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Key factors affecting the purchase decisions of Photovoltaic Solar Panels in Zimbabwe: A case study of Matabeleland Region

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Abstract
Photovoltaic solar energy has proven to be a feasible option for solving urban and rural electrification problems. The technology of solar photovoltaic panels has been vastly studied in various aspects, but little attention has been paid to examining the purchase intention of the photovoltaic solar systems in developing countries; hence this study seeks to examine the purchase intention of solar panels for urban and rural settlers in the Matebeleland region of Zimbabwe. Based on the literature, perceived cost, social influence, perceived usefulness, and perceived ease of use are the main factors influencing purchase decisions of photovoltaic solar panels and were treated as the independent variables of this study, while purchase intention was treated as a dependent variable. Focusing on this relationship, the study acknowledges the mediating role of willingness to adopt. A quantitative, non-probability sampling approach was adopted to collect data from the targeted participants (N = 362). The results indicate that all the proposed hypotheses of this study are proven significant, emphasizing that purchase intentions of photovoltaic solar panels in the studied region are influenced by the independent variables of the study and stakeholders should formulate incentives that accelerate the adoption based on the country's situation.
Keywords: *photovoltaic solar panels; purchase intention; adoption*

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I. Introduction

The accessibility of affordable and dependable energy is an integral part of sustainable livelihoods across the world. The limited supply of energy from the conventional sources of energy has been a major obstruction to the sustainability of livelihoods in developing countries such as Zimbabwe. Energy is of paramount importance in any given society (Khan and Ahmad, 2009). The demand for sustainable energy has been increasing due to changes in people's lifestyles and as a result of industrial revolution across the globe (Akroush et al, 2019).

According to the International Energy Agency, African countries emitted 39 percent of their total carbon dioxide emissions from the electricity sector in 2017. Around 84 percent of Africa's carbon dioxide emissions from electricity generation in 2017 came from six countries: South Africa, Egypt, Algeria, Morocco, Libya, and Nigeria (IEA, 2019). As such, this has ignited the need for other sources of energy that are affordable, sustainable, and replenishable. Renewable energy is also known as green energy. Renewable energy is regarded as replenishable (Shin, 2018). According to Janseen and Jagger (2002), the concept of green product, which is regarded as green energy in this case, is understood as a source of energy that reduces the risk of environmental damage. Renewable energy is sustainable in nature. It consists of solar energy, ocean energy, wind energy, geothermal energy, and other alternative sources of renewable energy. The continent of Africa's renewable energy capacity is led by South Africa with 19,000 MW. Compared to other regions, however, Central Africa has the highest share of installed renewable energy, with 72 percent, mainly from hydropower (The Renewable Energy Transition in Africa, 2021).

Photovoltaic solar panels provide cost effective, reliable, environmentally friendly and sustainable energy. They contribute to the improved livelihoods, food security, increased productivity and sustainable incomes, increased social welfare, reduced emissions and reduced spending on traditional fuels such as fossil fuel. The use of photovoltaic solar panels is becoming common and widespread, and there are a growing number of development agencies, governments and the private sector who are investing in this type of energy. Sustainable energy enables the supportability of socio-economic development and productivity.

Solar energy is considered as one of the most reliable and promising technologies (Bandara1 and Amarasena, 2020). Solar energy is coming straight from the sun through the process of solar radiation. It is regarded as the most abundant type of energy source on earth. The sun is very reliable, and it produces pollution free, renewable type of energy. Sustainable energy is a very interesting concept which requires some serious courtesy as energy costs are always increasing, the environment is being polluted, and the resources are becoming scarce.

Globally, renewable energy represented about 58.5% of net additions to power capacity in the year 2014, with growth being experienced in all regions across the globe (Purohit, et al., 2017). As estimated by the International Energy Agency (IEA), in 2050, around 11% of electricity production would be coming from solar energy globally (Katinas; et al., 2013).

The top key players in solar cell manufacturers in the world are First Solar, Hanwha, SunPower, BYD, GCL System Integration, Yingli, Jinko Solar, Trina Solar, Elkem Solar, Kyocera Solar, Sharp, Solar Frontier, Canadian Solar, JA Solar, Solarworld, NSP, Shunfeng, ReneSola, Chint Group, Risen, Hareonsolar, CSUN, Eging PV and HT-SAAE among others (WBOC Delrmava's News Leader, 2021).

Photovoltaic solar energy has evolved as a reliable and an economic feasible notion as a result of the reduced price of solar photovoltaic technologies and the soaring price of diesel fuels in Zimbabwe. Thus, the declining price of solar equipment has contributed to increased solar adoption and use, especially in Africa. As a key step towards the adoption of solar energy, non-governmental organizations and governments are now supporting communities in establishing off-grid solar powered systems. The global market for solar cells and modules is expected to rise at a considerable rate between 2021 and 2026. As of 2021, the global market is growing steadily and given the adoption of strategies by major players; the market is likely to expand as projected (WBOC Delmarva's News Leader, 2021).

Even though many researchers have evaluated the technology of photovoltaic solar panels, little attention has been directed towards investigating the key factors contributing to the purchase intention of photovoltaic solar panels and the willingness to adopt this type of technology, especially in developing countries. It is against this background that this research seeks to bridge the knowledge gap by providing a broad assessment of the key factors affecting the purchase decisions of photovoltaic solar panels in Zimbabwe.

Zimbabwe is blessed with abundant energy from the sun Zimbabwe enjoying average radiation of solar energy that ranges from 5,5kWh/m²/day to 6kWh/m²/day. Zimbabwe enjoys about 300 days of direct sunshine and an average of 5.7 kWh/ m²/year (Mhaka, 2015). Solar radiation intensity varies with geographical place and with different types of seasons in a year, such as winter and summer. It also depends on a given time of the day. Boxwell (2014) indicates that the levels of solar irradiance are normally used to calculate the solar output levels in a day. However, the irradiance levels differ at different times of the year as a result of the weather, seasons and the time of the day.

Currently, Zimbabwe has a national electrification rate of 42%. Even though electricity has reached a total of 83% of the urban centres, rural electrification is still around 13% as in line with the National Energy Policy of 2012. Zimbabwe has an installed capacity of 2,300 Mega Watts, with Zimbabwe Power Company (ZPC), owning approximately 95% of this power. More than 50% of generated electricity is drawn from hydropower while the other part is coming from thermal power plants. Bagasse, mini hydropower and small sized grid connected solar systems have the capacity of about 130Mega Watts. The actual power generation capacity in the year 2019 was around 1000 Mega Watts against the demand of about 1700 Mega Watts. The National Renewable Energy Policy of Zimbabwe aims to achieve an installed renewable energy capacity of 1,100 Mega Watts, excluding large hydro, or 16.5% of total electricity supply, whichever is a bit higher, by the year 2025 and 2,100 Mega Watts or 26.5% of total electricity supply, whichever is a bit higher by the year 2030 (Ministry of Energy and Power Development, 2019).

Although many studies have assessed the technology of photovoltaic solar panels, little attention has been directed towards examining the key factors influencing purchase intention of photovoltaic solar panels and the willingness to adopt this type of technology in developing countries. As such, this study seeks to examine the purchase intention of photovoltaic solar panels in Zimbabwe. In other words, it seeks to determine the key factors affecting the purchase decisions of photovoltaic solar panels in the above-mentioned region. Based on this study, future researchers will gain an understanding of the success factors and post-implementation interventions contributing to the acceptance and assimilation of photovoltaic solar panels in developing countries such as Zimbabwe.

II. Literature Review

According to Kaiser et al (1999), responsibility feeling, environmental values and environmental knowledge are key antecedents of ecological behaviour (Henning and Karlsson, 2011). There is a strong link between a person's values and a commitment to pro-environmental behaviour (Schwarts, 1994; Keltner and Buswell, 1996; Cialdini and Goldstein, 2004). Environmentally concerned citizens are more willing to purchase products that are environmentally friendly (Yusof et al, 2013; Frick, Kaiser and Wilson 2004). The extent to which users are aware of the new technology and its benefits and weaknesses influences the adoption of a technology. (Fishbein et al, 1975; Zografakis et al, 2010; Rogers et al, 2001; Howard, et al, 2002). The perceived ease of use and perceived usefulness influence the attitude, attitude influences intention, intention influences the action (Fig. 1).

