives, and intentions to install rooftop photovoltaic. Empirical data were collected from one nationwide company in Taiwan, and 300 valid questionnaires were collected. The collected data were analyzed using a structural equation model. The results show that an ecological lifestyle, consumer innovativeness, and warm glow affect rooftop photovoltaic installation intention through the attitude toward rooftop photovoltaic. Moreover, government incentives have the strongest influence on this intention.

Abdullahi (2021) studied framework for adopting solar energy governance in the Nigerian power sector. This research explores the drivers, barriers and benefits of implementing solar energy strategies. In doing so, a framework for adopting solar energy governance in the Nigerian power sector was developed based on literature review and findings from the semi-structured interview held with 25 top management officials of solar energy stakeholders in Nigeria. The philosophical position of this research is inductive approach and interpretivist paradigm. The qualitative data collection method was employed, data were interpreted and analyzed using content analysis. Interpretive Structure Modelling (ISM) was used further to analyze the barriers for solar energy implementation in Nigeria. The study revealed that sociocultural aspects, lack of financing and lack of awareness of the technology are the key barriers that have slowed the implementation of solar energy strategies.

Ogo, Omosekejimi, & Ebhonu, (2021) examined usage of solar-inverter technology as alternative energy source: a catalyst for round the clock electronic services in Nigerian

university libraries. The total population for this study comprised three hundred and seventy-one (371) librarians from 40 university libraries in South West, Nigeria. The data collected were analyzed using simple percentage/frequency counts and weighted mean. Findings from this study revealed among others that the extent of librarians' awareness of solar inverter technology as alternative sources of energy in university libraries in South West, Nigeria is very high; electronic reference service, online interlibrary loan service, online cataloguing and classification service,

Ing, Keong, Hong, Yan, Wei & Ching (2017) carried out a study on Factors Affecting Consumers' Perception Toward Renewable Energy Among Adults in Kuala Lumpur, The study focuses on understand the relationship between few factors such as global and local economic factors, personal characteristics, perceived price and perceived product benefits to consumers' perception toward renewable energy. The main mode of data collection is through survey questions where Kuala Lumpur residents between 21 and 50 are targeted. Data received will be processed through SPSS and several analysis techniques such as Reliability test, Pearson's Correlation and Multiple regression were used to analyze the data. A total of 200 valid responses were received. Through the analysis, it is found that global & local economic factors contributed most to consumers' perception toward renewable energy while perceived product benefits have little to none relationship. The result of this study suggest that economic factors is a main concern among Malaysians. Given the stagnant poor economic outlook, adoption of renewable energy will be met by reluctance.

Gârdan, Micu, Pas, Micu, Gârdan, (2018) studied consumers' attitude towards renewable energy in the context of the energy crisis. The research envisages using a sample of 1126 respondents for the validation of a theoretical model that highlights the complex relationship between specific variables, such as concern for the environment, knowledge about renewable energy (RE), perceived utility regarding RE usage, ease of use regarding RE, attitude toward RE utilization and behavioral intentions to use RE. The results show that attitudes towards renewable energy consumption are strongly influenced by the other latent constructs with perceived utility, social influence and concern for the environment being among the most determining ones. Behavioral intentions and the actual consumption behavior for RE are more and more clearly expressed in terms of decisions regarding the type of renewable energy technology preferred by consumers, and correlations with variables such as the level of education and higher income are easily highlighted

Ayoub, Dastir and Waquas (2019) examined factors affecting consumer purchase intentions for solar energy applications at domestic level. Quantitative methodology was used for the study. Research design was cross sectional and positivist approach is used for collection of data. Questionnaire was used as a source of data collection. A mix of systematic and convenience-based sampling was used. Data from 260 participants was analyzed for result. The result found that consumer purchase intentions is significantly affected from perceived usefulness of the solar energy applications. Similarly, the cost of using and purchasing solar energy, perceived ease of use and attitude towards purchase of solar energy all affect positively the consumer purchase intentions for solar energy at domestic level. This study fills the gap existing in literature to find the barriers in application of solar energy at domestic level at Pakistan. This research enables public institutions to understand the customer expectations and barriers in application of solar energy at domestic level.

