Perception Influence on Adoption of Solar Energy Technologies at Household Level in Konoin Sub-County, Bomet County, Kenya

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Abstract

Globally, the demand and price of energy, especially fossil fuels, is rising because of growing population and economic crisis. The Kenyan government spends a substantial amount of money importing fossil fuels to satisfy the needs of its citizens. The rising use of fossil fuels has substantial environmental consequences, including increased carbon emissions. It is necessary to use solar energy technologies, such as solar power, to reduce the impacts of fossil fuels on the environment. Thus, there is need for more knowledge about the factors influencing adoption of solar energy technologies in the study area. This research investigated how perception affects the adoption of solar energy technologies in households. Descriptive research survey approach was used. There were 38,178 households in Konoin sub-county, and 387 respondents were selected for the survey. Stratified-random sampling was used to choose 80 households from Mogogosiek, 84 from Boito, 91 from Embomos, 64 from Kimulot, and 61 from Chepchabas wards. Purposive sampling was used to choose seven key informants. Primary data was gathered through the use of a semi-structured questionnaire. The data was examined using descriptive statistics and multiple linear regression. Findings indicate that perception has a limited correlation with adopting solar energy systems in homes.

Keywords: Bomet, Carbon Emissions, Fossil Fuels, Green Energy, Solar Energy

Background to the Study

Green energy technologies are ecologically friendly energy sources, have little environmental effect, produce little to no secondary waste, and are economically, socially, and environmentally sustainable (Kumar et al., 2021). The renewable energy sector is notable for its varied energy source, reduced reliance on fossil fuels, decreased greenhouse gas emissions, and efforts to address climate change. Renewable energy sources include solar, wind, geothermal, biomass, hydropower, and marine energy (Nelson & Starcher, 2015).

Sustainable energy, sometimes called green energy, involves using different energy sources that may fulfill requirements without risking resource exhaustion, as described by Koch and Koch (2019). Sustainable energy solutions have little impact on the environment and provide an endless supply of energy (Vezzoli et al., 2018). They provide sustainable energy sources that are secure, durable, and self-regenerating. Wind and solar power are highly sustainable energy sources since wind turbines and solar panels may be installed in many areas globally without causing significant harm to the natural environment. AGENDA 21, adopted at the 1992 United Nations Conference on Environment and Development in Rio de Janeiro, provides the guidelines for achieving sustainable development in renewable energy.

Solar energy is the fastest-growing renewable energy source worldwide, seeing an annual average growth in net solar output of 8.3 percent. Hydroelectric and wind power each account for 1.9 trillion kWh (33%) of the 5.9 trillion kWh of extra renewable energy produced in the projected timeframe. Solar energy accounts for 859 billion kilowatt-hours. The yearly growth rate of power produced from green sources is 2.9 percent, and the renewable percentage of global energy generation is projected to increase from 22 percent in 2022 to 29 percent in 2040. Renewable sources such as biomass and garbage account for 856 billion kWh, which is 14% of the total energy production (Petrovic, 2023). The indicators show that sustainable energy consumption is widely accepted globally (Ibrahim et al., 2021).

Kenya utilizes wood fuel to provide the fundamental energy requirements of rural communities, urban disadvantaged regions, and homes. Petroleum and electricity dominate the country's energy market. Examination of the country's energy use reveals that 68% of the overall energy consumption is derived from wood, fuel, and other biomass, mainly petroleum. Electricity makes up about 22% of the total, while other sources contribute 9%. Electricity access in Kenya is limited to a tiny segment of the population. The government aims to increase power access from 15% to 65% by 2030 (Ocelli et al., 2013). In Kenya, electricity comprises 22% of total energy consumption, petroleum products constitute 22%, and renewable energy makes up 3%. Biomass is the primary energy source for home cooking, heating, and lighting.

Wood biomass is the most often used renewable fuel source. There is already a shortfall of about 5,000 metric tons of wood fuel, growing daily. The high demand for wood fuel is causing deforestation, forest fragmentation, land degradation, and threatening water catchments. Additionally, the country's energy demand is projected to rise by 2030 (Kendagor and Prevost, 2013).