2.1. Technology Acceptance Model (TAM)

In order to give a more general theoretical foundation for reasoned actions, Davis (1985) came up with the technology acceptance model. The technology acceptance model was developed on the basis of the theory of reasoned action. This model is used to explain and predict the acceptance of technology. In this study, it is used to analyze and explore factors influencing the acceptance of photovoltaic solar panels in Zimbabwe, using a case study of Matabeleland Region. The technology acceptance model suggests that the perceived usefulness and the perceived ease of use are two factors that can influence the attitude of a consumer. According to the technology acceptance model, the behavioral intention is a key factor influencing the actual behavior.

The perceived usefulness and the perceived playfulness are directly influencing the behavioral intention while social factors, self-efficacy, facilitating conditions, expected targets and the content might indirectly affect behavioral intention (Terzis and Economides, 2011). On a similar note, Sanchez-Franco (2010) indicates that the perceived ease of use, perceived usefulness and perceived playfulness could be used to predict the behavioral intention.

In conjunction with the above analysis, Lu, Zhou, and Wang (2009) suggests that the perceived playfulness and the perceived usefulness have a significant effect on users' attitudes. In addition, they also uncovered those subjective norms, and the perceived behavioral control might also affect the behavioral intention of a consumer. In the same vein, Davis, Bagozzi, and Warshaw (1989) unearthed a correlation between perceived ease of use, perceived usefulness and the actual usage of a technology. As such, consumers' willingness to adopt influences the adoption of photovoltaic solar panels. Hence, the following hypothesis was developed:

Hypothesis 1: *The willingness to adopt new technology mediates the relationship between the perceived ease of use, perceived cost, perceived usefulness, social influence and the purchase intention of photovoltaic solar panels.*

1.2. Perceived Ease of Use

The perceived ease of use can be regarded as the degree to which the users easily understand, maintain and operate a new technology, which in this case is the photovoltaic solar technology. Governments can ensure the ease of use of renewable energy through an effective quality control mechanism (Fishbein et al, 1975). According to Shinde and Wandre (2015), solar energy is harmonious with nature. Wider support from the public to adopt and use the renewable energy can be possible if users find the technology to be family-friendly, user-friendly and identical to their living standards (Seyal et al., 2006). The technology acceptance model indicates that the acceptance of new technology by users is usually based on their perceived ease of use. Hence, in this study, the perceived ease of use is explained and justified from the technical point of view in as far as the renewable energy is concerned. The renewability of technology will thus positively influence the adoption of photovoltaic solar panels. Hence, the following hypothesis was proposed:

Hypothesis 2: *Perceived ease of use has a positive effect on the purchase intention of photovoltaic solar panels.*

1.3. Perceived Cost

The cost of renewable energy is centered on the initial requirement to set up the new technology and machines as well as the periodic costs such as the maintenance costs. If the cost of a new technology becomes high, the value and usage of that particular technology becomes low (Premkumar et al, 1997). The cost of a product is one of the most important factors influencing the adoption of a new innovation such as photovoltaic solar panels. Hence, the new technologies should be reasonably priced relative to the alternatives in order to promote their adoption. Otherwise, the product may not be adopted by consumers if the costs are high.

There is a strong relationship between cost and the adoption of a new technology (Seyal et al, 2006). If the benefit-cost ratio is high, consumers are likely to switch to renewable energy. This situation is also common for solar energy. The installation investments of renewable energy can be high. Hence Rogers et al (2008) and West et al (2010) suggested the introduction of economic incentives to ease the financial burden on the side of the users. On the average consumers are more reluctant to fork out more than 5% of payment when compared to their existing energy expenses. As such, this attitude may negatively impact users' intention to adopt renewable energy.

A perfectly designed solar system requires little maintenance above the process of cleaning solar panels once a week or once a month. Solar water pumps require minimal attention since they are self-starting. Monroe (2003) indicates that the purchase intentions are highly influenced by the perceived value of a product. The perceived value of a product is as a result of the expected quality of that specific product. As such, the following hypothesis was developed:

Hypothesis 3: *Perceived cost has a positive effect on the purchase intention of photovoltaic solar panels.*

1.4. Perceived Usefulness

Among several factors that may influence the purchase intention of photovoltaic solar panels, previous research indicates that, people tend to adopt or not adopt a system based on the extent to which they believe it will assist them in performing their jobs better. Hence, this variable can be understood as the perceived usefulness. In addition, even if the potential users assume that a given technological system is valuable and useful, they may, at the same time trust that the system is difficult to use and that the performance benefits of usage are outweighed by the effort of utilizing the application. Hence, in addition to usefulness, the usage of a technology is theorized to be influenced by the perceived ease of use (Davis, 2014).

As such, perceived usefulness can be understood as the degree to which a person assumes that using a specific system would enhance their job performance (Davis, 2014). This is derived from the definition of useful, which means capable of being used. A system that is high in terms of its perceived usefulness is the one that has a positive user-performance relationship.

Solar energy can be established almost anywhere in the world (Fakir, 2013). Hence this allows greater diversity of ownership since it allows the socio-economic benefits and advantages to be felt in every location as compared to the national electricity grid system which is centralized. The decentralization of photovoltaic solar panels curbs problems of frequent power outages and electricity rationing (Ndlovu, 2015). Based on this discussion, the following hypothesis was proposed:

Hypothesis 4: *Perceived usefulness has a positive effect on the purchase intention of photovoltaic solar panels.*

1.5. Social Influence

The need for a sense of belonging and the acceptance by a group can significantly influence consumer decisions and choices. According to Caird, Roy and Herring (2008), there is a positive correlation between social influence and the purchase behavior of green products, such as photovoltaic solar panels. The moral norms also influence the purchase intention of green products such as photovoltaic solar panels (Chowdhury, Salam and Tay, 2016). Peer groups such as colleagues, friends and family may influence the decision to adopt environmentally friendly products (Salazar et al, 2012). On a similar note, Lee (2010) indicates that peer groups influence green purchase behaviors. Social norms are connected to environmental attitudes towards energy savings (Gadenne et al, 2011). According to Gerpott and Mahmudova (2009), the intention to use green electricity was most strongly affected by close social contacts. Graziano and Gillingham (2015) uncovered the social-interaction effects and the social learning processes as key attributes influencing the adoption of solar panels. In addition, Noll et al (2014) indicate that the social-interaction effect influences the adoption of photovoltaic solar panels. As such, the following hypothesis was developed:

Hypothesis 5: *Social influence has a positive effect on the purchase intention of photovoltaic solar panels.*

1.6. Purchase Intention

Purchase intention is usually related to the behavior, perceptions and attitudes of consumers. Purchase behavior is a key point for consumers to access and evaluate the specific product (Morinez et al, 2007; Shah et al, 2012). The intentions of a consumer are an indicator of the extent to which people are willing to carry out a specific behavior (Ajzen, 1991), which in this research would be translated as photovoltaic solar purchase behavior. Ghosh (1990) indicate that purchase intention is a very effective tool that predicts the buying process. However, it should be noted that purchase intention may be affected by the perceived quality, perceived value and the price. In addition, consumers tend to be affected by either internal or external motivations during the purchasing process (Gogoi, 2013).

III. Research Framework And Methodology

3.1. Research Framework

Based on the Technology Acceptance Model (TAM), Theory of Planned Behaviour and Theory of Reasoned Action, the following model (**Fig. 1**) was developed. Purchase intention is directly influenced by, and indirectly, through the mediating role of willingness to adopt, influenced by perceived usefulness, perceived ease of use, perceived cost and social influence (Zhou and Abdullar, 2017; Bandara1 and Amarasena, 2020; Davis, 1985).