Lo, Leung, Nah and Alex (2018) carried out a study on Barriers to adopting solar photovoltaic systems in Hong Kong in the businesses, and the public sector. A total of 55 interviews were conducted to collect the data for the study. The results indicate that the most important constraints were technical barriers such as space limitations and low energy output, followed by economic barriers such as high upfront costs and long payback periods. Furthermore, we they found that individuals were the group most exposed to market, policy, and regulatory barriers and they had to contend with the highest number of barriers. Their analysis also illustrates that there was a close interrelationship between the barriers. For example, technical barriers, such as space limitations, could be overcome partially by addressing regulatory barriers

Kumar, Siyan and Hundal (2020) carried out a study on Factors affecting customers' attitude towards solar energy products. The study aimed at understanding the customer attitude toward solar energy products in the Indian context. The data of 510 respondents have been collected from rural areas of Punjab (India) through a structured research schedule using convenient sampling. Various factors have been identified that collectively impact the customer attitude towards solar energy products. Multiple regression analysis was used to measure the magnitude of the impact of the identified dimensions on the customer attitude. The results of regression analysis validated that customer attitude towards solar products is significantly determined by green purchase behavior and government initiatives. However, dimensions such as environmental knowledge, promotion and advertisement, environmental concern, and peers influence were not found significant to the customer attitude towards solar energy products.

Research Gap

Although much progress has been made in conceptualizing and measuring consumer perception and use of solar energy, as well as in better understanding their antecedents and consequences, several gaps remain, there is a lack of research that specifically addresses is a lack of sufficient empirical studies specifically investigating the consumer perception and use of solar energy in the Jos South region. Existing literature has not adequately capture the local nuances, challenges, and opportunities related to solar energy adoption as well as such as income levels, education, and cultural aspects, influence consumer perceptions and decisions regarding the adoption of solar energy technologies in Jos South.

METHODOLOGY

In this study, the survey research design was adopted and the data was collected through the distribution questionnaire. The nature of the questionnaire used for this study was a five-point Likert-scale, ranging from “strongly agree” to “strongly disagree” (5 = ‘Strongly Agree’, 4 = ‘Agree’, 3 = ‘Undecided’, 2 = ‘Disagree’ and 1 = ‘Strongly Disagree’).

The population for this study is made up of people in Jos South Local Government of Plateau State. According to the census conducted by the National Population Commission in 2006, the population of Jos South Local Government Area is 306,716. The sample size was estimated with Yamane 1976 formula which resulted in sample size of 400. The simple random sampling technique was applied in this study. The simple random sampling is applied to studies to indicate that any individual is eligible to participate as long as the respondent in within the study area. A total of 400 copies of questionnaire were distributed. Only 324 copies were completed and returned representing a response rate of 81.0%.

The data for this study was subjected to data cleaning tests and certified for the final analysis. Data analysis was conducted using partial least square (PLS) software 4.0.1.9, an approach to structural equation modeling and presented as required.

ANALYSIS AND FINDINGS

Measurement model

The measurement model is the extent of assessing of the constructs involved in the study, which is to determine whether the indicators such as, Composite reliability (CR), convergent validity, average variance extracted (AVE) and discriminant validity, as described by Hair et al. (2011), Hair, Sarstedt, et al. (2012) and Henseler, Ringle, and Sinkovics (2009) met their required threshold.

Table 1: Convergent Validity (SmartPLS output)

	Indicators	Factor Loading	CR	AVE
Consumer Safety	COS3	0.695	0.719	0.562
	COS4	0.801		
Price	PRC3	0.610	0.710	0.558
	PRC4	0.862		
Reliability	REL1	0.632	0.754	0.507
	REL2	0.794		
	REL4	0.701		
Solar Energy Use	USE2	0.667	0.750	0.500
	USE3	0.765		
	USE4	0.687		

The result in Table 1 shows the convergent validity for the constructs under study. The results thus demonstrated a high level of convergent validity of the latent construct and used in the model. An AVE value of at least 0.5 indicates sufficient convergent validity, meaning that a latent variable can explain at least half of the variance of its indicators on average.

Table 2: Fornell and Larcker Discriminant Validity (SmartPLS output)

	COS	PRC	REL	USE
COS	0.750			
PRC	0.338	0.747		
REL	0.119	0.137	0.712	
USE	0.399	0.342	0.266	0.707

Results in Table 2 indicated that discriminant validity was established among constructs since all bolded values are greater than the correlated values.