Many rural and urban households still need a plan for adopting the green energy revolution, which has worsened the current climate change crisis. It is necessary to address the discrepancy in the acceptance of renewable energy policies between rural and urban families, as shown in the research on advocating for

clean energy by Covey et al. (2012). This research examines the variables that impact the adoption of renewable energy technologies in residential settings.

Literature Review

Influence of Perception on Adoption of Solar Energy Technologies among Households

Perception impacts the acceptance of new solar energy technologies. Walker (1995) found consistent support for the idea of Green Energy Technologies (GET) and its expansion. He emphasizes the need for researchers to have a clear understanding and precise use of the phrase "green energy" due to its complexity. Research indicates that 80% to 90% of people favor green energy, as shown by a study conducted by Lorenzoni (2016). The study revealed that 60% strongly supported solar energy, while 25% disagreed. Men showed a higher level of support (91%) compared to women (80%). Elderly participants aged 65 and older had little interest in solar energy.

Several research have raised questions regarding green energy in relation to other energy sources, and the findings of these polls show a significant preference for green energy. A research by Poortinga et al. (2006) found that most participants saw solar energy technology as much better than fossil fuels. Overall, solar energy is positively recognized for its environmental advantages, being clean, non-polluting, and sustainable. Poortinga et al. (2006) provided statistics from their study showing that 25% of respondents had a positive attitude towards GE due to its sustainability benefits, 16% liked it for economic advantages, and 47% for future-related benefits of using GE.

Research conducted in Bahrain revealed that respondents with a higher level of comprehension are more willing to pay for green energy installations. This conclusion aligns with the research conducted by Sinha (2019) and Semenkova & Kolosov (2021), indicating a prevalent lack of energy literacy. This underscores the need to educate consumers to enhance their ability to make informed energy decisions. The findings are similar to those published by Valentova et al. (2014), indicating that families' socioeconomic characteristics might partially account for investment in energy efficiency. The results are consistent with Mishra et al.'s (2013) findings, indicating that more awareness and knowledge might result in a stronger inclination to embrace green energy and be ready to pay for it.

Conversely, families in some industrialized regions possess extensive awareness of environmental concerns and are highly likely to embrace renewable energy. Research has shown that those prioritizing environmental concerns are more inclined to invest in energy-efficient devices. Shang et al. (2020) suggest that socioeconomic factors, including environmental interest, knowledge of green energy, and education, are linked to willingness to pay, a stance that is supported. Conversely, he contends that customers' environmental concerns differ from their comprehension of renewable energy. They reached this result after analyzing the survey replies. Dutta et al. (2021) said that most socio-demographic parameters cannot explain attitudes towards various energy technologies.

Valentova et al. (2014) found that older and wealthier consumers had less favorable attitudes towards wind power energy. In contrast, those who prioritize environmental issues tend to have a favorable view of green electricity. Furthermore, he discovered that demographic features significantly impact an individual's

willingness to pay a premium for energy derived from renewable sources. Considering these variables, it is evident that implementing GET is a complex procedure impacted by several circumstances. This study aims to demonstrate the impact of perceptions and attitudes on individuals' behavior towards green energy technology.

The International Energy Agency (IEA) predicts a 40-60% decrease in oil and gas reserves output by 2030. As shown by this research, most nations are still predominantly reliant on coal, oil, and natural gas. Despite a reduction in coal use, Asian nations, Australia, and South Africa still rely heavily on it as a primary component of their energy sources. Solid biomass is identified as the primary kind of biomass used for energy across all nations. This aligns with research conducted by WFF in 2011, which discovered a significant dependence on bioenergy. Some nations with few forested areas ban biomass collection but offset this by importing it for energy (IEA, 2021).