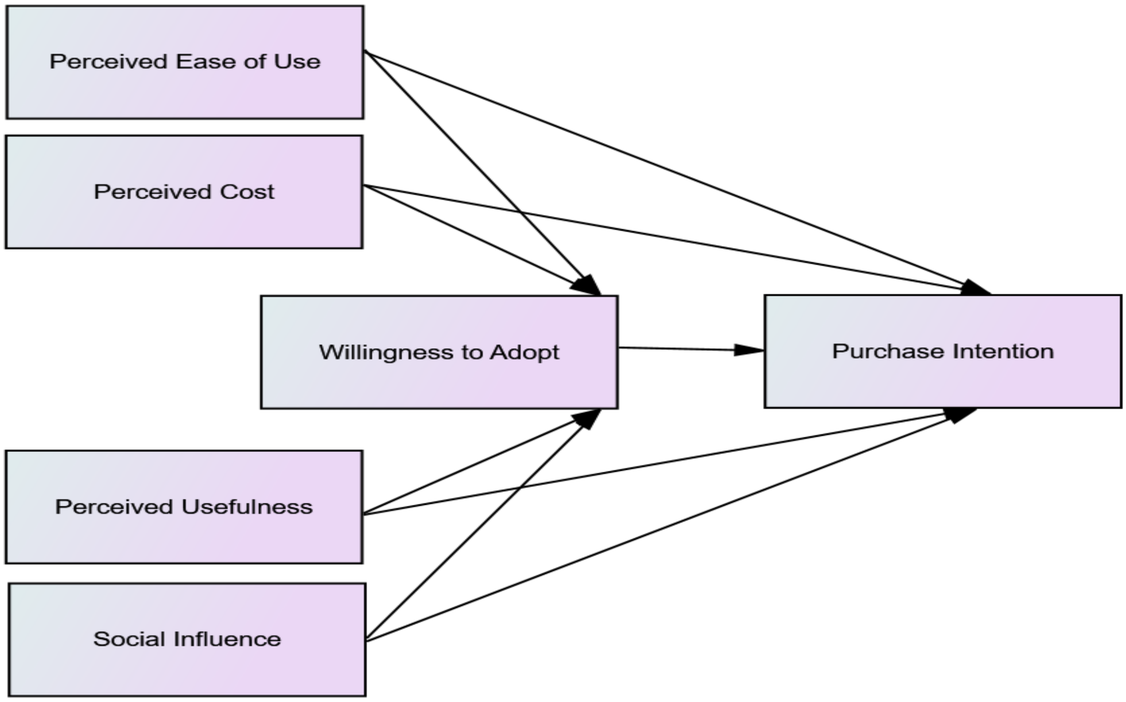


Fig. 1. Photovoltaic solar panel acceptance model
Source: Adapted from Zhou and Abdullar (2017)
Where *WA* represents *Willingness to Adopt, PI* represents *Purchase Intention, PU* represents *Perceived Use, PEOU* represents *Perceived Ease of Use, PC represents Perceived Cost and SI* represents *Social Influence or Social Capital* as derived from **Fig.1**.

1.7. Research Methodology

This research relied on a quantitative approach to analyze the primary data which was gathered using a questionnaire survey that was developed and then made accessible to the respondents via Google Forms. The targeted participants were chosen using a non-probability sampling which is also known by different names such as deliberate sampling, purposive sampling and judgment sampling (Korthari, 2004). The participants took part in this survey under informed consent and anonymity as none of their personally identifying information was collected. The participants came from Matabeleland Province of Zimbabwe. Zimbabwe, officially the Republic of Zimbabwe, is a landlocked country located in Southeast Africa, between the Zambezi and Limpopo Rivers, bordered by South Africa to the south, Botswana to the south-west, Zambia to the north, and Mozambique to the east. Data entry and analysis were conducted on a Statistical Package for Social Sciences (SPSS Version 20). Smart PLS3 software was used for Structural Equation Modeling (SEM) and for model assessment. This research relied on the positivist paradigm and adopted a quantitative approach to collect data from the targeted participants of the Matabeleland Province of Zimbabwe and the results assisted in proving the relationship between all the measurement items of this study.

1.8. Measurement Items

The measurement items for assessing the purchase intention for solar photovoltaic panels are shown in **Table 1**. Specifically, the independent variables are perceived usefulness, perceived ease of use, perceived cost, social influence with willingness to adopt as the mediating variable and purchase intention as the dependent variable.

Table 1
Measurement Items for Study

Perceived Usefulness
1. The use of photovoltaic solar panels saves natural resources:
2. The use of photovoltaic solar panels reduces the emission of greenhouse gases:
3. The use of photovoltaic solar panels enhances the ecological behaviour:
4. I would purchase photovoltaic solar panels because they meet my needs
5. I would purchase photovoltaic solar panels because they do everything I expect them to do
6. I would purchase photovoltaic solar panels because they save me time
Perceived Ease of Use
Adapted from: Ali et al. (2020) and Parasuraman (2000):
7. I think photovoltaic solar technology is easy to use:

8. I think photovoltaic solar technology is reliable and dependable:
9. I think photovoltaic solar technology is easy to maintain:
10. I think photovoltaic solar technology is easy to install:
11. I think photovoltaic solar systems have low operational costs:
Perceived Cost
Adapted from Ali et al. (2020):
12. I think photovoltaic solar panels are expensive:
13. I think it is very costly to maintain photovoltaic solar panels:
14. I think it is very expensive to import photovoltaic solar panels in my country:
Social Influence
Adapted from: Song et al. (2019):
15. I will purchase photovoltaic solar panels just like my friends:
16. I will purchase photovoltaic solar panels just like my neighbours:
17. My friends advised me to use photovoltaic solar panels in order to cut costs:
Willingness to Adopt
Adapted from: Paul et al. (2016):
18. I intend to use photovoltaic solar panels to save the environment:
19. I intend to use photovoltaic solar panels to cut costs:
20. The probability of everyone using photovoltaic solar panels in my community is very high:
21. I intend to adopt photovoltaic solar panels because of its ease of use:
22. I intend to adopt photovoltaic solar panels to protect the environment:
23. I intend to adopt photovoltaic solar panels as an act of pro-environmental behavior:
Purchase Intention
Adapted from Henning and Karlsson (2011):
24. I would purchase a photovoltaic solar panel even if the cost is high
25. I would purchase a photovoltaic solar panel even if the quality is poor
26. I would purchase a photovoltaic solar panel even if the performance is poor.
27. I would purchase a photovoltaic solar panel even if it has a less appealing design.
28. I would purchase a photovoltaic solar panel even if it is expensive.
29. I would purchase a photovoltaic solar panel even if it is expensive to maintain.

Adapted from Ali S., Poulova P. et al (2020), Lluís G., Xavier F., et al (2019) and Lund, A. M. (2001).

IV. Data Analysis And Results

The survey questionnaires were distributed among the targeted sample of 417 Zimbabweans. From 417, 362 participants responded (**Table 2**). Hence there was 86.81% response rate. Out of 362 participants who responded, 150 (41.4%) respondents were males, while 212 (58.6%) were females. Out of 362 respondents, 48 (13.3%) were aged below 21 years, 72 (19.9%) were aged between 21 and 30 years, while 139 (38.4%) were aged between 31 and 40 years, 51 (14.1%) were aged between 41 and 50, whereas 52 (14.4%) had more than 50 years of age.

On education, 36 (9.9%) respondents had only attained High School education, while 204 (56.4%) had obtained Diplomas, 92 (25.4%) were in possession of Bachelor's Degrees, whereas 30 (8.3%) had Master's Degrees. In Zimbabwe, the Ministry of Primary and Secondary Education has recommended the integration of environmental education in the school curriculum. Environmental knowledge encourages citizens to adopt and exert a pro-environmental and sustainable human behaviours. According to Moyo (2018), individuals who possess environmental knowledge are more willing to purchase green products, such as solar panels in this case. Hence, education is expected to influence the adoption behavior of photovoltaic solar panels. This is also echoed by the findings of the previous research which indicates that highly educated consumers are more likely to adopt renewable energy than others (Sardianou and Genoudi, 2013).

On employment status, 76 (21%) respondents had 6 years of work experience, while 214 (59.1%) had more than 6 years of employment history, whereas 72 (19.9%) were unemployed. This could also affect the purchase decisions of solar panels. For instance, people who are employed are able to purchase photovoltaic solar panels since they have the source of income as compared to those who are unemployed.

4.1. Descriptive Statistics

Table 2
Descriptive Statistics Using Construct Variables

Constructs	N	Minimum	Maximum	Mean	Std. Deviation
PU	362	3.00	5	4.8223	0.34562
PEOU	362	1.00	5	4.6920	0.58822
PC	362	1.00	5	4.6657	0.55838
SI	362	2.67	5	4.7680	0.39252

WA	362	3.00	5	4.7331	0.36533
PI	362	2.67	5	4.7302	0.38491
Valid N	362				

In **Table 2**, the descriptive statistics of the obtained data for the construct variables of this study are depicted. As shown, out of the targeted sample of 417 participants, 362 responded.