Structural model

Table 3: Structural Fitness Indices (SmartPLS output)

	Indicators	VIF	R ²	f ²	SRMR
Consumer Safety	COS3	1.016		0.108	
	COS4	1.016			
Price	PRC3	1.016		0.052	
	PRC4	1.016			

Reliability	REL1	1.148	0.052
	REL2	1.164	
	REL4	1.093	
Solar Energy Use	USE2	1.078	0.247
	USE3	1.158	0.078
	USE4	1.129	

Table 3...

Table 3 presents the VIF diagnostic and estimated PLS weights for the indicators of the items from the questionnaire. There was no problem of VIF, since the value is greater than four, and no indicator variable was discarded due to their negative weights.

The overall r-squared measure for the structural model, as in regression, indicated that 24.7% of the variance in the solar energy use is explained by the model. The f-squared here would be considered to be of moderate strength or effect, following Cohen (1988), .02 represents a “small” f^2 effect size, .15 represents a “medium” effect, and .35 represents a “high” effect size. It can be said that the effect size of the model is medium for customer safety, and low for price and reliability respectively. Based on the result of the SRMR the model is a good fit model since SRMR is less than .08 which is 0.078.

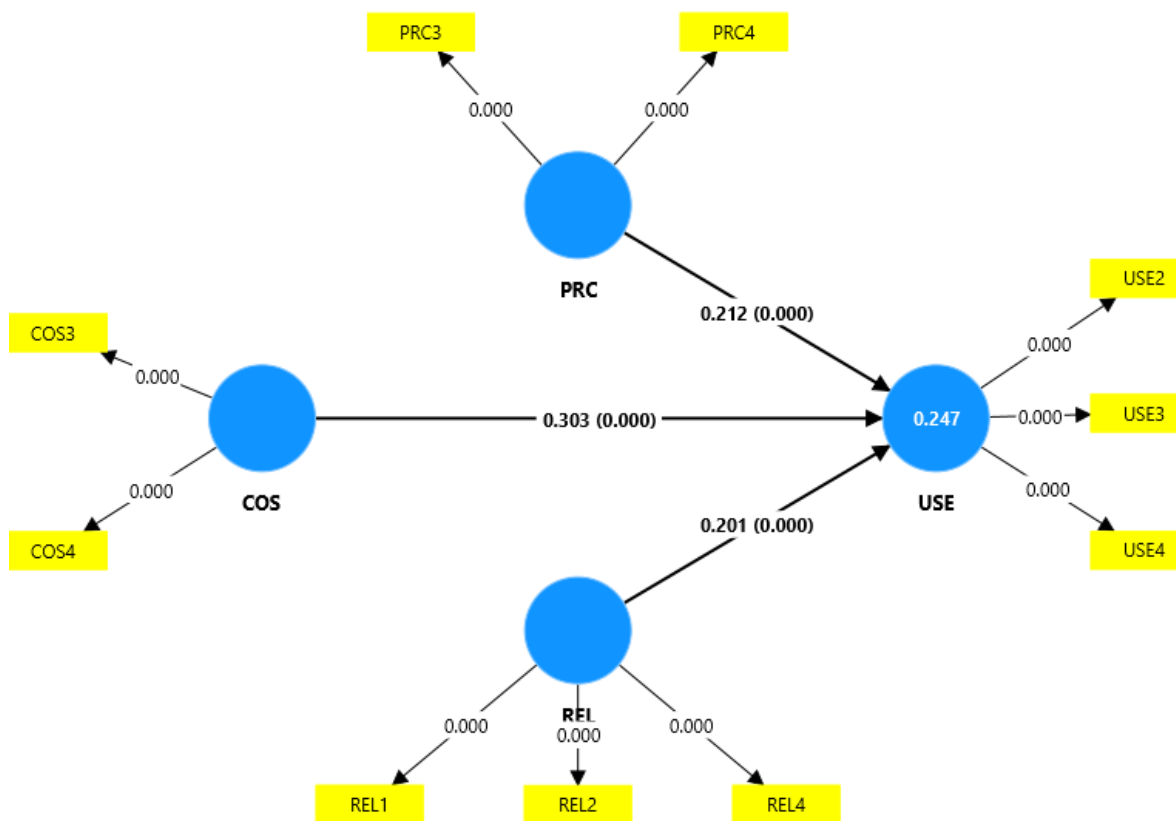


Figure 1: PLS-SEM structural model with Bootstrapping result (SmartPLS output)

Table 4: PLS-SEM Result (SmartPLS output)