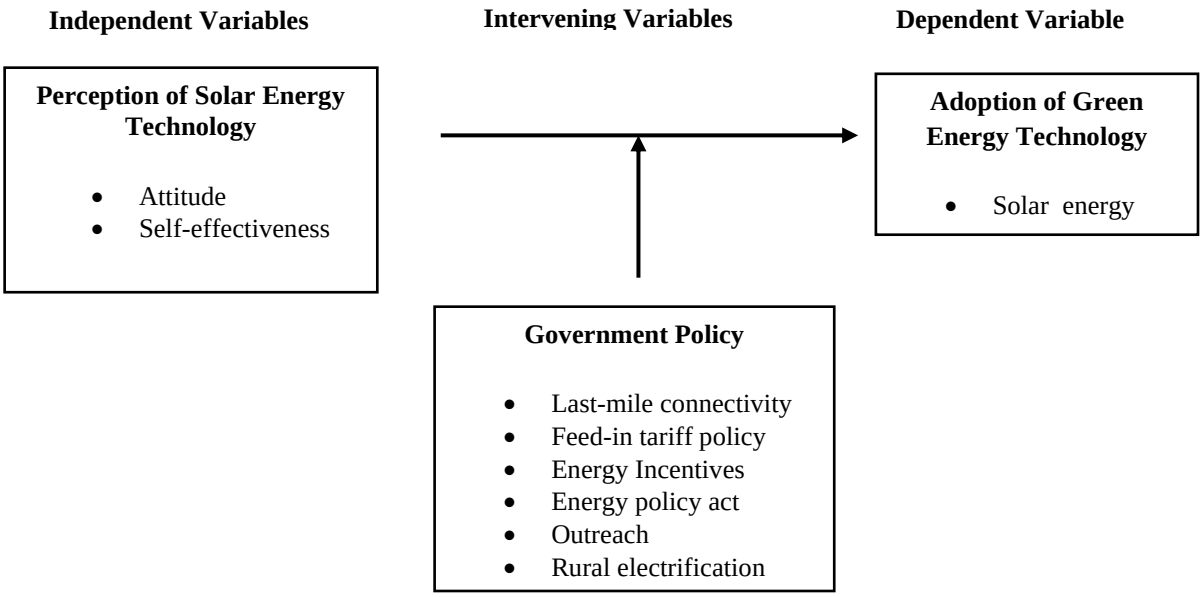
In Africa, the situation is far more severe. In 2020, 9% of energy produced in Africa came from green sources, with North African nations leading in this aspect, as reported by the World Economic Forum (2022). Despite Africa's abundance of green energy technologies, including hydro, solar, and wind, the situation remains unchanged. The international renewable energy agency (IRENA) reports the emergence of several regional projects in the field of renewable energy. Examples include the African Clean Energy Corridor, an effort promoting cross-border commerce in green energy in Eastern Africa, and the West African Clean Energy Corridor, which encourages clean energy development in West Africa. Additional initiatives include an Entrepreneurship support facility and a Renewable Readiness Assessment (RRA) (IEA, 2021).

Policy on Energy

Kenya has been actively implementing several initiatives to improve its energy industry. An exemplary endeavor is the Kenya National Electrification Strategy (KNES), with the objective of attaining comprehensive power accessibility by the year 2022. The approach prioritizes a combination of grid expansion, mini-grids, and off-grid options to effectively reach distant and neglected communities. In addition, Kenya has pledged to increase the proportion of renewable energy in its total energy composition. The nation has established ambitious objectives, including the attainment of 100% renewable energy by 2030, specifically by harnessing its substantial geothermal capacity, as well as wind and solar resources (Government of Kenya, 2017).

Conceptual Framework

The independent factors are perception, shown by mood and self-effectiveness; temporal features, shown by changes in policy and energy use over time; and acceptance over time. Adoption and use of green energy solutions are the things that are being measured.



Study Area

The location of the investigation is Konoin sub-county, which is situated in Bomet County, Kenya. Kimulot, Mogogosiek, Boito, Chepchabas, and Embomos, the largest ward, comprise the five wards of Konoin Sub-County. The geographic coordinates of the area are 35° 16' east longitude and 0° 36' south latitude, with a 1909-meter elevation above mean sea level (Survey of Kenya, 2022). Consisting of hills, plains, and vast agricultural regions, the varied topography of Konoin Sub-County significantly influences the socioeconomic and environmental milieu of the research (CIDP,2022).

The undulating hills offer a picturesque backdrop and may impact the region's resource accessibility and distribution. The existence of plains may indicate regions that are amenable to a variety of land uses, such as agricultural or infrastructure development. The prioritization of agricultural regions highlights the significance of the regional economy, which may have repercussions on the inhabitants' way of life and their perspectives on renewable energy technologies. In addition, a comprehensive comprehension of the administrative and geographical attributes of Konoin Sub-County contributes to the contextual lucidity of the study concerning the adoption of green energy technologies. This provides a nuanced viewpoint on the intricate relationship between the administrative frameworks, local topography, and the community's potential reception of sustainable energy solutions (CIDP, 2022).