Table 3
Simple Linear Regression

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.598a	0.357	0.348	0.31072

a Predictors: (Constant), Willingness to Adopt, Perceived Usefulness, Social Influence, Perceived Ease of Use, Perceived Cost

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19.113	5	3.823	39.594	.000b
	Residual	34.37	356	0.097		
	Total	53.483	361			

a Dependent Variable: Purchase Intention

b Predictors: (Constant), Willingness to Adopt, Perceived Usefulness, Social Influence, Perceived Ease of Use, Perceived Cost

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.115	0.300		3.716	0.000
PU	0.125	0.049	0.113	2.544	0.011
PEOU	0.083	0.031	0.126	2.660	0.008
PC	0.153	0.036	0.223	4.301	0.000
SI	0.137	0.049	0.140	2.798	0.005
WA	0.265	0.058	0.251	4.596	0.000

a Dependent Variable: Purchase Intention

In **Table 3**, using a Simple Linear Regression, we obtained the R Square of 0.357 and a regression equation of Variable: Purchase Intention = 1.115 + 0.125 (Perceived Usefulness) + 0.083 (Perceived Ease of Use) + 0.153 (Perceived Cost) + 0.137 (Social Influence) + 0.265 (Willingness to Adopt). The ANOVA resulted in F = 39.594 with 5 and 356 degrees of freedom. The F is significant at the level less than .001 level. Thus, we could state the following in a results section:
A significant regression equation was found ($F(5, 356) = 39.594$, $p < .001$), with an R Square of 0.357. The predicted effect on Purchase Intention = 1.115 + 0.125 (Perceived Usefulness) + 0.083 (Perceived Ease of Use) + 0.153 (Perceived Cost) + 0.137 (Social Influence) + 0.265 (Willingness to Adopt). Hence, it can be concluded that the proposed hypotheses of this study are significant.

Table 4
Pearson Correlations

Pearson Correlations	1	2	3	4	5	6
1	1					
2	.166**	1				
3	.199**	.259**	1			
4	.181**	.161**	.471**	1		
5	.254**	.435**	.485**	.432**	1	

6	.267**	.334**	.465**	.394**	.503**	1

** Correlation is significant at the 0.01 level (2-tailed).

Where *1* shows *Perceived Usefulness, 2* shows *Perceived Ease of Use, 3* shows *Perceived Cost, 4* shows *Social Influence, 5* shows *Willingness to Adopt and 6* shows *Purchase Intention.*

The results in **Table 4** indicate that there is a positive correlation (**) between the perceived usefulness, perceived ease of use, perceived cost, social influence, willingness to adopt and purchase intention.
One of the key reasons of doing correlational research is to determine the degree to which a relationship exists between the constructs. Based on the findings of this study, all the developed constructs are correlated.

Table 5
Income statistics for respondents

How much is your monthly income?

	USA Dollar	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	$100&Bellow	68	18.8	18.8	18.8
	$101-$300	139	38.4	38.4	57.2
	$300-$500	62	17.1	17.1	74.3
	$501-$700	35	9.7	9.7	84
	$701-$900	35	9.7	9.7	93.6
	$901&Above	23	6.4	6.4	100
	Total	362	100	100	

The respondents were also asked to state their monthly income and the results obtained are shown in **Table 5**. Out of 362 respondents, 68 (18.8%) respondents highlighted that they were paid less than $101 per month. 139 (38.4%) respondents were paid between $101 and $300, while 62 (17.1%) were paid between $300 and $500, whereas 35 (9.7%) were paid between $501 and $700. In addition, 35 (9.7%) respondents were paid between $701 and $900, whilst 23 (6.4%) respondents were getting more than $900 per month.

Table 6
Affordability and its effect on purchase intention

Based on my monthly income, I can afford to buy a photovoltaic solar panel.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	26	7.2	7.2	7.2
	Disagree	46	12.7	12.7	19.9
	Neutral	21	5.8	5.8	25.7
	Agree	67	18.5	18.5	44.2
	Strongly Agree	202	55.8	55.8	100
	Total	362	100	100	

The respondents were subsequently asked to indicate whether their monthly income was enough to buy a photovoltaic solar panel. The results are shown in **Table 6** where the responses were then analysed in a descriptive format in order to support the objective of this study. Out of 362 respondents, 202 (55.8%) strongly agreed that their income was enough to buy a photovoltaic solar panel. 67 (18.5%) respondents also agreed, whereas 21 (5.8%) were neutral, with 46 (12.7%) in disagreement, whilst 26 (7.2%) strongly disagreed.

1.9. Measurement Model

The researcher relied on Smart PLS 3 software to construct and assess the measurement model of this study. The model was utilised to determine the reliability and validity of each variable. The outer loadings of each measurement item were also examined to determine the reliability of each individual item.

According to Hair, Sarstedt, Ringle and Mena (2012), the individual item, reliability should range between 0.40 and 0.70. In as far as the reliability analysis is concerned; it is believed that composite reliability is the most suitable approach to use when conducting a reliability analysis as compared to Cronbach's Alpha (Shahid et al, 2020). Hence, the researcher relied on composite reliability to assess the reliability of this study.

The first model assessement is focusing on PLS Algorithm, as depicted in **Fig. 2.** The model assessment was based on 21 items that were retained.

First Model Assessment: PLS Algorithm

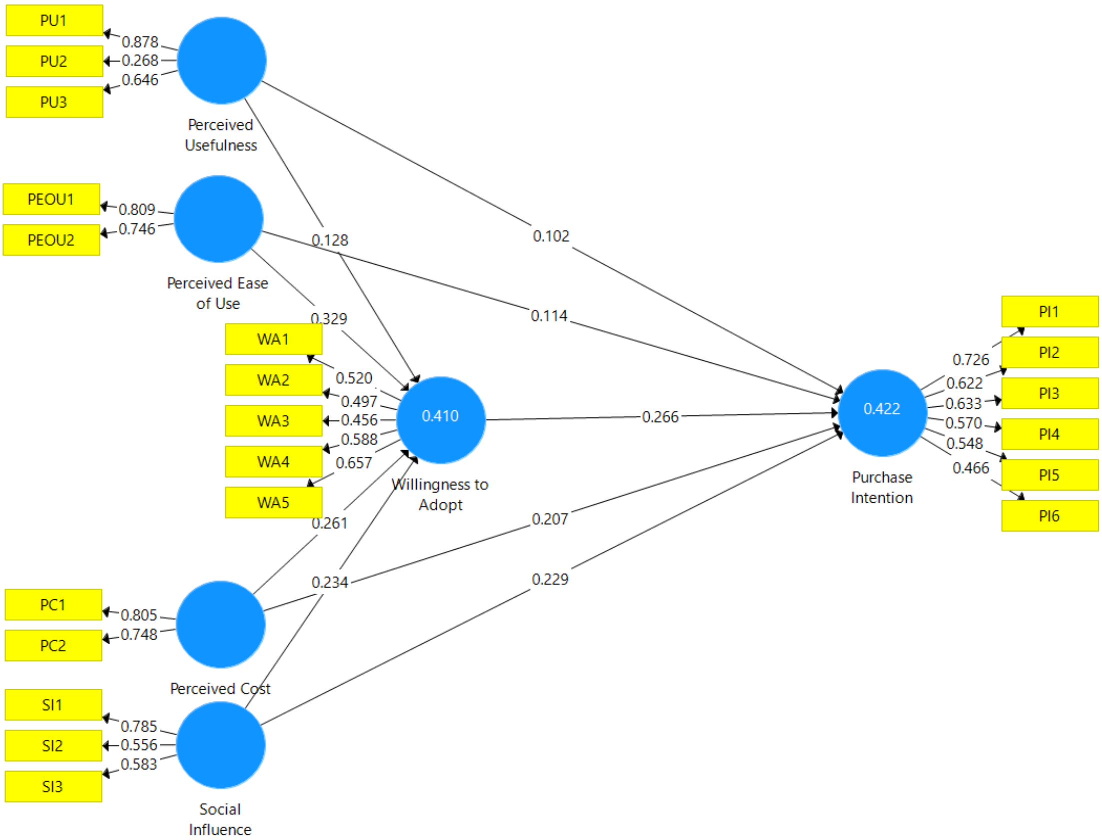


Fig. 2. First Model Assessment: PLS Algorithm

Where *WA* represents *Willingness to Adopt, PI* represents *Purchase Intention, PU* represents *Perceived Use, PEOU* represents *Perceived Ease of Use, PC represents Perceived Cost and SI* represents *Social Influence or Social Capital.*