	Coeff. β	Std err	t-test	P-value	Decision
COS -> USE	0.303	0.054	5.611	0.000	Significant
PRC -> USE	0.212	0.060	3.530	0.000	Significant
REL -> USE	0.201	0.049	4.085	0.000	Significant

DISCUSSION OF FINDINGS

In this study, it was found that the p-value (0.005) is less than the significant level of 0.05, concluding that Price has a significant influence on the use of solar energy in Jos South. The outcome does not agree with Ing, Keong, Hong, Yan, Wei & Ching (2017), the result of this study suggested that economic factors is a main concern among Malaysians. Given the stagnant poor economic outlook, adoption of renewable energy will be met by reluctance. Furthermore, the result supported the outcome of Ayoub, Dastir and Waquas (2019) examined factors affecting consumer purchase intentions for solar energy applications at domestic level. The result found that consumer purchase intentions is significantly affected from perceived usefulness of the solar energy applications. Similarly, the cost of using and purchasing solar energy, perceived ease of use and attitude towards purchase of solar energy all affect positively the consumer purchase intentions for solar energy at domestic level.

In line with the results obtained from the relationships, it was discovered that the p-value (0.000) is less than the significant level of 0.05. Thus, consumer safety has significant effect on the use of solar energy in Jos South. The result in this study is consistent with study of Gârdan, Micu, Pas, Micu, Gârdan, (2018) studied consumers' attitude towards renewable energy in the context of the energy crisis. The results show that attitudes towards renewable energy consumption are strongly influenced by the other latent constructs with perceived utility, social influence and concern for the environment being among the most determining ones. Behavioral intentions and the actual consumption behavior for RE are more and more clearly expressed in terms of decisions regarding the type of renewable energy technology preferred by consumers, and correlations with variables such as the level of education and higher income are easily highlighted

Again, in the case of reliability, it was found that, Reliability has a significant effect on the use of solar energy in Jos South. This finding is in variance with Abraham, Owodunni, Audu (2022) who investigated consumer's utilization of solar energy technologies for electricity generation in Kogi state, Nigeria. The findings revealed that consumers are aware of solar energy technologies and believe that lack of manpower and the desired technological skills to manage solar energy technologies efficiently among others are factors affecting effective

utilization of solar energy technologies. There is no consistency of the present study with that of Abdullahi (2021) who studied framework for adopting solar energy governance in the Nigerian power sector. The study revealed that sociocultural aspects, lack of financing and lack of awareness of the technology are the key barriers that has slowed the implementation of solar energy strategies.

CONCLUDING REMARKS

Conclusion

The global shift towards renewable energy sources, driven by concerns over climate change and energy security, has prompted increased interest in solar power. In Jos South, where access to reliable electricity is inconsistent, solar energy represents a promising alternative. However, consumer perceptions and considerations regarding affordability, safety, and reliability significantly shape the adoption of solar technologies. Affordability is an important factor influencing the decision of consumers in Jos South to adopt solar energy. While the initial cost of installing solar panels and associated equipment can be relatively high, the long-term financial benefits are substantial. Many consumers perceive solar energy as a cost-effective solution due to potential savings on electricity bills and reduced reliance on the often-unreliable grid power.

However, the upfront costs remain a barrier for many households and businesses, particularly those with limited financial resources. Safety considerations are paramount in the adoption of any new technology, including solar energy systems. In Jos South, concerns about the safety standards of solar installations and the reliability of equipment play a crucial role in consumer decision-making. Reliability is a critical consideration for consumers in Jos South evaluating the feasibility of solar energy adoption. Solar systems must demonstrate consistent performance and durability to justify the initial investment and provide reliable electricity supply over the long term. Issues such as the efficiency of solar panels, durability of batteries, and the ability to operate effectively under varying weather conditions are significant concerns for consumers.

Recommendations

Thus, this study recommended that there should be subsidy programs or financial incentives to make solar energy systems more affordable for consumers in Jos South. Strict quality standards and certification requirements for solar equipment and installation practices. Conduct regular inspections and audits to ensure compliance and reassure consumers about the safety and reliability of solar installations and promote quality assurance measures among

solar energy providers and manufacturers. Encourage partnerships with reputable brands known for durable and efficient solar products. Provide consumer education on proper maintenance practices to prolong system lifespan and enhance reliability.

Limitations of the Study

The limitation of the study is based on the fact that it is a quantitative study. Further, the findings, conclusion, and recommendations are limited to Jos South and are not applicable to any other location.

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