The research was conducted in this sub-county due to indications of household and county government initiatives aimed at educating residents and providing subsidized solar panel installations (CIDP, 2022). Additionally, the sub-county benefits from its strategic location near multinational tea companies, significantly contributing to community education regarding the sustainable utilization of solar energy implemented within the estates via corporate social responsibility.

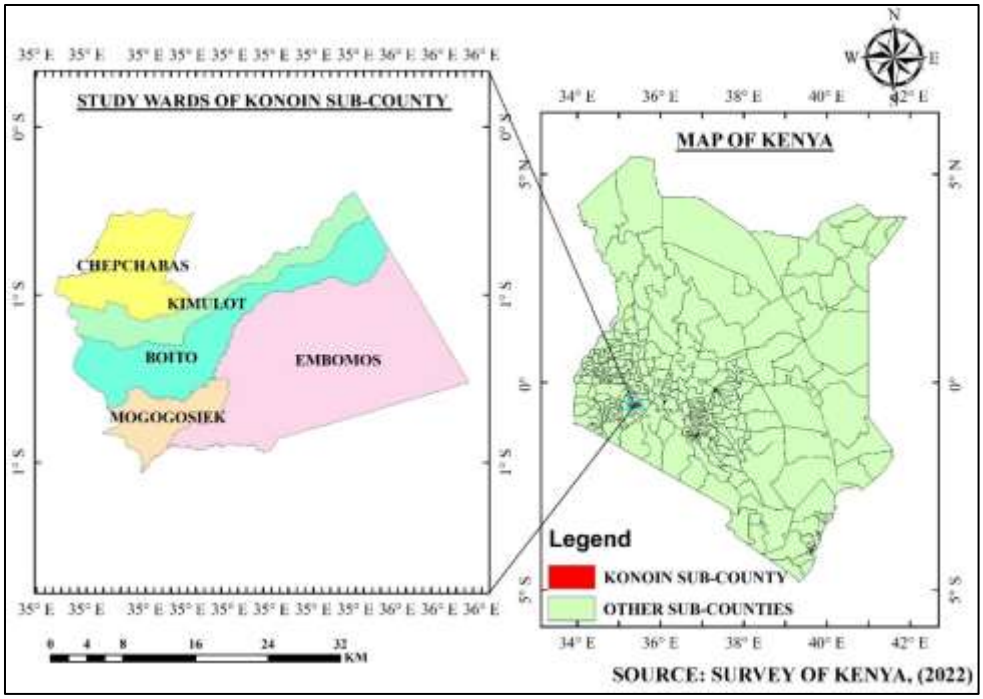


Figure 1: Map showing the location of study area
Source: (Survey of Kenya, 2022)

Research Methodology

Research Design

This research used a descriptive survey approach that utilized questionnaires for data collection. A descriptive survey design is a research approach focused on gathering thorough and detailed data on the features of a population or phenomena. It entails methodically collecting data to provide a comprehensive overview of the present condition of the topic under investigation, providing insights into its characteristics and qualities. This design aims to provide a summary rather than build cause-and-effect connections. (Burkholder et al., 2019)

The study's design was suitable as it enabled the researcher to gather and present information without altering the study's variables. The researcher gathered data on the attitudes and views of the participants. Descriptive survey research design is efficient, simple, and cost-effective compared to other approaches. (Burkholder et al., 2019)

A descriptive survey approach used in energy research aims to elucidate current energy consumption patterns, assess knowledge and attitudes toward various energy sources, and identify particular energy needs and preferences within a community. This technique offers crucial data for making educated choices, formulating policies, and executing targeted actions in the energy industry (Creswell, 2014).

Target Population

This research had a target population of 38,178 homes spread over five wards. Households play a significant role in energy studies due to their enormous impact on overall consumption patterns. Studying energy use in residential dwellings reveals essential insights into human behavior, preferences, and choices influencing energy needs. Understanding this notion is essential for tailoring effective strategies to enhance energy efficiency and sustainability. By studying dwellings, researchers may assess the direct impacts of energy-related behavior at an individual level and recognize the broader implications of energy use on the whole community. Examining houses is essential for developing comprehensive strategies to address energy challenges and enhance a sustainable and resilient energy landscape.