Table 7

Constructs, Items, VIF, Composite Reliability and AVE

Constructs	Items	VIF	Composite Reliability	AVE
Perceived Cost	PC1	1.045	0.753	0.604
	PC2	1.045		
Perceived Ease of Use	PEOU1	1.047	0.754	0.606
	PEOU2	1.047		
Purchase Intention	PI1	1.814	0.768	0.360
	PI2	1.283		
	PI3	1.224		
	PI4	1.150		
	PI5	1.508		
	PI6	1.107		
Perceived Usefulness	PU1	1.078	0.649	0.420
	PU2	1.044		
	PU3	1.118		
Social Influence	SI1	1.048	0.681	0.422
	SI2	1.040		

	SI3	1.023		
Willingness to Adopt	WA1	1.083	0.679	0.301
	WA2	1.064		
	WA3	1.057		
	WA4	1.042		
	WA5	1.053		

The results of PLS Algorithm are also shown in the **Table 7**. Based on the results of the first model, the composite reliability of all the constructs were reported between 0.649 and 0.768 respectively. As such, all the results are acceptable as recommended by (Shahid et al, 2020). The composite reliability of perceived cost was 0.753, while perceived ease of use recorded: 0.754. Purchase intention obtained: 0.768, whereas perceived usefulness attained: 0.649. Social influence acquired: 0.681, whereas willingness to adopt got: 0.679. The average variance extracted (AVE) is a measure of the amount of variance that is captured by a construct in relation to the amount of variance due to measurement error. The recorded values of AVE ranged between 0.301 and 0.606.

Table 8
Discriminant Validity

Constructs	1	2	3	4	5	6
1	0.777					
2	0.264	0.778				
3	0.242	0.124	0.648			
4	0.486	0.338	0.295	0.6		
5	0.426	0.162	0.232	0.473	0.649	
6	0.479	0.452	0.286	0.544	0.428	0.548

Where 1 illustrates Perceived Cost, 2 illustrates *Perceived Ease of Use, 3* illustrates *Perceived Usefulness, 4* illustrates *Purchase Intention, 5* illustrates *Social Influence* and *6* illustrates *Willingness to Adopt.*

An analysis was conducted, and the results of discriminant validity in **Table 8** show that all values were within the suggested threshold of 0.85 as recommended by (Henseler, Ringle and Sarstedt, 2015). Hence the research variables of this study were different from each other. The model fitness was achieved, with Chi-Square = 1286.482. The second model assessement is focusing on Bootstrapping, as depicted in **Fig. 3.** The model assessment was based on 21 items that were maintained.

Second Model Assessment: Bootstrapping

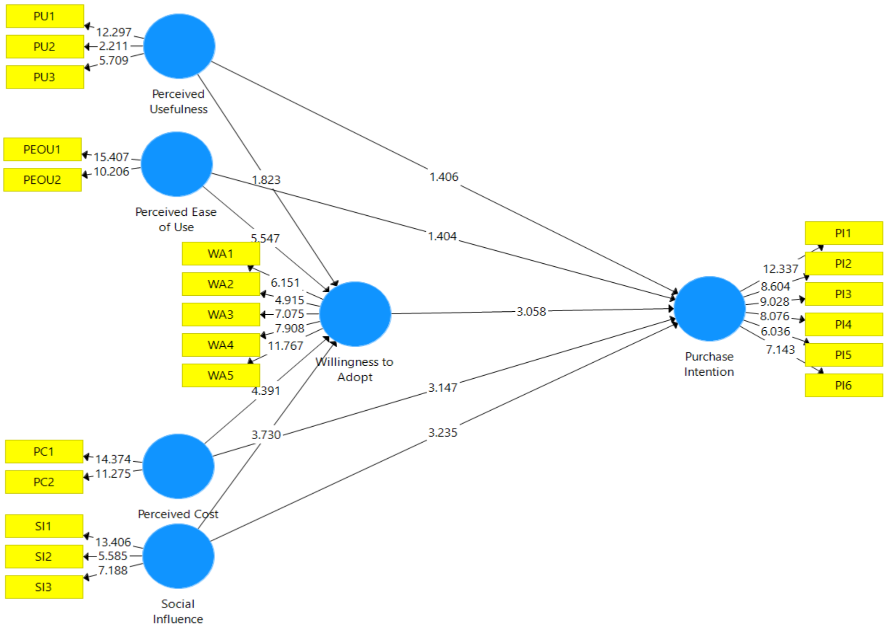


Fig. 3. Second Model Assessment: Bootstrapping

Where *WA* represents *Willingness to Adopt, PI* represents *Purchase Intention, PU* represents *Perceived Use, PEOU* represents *Perceived Ease of Use, PC represents Perceived Cost and SI* represents *Social Influence or Social Capital.*

Table 9
Hypothesis Testing

Hypothesized Effect	Sample Mean	Standard Deviation	T Statistics	P Values	Decision
Perceived Cost -> Purchase I	0.286	0.068	4.044	0.000	Positive
Perceived Ease of Use -> Purchase I	0.190	0.067	2.986	0.003	Positive
Perceived Usefulness -> Purchase I	0.143	0.071	1.915	0.056	Positive
Social Influence -> Purchase I	0.293	0.068	4.295	0.000	Positive
Willingness to Adopt -> Purchase I	0.276	0.087	3.058	0.002	Positive

Table 9 shows the results of hypothesis testing indicating that the perceived cost has a positive positive effect on purchase intention of photovoltaic solar panels: (β = 0.286, t-value = 4.044, p < 0.05). As such, individuals who perceive the cost of purchasing photovoltaic solar panels to be low and affordable are more likely to purchase, as compared to individuals who perceive the cost to be high. The perceived ease of use has a positive effect on purchase intention of photovoltaic solar panels: (β = 0.190, t-value = 2.986, p < 0.05).

The perceived usefulness has a positive effect on purchase intention of photovoltaic solar panels: (β = 0.143, t-value = 1.915, p < 0.05). Individuals who consider the idea of purchasing a system of photovoltaic solar panels to be a smart investment due to the usefulness of its technology are more likely to purchase the solar system as compared to individuals who do not perceive the usefulness.

Moreover, social influence has a positive strength on purchase intention of photovoltaic solar panels: (β = 0.293, t-value = 4.295, p < 0.05). Having recorded the values: (β = 0.293, t-value = 4.295, p < 0.05), willingness to adopt has a positive strength on purchase intention of photovoltaic solar panels. Consumers who are willing to adopt photovoltaic technology are more willing to purchase photovoltaic solar panels.

Table 10
Specific Indirect Effects (Mediation)

Specific Indirect Effects (Mediation)	Sample Mean	Standard Deviation	T Statistics	P Values	Decision
Perceived Ease of Use -> Willingness to A -> Purchase I	0.089	0.031	2.814	0.005	Positive
Perceived Cost -> Willingness to A -> Purchase I	0.072	0.026	2.667	0.008	Positive
Perceived Usefulness -> Willingness to A -> Purchase I	0.038	0.024	1.394	0.164	Negative
Social Influence -> Willingness to A -> Purchase I	0.066	0.030	2.093	0.037	Positive

According to the results in **Table 10,** it is revealed that through the mediation of willingness to adopt, the perceived ease of use has a positive and significant effect on purchase intention of photovoltaic solar panels: (β = 0.089, t-value = 2.814, p < 0.05). Through the mediation of willingness to adopt, perceived cost has a positive strength on purchase intention of photovoltaic solar panels: (β = 0.136, t-value = 2.992, p < 0.05). However, through the mediation of willingness to adopt, perceived usefulness has a negative effect on purchase intention of photovoltaic solar panels: (β = 0.038, t-value = 1.394, p > 0.05). Through the mediation of willingness to adopt, social influence has a positive strength on purchase intention of photovoltaic solar panels: (β = 0.211, t-value = 3.962, p < 0.05).