Key informants were vital in providing strategic insights for implementing green energy initiatives in the study area. The committee has five ward members, one from each ward and a representative from the ministries of water, sanitation, environment, natural resources, and climate change, and another from the ministry of trade, energy, industry, and tourism. The addition increased the overall number of delegates to seven.

Key informants are crucial in energy studies since they provide critical insider knowledge for comprehending certain energy practices, laws, or community dynamics. Their perspectives provide a nuanced understanding beyond surface-level observations, enabling researchers to grasp the intricacies of energy-related issues. Key informants are vital in enhancing stakeholder engagement and increasing collaboration between academics and those directly involved in or affected by energy systems.

The study also focused on institutional homes as a specific category to collect necessary data. The study focused on 35 institutions, which were classified accordingly: There are 15 elementary schools, ten secondary schools, five tertiary institutions, and five tea factories.

In energy studies, institutions are crucial since they possess significant influence in formulating and implementing policies within the energy sector. These organizations may create regulatory frameworks that govern energy activities, influencing sustainable energy development. Institutions play a crucial role in the strategic development, financial backing, and operational monitoring of energy infrastructure, hence improving the organization and efficiency of the energy industry. Institutions play a crucial role in bringing together different stakeholders in the energy sector to promote the collaboration necessary for the successful implementation of sustainable energy projects and overcoming systemic challenges.

Sampling Procedure and Sampling Size

The sampling method in this study was designed to account for the extensive geographical distribution of residences effectively. A systematic and deliberate approach was used to reach out to specific households in each ward, ensuring comprehensive representation.

A purposive sample strategy was deliberately used to include key informants and institutions such as schools in the study, following the suggestions of Zhang et al. (2016). The selection process ensured a focused and intentional representation of perspectives from significant sources and organizations such as factories within the study area. It ensured an understanding of their roles and contributions in the broader

energy research field. The sampling procedures were designed to enhance the study's dependability by including diverse home perspectives and intentionally incorporating insights from critical informants and organizations.

Mugenda (2003) defines sample size as a small group chosen from a more prominent target population to reflect the whole community. This study used a conventional sampling formula developed by Krejcie and Morgan (1970) to determine the sample size. This approach is suitable for significant populations, ensuring that the generated figure accurately represents the total number of households. The formulae is given below.

$$n = \frac{x^2 Npq}{d^2(N-1) + x^2 pq}$$

Where:
n =Required sample size.
x^2 =The table value of Chi-Square value for one degree of freedom at the desired confidence level (x^2 =3.841 at confidence level).
N =The target population.
p= The population proportion (Assumed to be 0.50 since this would provide the maximum sample size)
d = Degree of accuracy reflected by the amount of error that can be tolerated.

Subjecting the formula to the target population of 38178, yields a sample size of 380 which was proportionately divided among the five wards.

Research Instruments

This research used three open-ended and closed-ended questions. Data from family homes was gathered using the first questionnaire, data from institutions was obtained using the second questionnaire, and data from key informants was acquired using the third questionnaire.

Using a questionnaire allows researchers or surveyors to gather information in a standardized and consistent manner. Each participant receives an identical set of questions, ensuring consistency in their responses. Uniformity is essential to support comparative analysis and provide reliable findings (Mugenda and Mugenda, 2012).

A questionnaire's structured design helps streamline the data processing method. Responses may be easily quantified, categorized, and analyzed using statistical methods. This allows for identifying patterns, trends, or correlations within the data, providing valuable insights into the many issues under investigation (Mugenda & Mugenda, 2012).

Ethical Considerations

The researcher first obtained permission from Egerton university institute of postgraduate and research studies, followed by a permit from the headquarters of National Commission for Science and Technology, and Innovation (NACOSTI). The researcher then obtained consent from Konoin Sub- County Education office since part of the target population were schools. The researcher also sought the respondent's

authorization before collecting data and in a situation where the respondents were not willing to provide any information, his or her decision was respected.