V. Conclusion And Policy Implications

5.1. Conclusion

The decision to adopt solar energy is not made in a vacuum (Rai, Reeves and Margolis, 2016). Consumers tend to rely on different contextual and personal factors (Hai, 2019). The current research indicates that the perceived cost of buying, installing and maintaining photovoltaic solar panels has a positive effect on the purchase intention of this type of renewable energy. In conjunction with the findings of the current research, previous research indicates that the perceived higher installation and maintenance costs associated with the renewable energies such as solar energy has a negative effect on the adoption process of this type of technology (Sardianou and Genoudi, 2013; Board, 2020; Khalid et al, 2021; Gboney, 2009; Chaveesuk and Khalid, 2019; Khalid and Lis, 2021).

It was also discovered that the perceived ease of use of photovoltaic solar panels has an effect on their adoption. Consumers' willingness to adopt photovoltaic solar panels is influenced by their perceptions of the complexities involved in using them (Khalid et al, 2021; Sardianou and Genoudi, 2013). For instance, individuals who perceive the technology of photovoltaic solar panels to be user-friendly are more likely to purchase as compared to individuals who do not.

Based on the findings of the current research, the perceived usefulness of photovoltaic solar panels has an influence on their adoption. According to Makki and Mosly (2020), the perceived usefulness of a technology is the key factor affecting its adoption. In support on their analysis, they reiterated that consumers are more affected by the technology's economic benefit and convenience, their impression and satisfaction (Makki and Mosly, 2020). Solar energy is viewed by many consumers as the alternative green type of energy to traditional fossil fuels (Khalid et al, 2021).

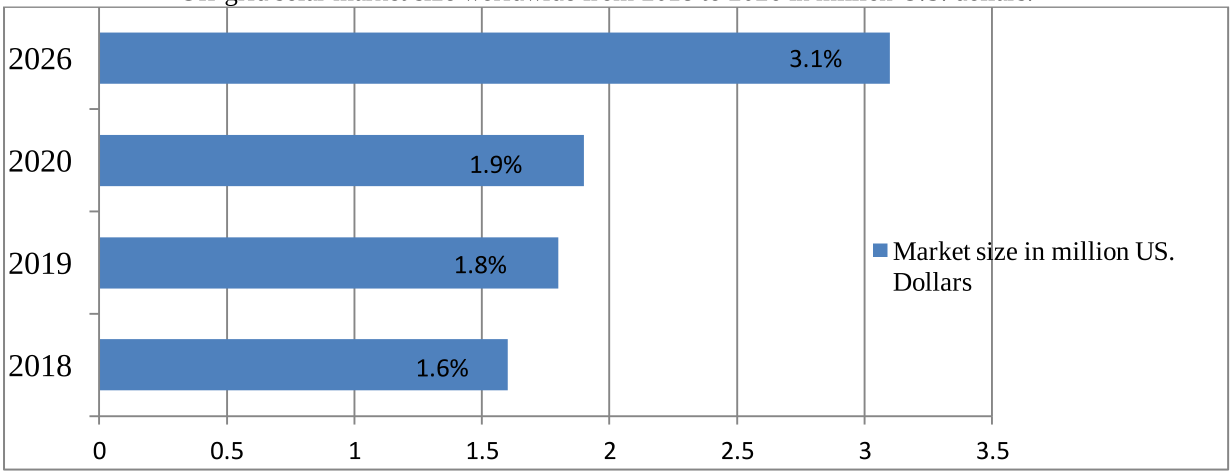
The current research has also established that the social influence is one of the key factors affecting the adoption of photovoltaic solar panels. Social influence, often known as reference groups in consumer purchasing are groups of individuals that consumers will look to when making purchasing decisions. If a reference group endorses a product, either through use or statements about the product, those that look to the group will often purchase that product. In other words, consumers are influenced by judgments of others when purchasing products and services (Wood and Hayes, 2012). According to empirical findings, consumers would install photovoltaic solar panels in their homes if they were encouraged by their family and friends (Sardianou and Genoudi, 2013). A positive peer effect increases the likelihood of photovoltaic solar adoption and decreases the length of decision-making time (Hai, 2019; Rai, and Robinson, 2013; Noll, Dawes, and Rai, 2014).

The following factors are also contributing to the adoption of photovoltaic solar panels: subsidies, financial support, after-sale support, and communication (Makki and Mosly, 2020). Tariff policies have been shown to enhance the diffusion of renewable energy (Thiam, 2011). The public's perception and attitude towards the photovoltaic solar panels are also contributing to the adoption of this form of green energy. Increasing the public's awareness about the benefits of renewable energy is another factor that influences the adoption of photovoltaic solar panels (Makki and Mosly, 2020). Environmental concern, trust, the perceived risk, financial incentives and relative advantage also influences the adoption of green energy (Khalid et al, 2021).

It is also believed that consumers are less likely to adopt green energy if they are uncertain about its efficiency (Khalid and Lis, 2021). The adoption of photovoltaic solar panels can be determined by people's personal factors, such as their motivation and nature, their age, their income, their occupation, their lifestyle, their needs and interests, as well as their contextual factors such as societal, political, and community aspects (Hai, 2019; Child, Haukkala and Breyer, 2017; Kahma and Matschoss, 2017; Haukkala, 2015; Rai and Beck, 2015).

Fig. 4

Off-grid solar market size worldwide from 2018 to 2026 in million U.S. dollars.



(Source: Jaganmohan, 2022)

Systems that generate power from solar energy are known as off-grid systems. As shown in **Fig. 4**, Off-grid solar market value was 1.6 million U.S. dollars in 2018, 1.8 million U.S. dollars in 2019, and 1.9 million U.S. dollars in 2020. By 2026, the market value is forecast to be over 3.1 million U.S. dollars (Jaganmohan, 2022).

Table 11

Computation of Renewable Energy (RE) Target

(*Source: National Renewable Energy Policy, 2019*)

Year	Total RE Generation Target (in GWh)	Corresponding RE Capacity (MW)	RE as a percentage of total electricity demand (Cumulative%)
2017	850	388	9.4
2018	969	442	10.2
2019	1.104	504	10.7

2020	1.258	574	11.3
2021	1,433	654	12.1
2022	1,633	746	13.1
2023	1,861	850	14.1
2024	2,120	968	15.3
2025	2,416	1,103	16.5
2026	2,753	1,257	18.1
2027	3,137	1,432	19.9
2028	3,574	1,632	21.9
2029	4,072	1,860	24.0
2030	4,640	2,119	26.6

Using renewable energy, the Zimbabwean government set a target to generate 1,100 Mega Watts (1,100 MW) of electricity by the year 2025 or 16 percent (16%) of total electricity generation by 2030, whichever is higher as shown in **Table 11**. In addition, 2,000 one hundred Mega Watts (2,100 MW) of electricity generation by the year 2040 is set to come from renewable energy sources, whichever is higher by the year 2030 (National Renewable Energy Policy, 2019). Based on this study, the results could aid in accelerating the solar panel adoption rate so as to achieve these goals.

1.10. Policy Implications and Limitations

This research examined the key factors affecting the purchase intention of photovoltaic solar panels in Zimbabwe. Based on the literature review, purchase intentions of photovoltaic solar panels are highly influenced by the perceived ease of use, perceived cost, perceived usefulness, social influence as mediated by willingness to adopt. As such, the perceived cost; social influence; perceived usefulness and the perceived ease of use were treated as the independent variables of this study, while purchase intention was regarded as a dependent variable. The researcher also tested the mediating role of willingness to adopt. The results indicate that the proposed hypotheses of this study are proven significant. All the respondents have intention to adopt photovoltaic solar panels. Most of the respondents who had the intention to adopt photovoltaic solar panels were influenced by their relatives, friends or close colleagues (social influence), the perceived ease of use, perceived cost and by the perceived usefulness.

Based on income, many respondents could afford to buy photovoltaic solar panels. Therefore, the study suggests that companies that manufacture these types of solar panels should thus take advantage of this situation and market their solar products so as to attract the attention of consumers. Although Zimbabwe has some policies and renewable energy goals such as:

I. Providing a better rate of interest, shortening the payback period, and having a sound approval process, the government shall collaborate and coordinate with domestic banks and foreign banks to promote renewable energy development in the country of Zimbabwe (National Renewable Energy Policy, 2019)

II. Independent clean energy fund called the Green Energy Fund of Zimbabwe will be created to facilitate financial assistance for developing new and renewable sources of energy, as well as other sustainable energy projects including Demand Side Management (National Renewable Energy Policy, 2019)

III. Funding from donor communities shall be used to support renewable energy projects at the community scale. These funds will go into the Green Energy Fund. International funding and development agencies are highly interested in financing the renewable energy projects in Zimbabwe when there is a sovereign guarantee (National Renewable Energy Policy, 2019).

Due to the lack of availability of updated information from the concerned organizations on tracking these goals, the researcher suggests the use of this and similar studies to be more prevalent as it might provide more accurate information on the consumer's willingness to adopt the solar panel technology. The manufacturers of photovoltaic solar panels should work on reducing the price of solar panels; enhance the longevity, power output and the resilience of their solar panels to boost the positive purchase intentions among consumers. The governments and non-governmental organizations should support the adoption of photovoltaic solar panels through strategies such as introducing incentives that benefit the adopters and availing financial resources or support as well as facilitating financial assistance at low interest rates due to the country's high inflation rates. This study was only limited to a province in Zimbabwe and the sample size was not big enough to reflect the behaviour of consumers at a regional and international level. Hence, future researchers may need to use a huge sample to compare the results amongst other developing countries and beyond. The variables selected for this study were chosen based on relevance to the selected province but there are still many theories that future researchers can use to analyse the solar adoption patterns. The lack of sufficient updated literature online for Zimbabwean data may have also limited the results of this study therefore the researcher sets out to seek more primary information from relevant organisations in the future.

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Appendix

Questionnaire used for study

(Adapted from Ali S. et al. (2020)

Please indicate your answer by a tick in the box provided:

SECTION A

Demographic Information

Gender: Male Female

Age: 20 and Below
20 – 30
31 – 40
41 – 50
51 and Above

Education: Ordinary Level
Advanced Level
Certificate
Diploma
Honors Degree
Masters

Monthly Income (USD): *$100 & below* *$101-300* *$300-500* *$501-700* *$701-900* *$901 & above*

SECTION B (*Please indicate your response by a tick in the box provided*)

Perceived Usefulness

1. The use of photovoltaic solar panels saves natural resources:
Strongly disagree" "Disagree" "Neutral" "Agree" "Strongly agree"
2. The use of photovoltaic solar panels reduces the emission of greenhouse gases:
Strongly disagree" "Disagree" "Neutral" "Agree" "Strongly agree"
3. The use of photovoltaic solar panels enhances the ecological behavior:
Strongly disagree" "Disagree" "Neutral" "Agree" "Strongly agree"
4. I would purchase photovoltaic solar panels because they meet my needs:
Strongly disagree" "Disagree" "Neutral" "Agree" "Strongly agree"
5. I would purchase photovoltaic solar panels because they do everything I expect them to do:
Strongly disagree" "Disagree" "Neutral" "Agree" "Strongly agree"
2. I would purchase photovoltaic solar panels because they saved me time:
Strongly disagree" "Disagree" "Neutral" "Agree" "Strongly agree"

Perceived Ease of Use

3. I think photovoltaic solar technology is easy to use:
Strongly disagree" "Disagree" "Neutral" "Agree" "Strongly agree"
8. I think photovoltaic solar technology is reliable and dependable:
Strongly disagree" "Disagree" "Neutral" "Agree" "Strongly agree"
9. I think photovoltaic solar technology is easy to maintain:
Strongly disagree" "Disagree" "Neutral" "Agree" "Strongly agree"
10. I think photovoltaic solar technology is easy to install:
Strongly disagree" "Disagree" "Neutral" "Agree" "Strongly agree"
11. I think photovoltaic solar systems have low operational costs:
Strongly disagree" "Disagree" "Neutral" "Agree" "Strongly agree"

Perceived Cost

11. I think photovoltaic solar panels are expensive:
Strongly disagree" "Disagree" "Neutral" "Agree" "Strongly agree"
13. I think it is very costly to maintain photovoltaic solar panels:
Strongly disagree" "Disagree" "Neutral" "Agree" "Strongly agree"
14. I think it is very expensive to import photovoltaic solar panels in my country:
Strongly disagree" "Disagree" "Neutral" "Agree" "Strongly agree"

Social Influence

15. I will purchase photovoltaic solar panels just like my friends:

Strongly disagree” “Disagree” “Neutral” “Agree” “Strongly agree”
16. I will purchase photovoltaic solar panels just like my neighbors:
Strongly disagree” “Disagree” “Neutral” “Agree” “Strongly agree”
17. My friends advised me to use photovoltaic solar panels in order to cut costs:
Strongly disagree”)isagree” tral” “A ” “Str agree”

Willingness to Adopt

18. I intend to use photovoltaic solar panels to save the environment:
Strongly disagree” “Disagree” “Neutral” “Agree” “Strongly agree”
19. I intend to use photovoltaic solar panels to cut costs:
Strongly disagree” “Disagree” “Neutral” “Agree” “Strongly agree”
20. The probability of everyone using photovoltaic solar panels in my community is very high:
Strongly disagree” “Disagree” “Neutral” “Agree” “Strongly agree”
21. I intend to adopt photovoltaic solar panels because of its ease of use:
Strongly disagree” “Disagree” “Neutral” “Agree” “Strongly agree”
22. I intend to adopt photovoltaic solar panels to protect the environment:
Strongly disagree” “Disagree” “Neutral” “Agree” “Strongly agree”
23. I intend to adopt photovoltaic solar panels as an act of pro-environmental behaviour:
Strongly disagree” “Disagree” “Neutral” “Agree “Strongly agree”

Purchase Intention

24. I would purchase a photovoltaic solar panel even if the cost is high:
Strongly disagree” “Disagree” “Neutral” “Agree” “Strongly agree”
25. I would purchase a photovoltaic solar panel even if the quality is poor:
Strongly disagree” “Disagree” “Neutral” “Agree” “Strongly agree”
26. I would purchase a photovoltaic solar panel even if the performance is poor:
Strongly disagree’ “Disagree” “Neutral” “Agree” “Strongly agree”
27. I would purchase a photovoltaic solar panel even if it has a less appealing design:
Strongly disagree” “Disagree” “Neutral” “Agree” “Strongly agree”
28. I would purchase a photovoltaic solar panel even if it is expensive:
Strongly disagree” “Disagree” “Neutral” “Agree” “Strongly agree”
29. I would purchase a photovoltaic solar panel even if it is expensive to maintain:
Strongly disagree” “Disagree” “Neutral” “Agree” “Strongly agree”

References

[1]. Ajzen, I. (1991). The Theory of Planned Behavior. Organizational Behavior and Human Decision Processes, 50, 179-211.

[2]. Alam, S. S. & Rashid, M., (2012). Intention to use renewable energy mediating role of attitude. Energy Research Journal, 3(2), 37-44.

[3]. Alam, S. S. et al., (2014). Small scale household renewable energy usage intention: Theoretical development and empirical settings. Renewable Energy, 68, 255-263.

[4]. Ali S., Poulova P., Kbar A., Javed H & Danish M. (2020). Determining the Influencing Factors in the Adoption of Solar Photovoltaic Technology in Pakistan: A Decomposed Technology Acceptance Model Approach. Economies 8(4), 108.

[5]. Arnold M. Lund (2001). Measuring usability with the USE questionnaire. Usability interface 8 (2), 3-6.

[6]. Bandara1, U.C., and Amarasena, T. S. M. (2020). Impact of Perceived Ease of Use, Awareness and Perceived Cost on Intention to Use Solar Energy Technology in Sri Lanka. Journal of International Business and Management 3(4): 01-13 (2020).

[7]. Board, C.E. (2020). Impact of Perceived Ease of Use, Awareness and Perceived Cost on Intention to Use Solar Energy Technology in Sri Lanka. J. Int. Bus. Manag. 2020, 3, 1–13. 13.

[8]. Byrne, B. M., 2010. Structural equation modeling with AMOS. 2nd edition ed. New York: Routledge.

[9]. Chaveesuk, S., and Khalid, B. (2019). Chaiyasoonthorn, W. Emergence of New Business Environment with Big Data and Artificial Intelligence. In Proceedings of the 9th International Conference on Information, Prague, Czech Republic, 23–26 August 2019.

[10]. Child, M., Haukkala, T., and Breyer, C. (2017). The role of solar photovoltaics and energy storage solutions in a 100% renewable energy system for Finland in 2050, Sustainability (9) (2017) 1358.