Data Analysis

The data was analyzed using descriptive and inferential statistics with the help of the Statistical Package for Social Scientists (SPSS). Descriptive statistics were essential for summarizing and organizing the data, facilitating the development of important conclusions. The analyzed data successfully achieved the goal of examining the research questions. The first and third goals were evaluated using multiple linear regression analysis, while the second target was analyzed using correlation analysis.

Results and Discussions

This section explores the presentation, analysis, and interpretation of the study outcomes, particularly on the field data. This study in the Konoin sub-county, Bomet County, Kenya, aimed to examine the factors influencing individual households' choices to adopt eco-friendly energy technology.

Multi-Variate Contingency Table Showing the Percentage Frequency of Variables

The cross-tabulation data show how the independent variables were analyzed across the different sets of variables and how they relate to the dependent variable, which is the use of solar energy technologies.

Table 1: Adoption of Solar Energy Technologies

Ward/Location of Respondent	Yes	No	Total
Mogogosiek	88.10%	11.90%	100.00%
Chepchabas	95.50%	4.50%	100.00%
Kimulot	92.30%	7.70%	100.00%
Embomos	84.80%	15.20%	100.00%
Boito	94.30%	5.70%	100.00%
Total	90.90%	9.10%	100.00%
Age Bracket	Yes	No	Total
18-30 years	86.70%	13.30%	100.00%
31-40 years	97.10%	2.90%	100.00%
41-50 years	89.40%	10.60%	100.00%
Above 50 years	96.90%	3.10%	100.00%
Total	90.90%	9.10%	100.00%

Source: Survey Data (2023)

Ward of Residence and Adoption of Solar Energy Technologies

The data in the table above shows the respondents percentage adoption levels of solar energy technologies across different wards. It is evident that there is a relatively high adoption rate of solar energy technologies across all wards, ranging from 84.80% to 95.50%. This suggests that there is a considerable interest or incentive for households in the study area to utilize solar energy technologies. However, it is also notable that there are some variances among the wards. For instance, Embomos has the lowest adoption rate at

84.80%, while Chepchabas has the highest adoption rate at 95.50%. These differences could be due to various factors such as differences in income levels, access to information, government incentives, or geographical factors affecting solar energy viability.

Age and Adoption of Solar Energy

The cross-tabulation provided presents the relationship between age interval and the adoption of solar energy technologies. It reveals the percentage of individuals within each age group who have adopted solar energy technologies and those who have not. Across all age brackets, there is a significant portion of individuals who have adopted solar energy technologies. However, there are variations in adoption rates among different age groups. In the youngest age bracket (18-30 years), 86.70% of individuals have adopted some form of solar energy technologies, indicating a relatively high adoption rate compared to other age groups. As age increases, the adoption rate tends to rise consistently. The age group of 31-40 years shows the highest adoption rate at 97.10%, followed closely by the above 50 years' group at 96.90%.

There is a slight drop in adoption rates in the 41-50 years' age bracket, where 89.40% have adopted solar energy technologies. However, this drop is not as significant as the difference observed between the youngest age bracket and the rest. Generally, the data suggests a positive correlation between age and the adoption of solar energy technologies, with older age groups showing higher adoption rates. This trend could be attributed to various factors such as financial stability, environmental consciousness, and the availability of incentives or subsidies for solar energy adoption, which might be more accessible to individuals in certain age demographics.

Households Perception and Adoption of Solar Energy Technologies

Household members were asked to evaluate several assertions based on their significance, perception, and agreement. 317 respondents took part in the survey, providing their opinions and perspectives on many areas of green energy. The analytical results are shown in the table below.

Table 2: Descriptive statistics on perception of family households and adoption of solar energy technologies.

Perception of Family Households	N	Min	Max	Mean	Std. Deviation
I believe that considering the environmental impact of your energy usage is crucial for you and your household	317	3.00	5.00	4.6025	.56231
What is the perception of the cost of solar energy technologies?	317	2.00	4.00	2.7508	.76991
What is the reliability and effectiveness of solar energy technologies compared to traditional energy sources?	317	3.00	4.00	3.1009	.30173
Perception of the government's role in promoting the adoption of solar energy technologies	317	3.00	3.00	3.0000	.00000
Influence of other members of your household on your decision to adopt solar energy technologies	317	2.00	5.00	3.6719	1.03404
Potential drawbacks of adopting solar energy technologies	317	3.00	3.00	3.0000	.00000

I believe that solar energy is a risk-free source of energy	317	1.00	5.00	3.5647	1.27031
I am aware of the risks associated with green energy	317	1.00	5.00	3.3249	1.34015
I do not think I am at risk when using green energy-	317	1.00	5.00	3.2366	1.42453
I know the experts to consult regarding green energy	317	1.00	5.00	3.7981	1.26926
I know where to find green energy products when I need them	317	1.00	5.00	3.9306	1.0016
Valid N (listwise)	**317**				

Source: Survey data (2023)

The table above shows that respondents rated the relevance of the environmental effect of utilizing solar energy as 4.60 on average. This shows a significant focus on environmental factors. A standard deviation of 0.56 indicates a constant emphasis on the environmental effect of utilizing solar energy across respondents. The average perception score on the cost of solar energy technology was 2.75, with a standard deviation of 0.77. Respondents had mixed judgments about the cost-effectiveness of solar energy systems. Respondents rated the dependability and efficacy of solar energy systems compared to typical energy sources with an average score of 3.10 and a standard deviation of 0.30. This suggests a consistent view of dependability and efficacy.

Respondents consistently scored the government's involvement in supporting the use of green energy technology at a mean score of 3.00, with a standard deviation of 0.00. All responders unanimously agreed that the government should control the usage of conventional energy sources. Respondents perceived other household members to have a moderate effect on their choices to adopt solar energy technology, with a mean of 3.67 and a standard deviation of 1.03. Respondents consistently assessed the possible downsides of adopting solar energy technology at 3.00 on average, reflecting a uniform assessment across poll participants.

Participants were instructed to assess different claims based on their degree of agreement or disagreement. The average score for answers to the statement "I believe that solar energy is a risk-free energy source" was 3.56, suggesting a modest degree of agreement with the idea that solar energy carries little hazard. The replies to this statement had a standard deviation of 1.27, indicating a significant level of variety in respondents' perspectives. Respondents had an average score of 3.32 on their awareness of the hazards linked to solar energy. The statement had a high standard deviation of 1.34, indicating a significant variation in respondents' knowledge of the possible dangers of solar energy sources. Respondents rated their sense of personal danger connected with utilizing green energy as 3.24 on average, indicating a modest degree of trust in its safety. The standard deviation of 1.42 suggests differing degrees of perceived danger among the respondents.

Respondents rated their knowledge of specialists to contact about green energy with an average score of 3.79, indicating a moderate familiarity with seeking assistance on green energy. The standard deviation of 1.27 indicated considerable heterogeneity in respondents' knowledge of these experts. Respondents had a high level of knowledge about the location of green energy goods, scoring an average of 3.93 with a standard deviation of 1.1.

Table 3: coefficient model on adoption of solar energy technologies among households

			Coefficients(a)			
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	T	Sig.
	(Constant)	1.121	0.26		4.303	0
	PAG1	-0.012	0.02	-0.035	-0.604	0.327
	PAG2	0.044	0.02	0.125	2.213	0.028
	PAG3	-0.011	0.018	-0.034	-0.594	0.043
	PAG4	-0.011	0.018	-0.036	-0.625	0.033
	PAG5	-0.007	0.022	-0.018	-0.322	0.048
a. Dependent Variable: Have you adopted any form of solar energy technology?						

Source: Survey data (2023)

The regression findings above analyze the correlation between the dependent variable "Have you adopted any form of solar energy technology?" and the independent variables PAG1, PAG2, PAG3, PAG4, and PAG5. The intercept in the model has a coefficient of 1.121 and a t-value of 4.303. Even when all independent factors are at zero, there remains a significant probability of adopting solar energy technology. The result is statistically significant since the significance threshold is below 0.05. Upon examining the coefficients for the independent variables, it is seen that PAG1 has a coefficient of -0.012 and a corresponding t-value of -0.604. The coefficient is not statistically significant at the 0.05 level due to a p-value of 0.327. The assumption that green energy is risk-free does not significantly influence the adoption of solar energy technologies.