[11]. Davis, F. D., (1989). Perceived usefulness, perceived ease of use and user acceptance of Information Technology. MIS Quarterly, University of Michigan, p. 319.

[12]. Dunlop, S. (2008). A Dictionary of Weather. OUP Oxford. ISBN 9780191580055. Retrieved 2017-01-29.

[13]. EIA, (2016). The International Energy Outlook, Washington: U.S. Energy Information Administration.

[14]. Fishbein, M. & Ajzen, I., (1975). Belief, attitude, intention, and behaviour: An introduction to theory and research., s.l.: MA: Addison-Wesley.

[15]. Garson, G., (2009). Quantitative research in public administration. s.l.:s.n. Hair, J., Black, W., Babin, B. & Anderson, R., (2010). Multivariate data analysis: A global perspective. 7th Edition, Pearson.

[16]. Gboney, W. (2009). Policy and regulatory framework for renewable energy and energy efficiency development in Ghana. Clim. Policy 2009, 9, 508–516.

[17]. Gogoi, b. (2013), Study of antecedents of purchase intention and its effect on brand loyalty of private label brand of apparel, International Journal of Sales & Marketing, Vol. 3, Issue 2, Jun 2013, 73-86.

[18]. Hai, M. A. (2019). Rethinking the social acceptance of solar energy: Exploring "states of willingness" in Finland. Energy Research & Social Science 51 (2019) 96–106.

[19]. Hair, J. J., Anderson, . R., Tatham, . R. & Black, W., (1998). Multivariate Data Analysis. 5th edition ed. Upper Saddle River, NJ: Prentice Hall.

[20]. Haukkala, T. (2015). Does the sun shine in the High North? Vested interests as a barrier to solar energy deployment in Finland, Energy Res. Soc. Sci. 6 (2015) 50–58.
[21]. Herick, O. (2015). Energy resources in Africa: distribution, opportunities and challenges.
[22]. Howard, J. & Moore, W., (2002). Changes in consumer Behavior Over the Product Life Cycle. Marshfield: Pitman.
[23]. IEA, (2006). Renewable Energy: RD & D Priorities, Insights from IEA Technology progrems, France: International Energy Agency (IEA).
[24]. Jaganmohan, M. (2022). Global off-grid solar market size 2018-2026. Statista. https://www.statista.com/statistics/1284086/global-off-grid-solar-market-size/
[25]. Kahma, N. and Matschoss, K. (2017). The rejection of innovations? Rethinking technology diffusion and the non-use of smart energy services in Finland, Energy Res. Soc. Sci. 34 (2017) 27–36.
[26]. Katinas, V., Karbauskaitė, J., Perednis, E. & Valančius, R., (2013). Efficiency analysis of combined biomass and solar energy in Lithuania. Clean technology and environmental policy, 15(4), 667-676. Kim, H. et al., (2014). An integrated adoption model of solar energy technologies in South Korea. Renewable energy, 523-531.
[27]. Khalid, B., and Lis, M. (2021). Chaiyasoonthorn, W.; Chaveesuk, S. Factors influencing behavioural intention to use MOOCs. Eng. Manag. Prod. Serv. 2021, 13, 83–95.
[28]. Khalid, B., Urbanski, M., Kowalska-Sudyka, M., Wysłocka, E., and Piontek, B. (2021). Evaluating Consumers' Adoption of Renewable Energy. Energies 2021, 14, 7138. https:// doi.org/10.3390/en14217138.
[29]. Lluís Garay, Xavier Font, and August Corrons (2019). Sustainability-oriented innovation in tourism: An analysis based on the decomposed theory of planned behaviour. Journal of Travel Research 58 (4), 622-636.
[30]. Makki, A. A., and Mosly, I. (2020). Factors Affecting Public Willingness to Adopt Renewable Energy Technologies: An Exploratory Analysis. Sustainability 2020, 12, 845; doi:10.3390/su12030845.
[31]. Malhotra, N. & Dash, S., (2011). Marketing Research: An applied Orientation. 6th Edition ed. Pearson Education.
[32]. Ministry of Energy and Power Development (2019). National Renewable Energy Policy. Available online at: https://www.zera.co.zw/National_Renewable_Energy_Policy_Final.pdf
[33]. Moyo, N., & Masuku, F. (2018). Based on Environmental Education: The Effects of Environmental Knowledge and Awareness on the Purchase Intention of New Energy Vehicles in the Southern part of China. Advances in Social Sciences Research Journal, 5 (11) 390-402.
[34]. National Renewable Energy Policy (2019). Republic of Zimbabwe Ministry of Energy And Power Development National Renewable Energy Policy. https://www.zera.co.zw/National_Renewable_Energy_Policy_Final.pdf
[35]. Noll, D., Dawes, C., and Rai, V. (2014). Solar Community Organizations and active peer effects in the adoption of residential PV, Energy Policy 67 (2014) 330–343.
[36]. Powell, R.; Bowden, D.; Tresemer, D.; Bento, W.; Farrants, W.; Gray, B.; Dann, K.; Paul, L.; Lainson, C.M.L.; Nurney, S. (2012). Journal for Star Wisdom 2013. Lindisfarne Books. ISBN 9781584201366. Retrieved 2017-01-29.
[37]. Premkumar, G., Ramamurthy., K. & Crum, M. R., (1997). Determinants of EDI Adoption in the Transportation Industry. European Journal of Information Systems, 6(2), 107- 121.
[38]. Purohit, I. & Purohit, P., (2017). Technical and economic potential of concentrating solar thermal power generation in India. Renewable and Sustainable Energy Reviews, 78, 648-667.
[39]. Rai, V. and Beck, A. (2015). Public perceptions and information gaps in solar energy in Texas, Environ. Res. Lett. 10 (7) (2015) 074011.
[40]. Rai, V., and Robinson, S. (2013). Effective information channels for reducing costs of en vironmentally- friendly technologies: evidence from residential PV markets, Environ. Res. Lett. 8 (1) (2013) 014044.
[41]. Rai, V., Reeves, D., and Margolis, R. (2016). Overcoming barriers and uncertainties in the adoption of residential solar PV, Renew. Energy 89 (2016) 498–505.
[42]. Rodríguez, L. (2021). Solar energy in Sub-Saharan Africa: 5 trends driving the growth. Available at: https://ratedpower.com/blog/solar-trends-sub-saharan-africa/
[43]. Rogers, E. & Shoemaker, F., (2001). Communications in Innovation, New York: Free press.
[44]. Sardianou, E., and Genoudi, P. (2013). Which factors affect the willingness of consumers to adopt renewable energies? Renewable Energy 57 (2013) 1-4.
[45]. Sardianou, E.; Genoudi, P. (2013). Which factors affect the willingness of consumers to adopt renewable energies? Renew. Energy 2013, 57, 1–4.
[46]. Sengere, L. (2021). 46% of Zimbabwean electricity users have solar as main source. Available at: https://www.techzim.co.zw/2021/09/46-zimbabwe-electricityusers-use-solar-as-main-source/
[47]. Shah, H., Aziz, A., Jaffari, A. R., Waris, S., Ejaz, W., Fatima, M. and Sherazi., K.(2012), The Impact ofBrands on Consumer Purchase Intentions, Asian Journal of Business Management 4(2): 105-110.
[48]. Taylor, M., Daniel, K., Ilas, A. & Young, E., (2014). Renewable Power generation cost, s.l.: IRENA.
[49]. The Renewable Energy Transition in Africa (2021). The Renewable Energy Transition in Africa: Powering Access, Resilience and Prosperity. The Federal Ministry of Economic Cooperation and Development (BMZ). Available at: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2021/March/Renewable_Energy_Transition_Africa_2021.pdf
[50]. Thiam, D. (2011). An energy pricing scheme for the diffusion of decentralized renewable technology investment in developing countries. Energy Policy 2011, 39, 4284–4297.
[51]. Williamson, O., (1979). Transaction Cost Economics: The governance of contractual relations. Journal of Law and Economics, Issue 22, 233-262.
[52]. Wood, W., and Hayes, T. (2012). Social Influence on consumer decisions: Motives, modes, and consequences. Journal of Consumer Psychology 22 (2012) 324–328.
[53]. Zografakis, N. et al., (2010). Renewable and Sustainable Energy Reviews, 14(3), pp. 1088-1095.

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