PAG2 has a positive and substantial link with the use of solar energy technology, as shown by a coefficient of 0.044 and a t-value of 2.213, reflecting awareness of the dangers of green energy. The p-value is below 0.05, indicating the importance of this link. PAG3 and PAG4 show negative coefficients of -0.011, with t-values of -0.594 and -0.625, respectively. Not recognizing the danger of not utilizing green energy and lacking the knowledge of professionals to consult about green energy negatively affects the adoption of solar energy technologies. Both coefficients are statistically significant, with p-values below 0.05. PAG5 has a negative coefficient of -0.007 and a t-value of -0.322, suggesting a negative correlation between knowledge about green energy product sources and the uptake of solar energy technologies. The coefficient is not statistically significant at the 0.05 level due to a p-value of 0.048.

The findings indicate that understanding the hazards of green energy and knowing which experts to contact about green energy have a favorable effect on adopting solar energy technology. On the other hand, having faith in the safety of green energy, not seeing oneself as being in danger, and being aware of where to get green energy items do not influence adoption.

Conclusion

The research concluded that families in Konoin sub-County, Bomet County, Kenya, are significantly concerned about the environmental effects of their energy use. They have moderate views on the cost-effectiveness and dependability of green energy solutions. Respondents think that the government should

control the usage of conventional energy sources and see other household members as having a minor impact on their choices of green energy. They also possess a uniform understanding of the possible disadvantages linked to using green energy technology. Local institutions often see solar energy positively as a sustainable and eco-friendly substitute for conventional power sources. They have a firm grasp of the advantages of using solar energy and are likely to seek advice from suppliers or installers for more details. They are worried about the high upfront cost of installing solar panels and the lack of understanding about government incentives. Key informants generally have a positive and unanimous view of solar energy, with high levels of agreement and little disagreement among participants. There is a subtle viewpoint about the environmental impacts of solar energy.

The study's inferential statistics revealed that several variables impact the adoption of green energy technology at the home level in Konoin sub-county, Bomet County, Kenya. The regression study revealed a modest correlation between the perception and adoption of green energy technology in homes, with around 20% of the variance in adoption accounted for by the independent variables. Understanding the hazards of green energy and knowing which experts to contact benefits its acceptance. However, having faith in the safety of green energy, feeling no personal danger, and being aware of where to get green energy items did not significantly influence uptake.

The regression analysis revealed a significant correlation between the perception and adoption of green energy technology across institutions, with the model accounting for around 73.3% of the variability in adoption. Factors including the perceived viability of solar energy as an alternative, the possible decrease in carbon footprint, the presence of financial incentives, and the anticipated installation costs all had a crucial role in influencing adoption. Additional variables, such as awareness of solar energy advantages, seeking advice from providers, long-term financial savings, and enhanced institutional reputation, all had minor but significant impacts on the decision to adopt. The regression analysis indicated that the independent variables in the model could account for 93.4% of the variation in adoption among key informants. Strong favorable beliefs on the environmental benefits of solar energy and the decrease of greenhouse gas emissions significantly influenced adoption. The idea that the future advantages justify the upfront expense of implementing solar energy and the government's efforts to encourage solar energy did little to influence acceptance.

Recommendations

- **Improve government incentives:** To address concerns about the initial installation cost of solar panels, the government should consider providing more attractive incentives, such as subsidies or tax breaks, to make solar energy technologies more affordable for households. This can promote broader acceptance and mitigate financial obstacles.

- **Strengthen regulation and support:** The study revealed that households believe the government should play a role in regulating traditional energy sources. Therefore, it is important for the government to establish clear regulations and policies that prioritize and support the adoption of solar energy technologies. This can provide a supportive environment for households to transition towards sustainable energy alternatives such as solar energy.

- **Prioritise Investment in Research and Development:** Increase government financing for research and development in specific green energy fields such as solar, wind, and geothermal power. This effort aims to develop advancements in energy storage, grid integration, and efficiency, resulting in lower costs and a more competitive renewable energy sector.

- **Enact Tax Credits for Solar Energy Technology**: Introduce tax incentives or credits for firms and individuals that invest in or utilize environmentally friendly energy technology, such as solar energy. Increasing the financial appeal of solar energy technologies may encourage more people to use them.

Suggestions for Further Research

The study suggested that further research should explore the specific factors that contribute to households' perceptions of the cost-effectiveness and reliability of solar energy technologies. In depth understanding these factors could help identify barriers to adoption and inform strategies for promoting the use of solar energy

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