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Investment on Solar Energy Generation in Sri Lanka

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Abstract--

Purpose: **The purpose of the article is to find out the factors influencing in investment on the adoption of solar PV system in Ampara district till 2024.**

Methodology: **This quantitative nonexperimental study explains in obtaining information from the population of 420customers who have installed solar PV system in 20 Divisional Secretarial (DS) Divisions Ampara District. Simple Random sampling technique was employed to draw the sample size of 166by visiting online calculator. Finally, 127 questionnaires were forwarded for the data analysis. The structured questionnaire with five-point Likert Scaleon a basis of 5 – 1 rating scale with strongly agree being the highest and strongly disagree the lowest was used collect the data. Financial benefits, energy usage, educational knowledge, advertisement and awareness, income level were taken as the independent variables and the dependent variable of the study is solar PV system adoption intention in Ampara district till 2024. The descriptive analysis, regression analysis, correlation analysis and chi-square analysis were used with SPSS 23 for statistical analysis.**

Findings: **It is noted that the energy usage and income level statistically significant difference and the null hypothesis is rejected as well as, financial benefits, educational knowledge, and advertisement and awareness statistically no significant difference and the null hypothesis is accepted.**

Implication of the research: **The findings of this research have significant implications for policymakers, industry stakeholders, and individuals considering solar energy adoption. It creates positive financial benefits to the potential investors and long-term cost savings, for the individuals higher electricity bills reduction. This suggests that knowledge and understanding of solar technology play a crucial role in decision-making.**

Keywords: **Solar power, Renewable energy, system Capacity (kW)**

I. INTRODUCTION

Sri Lanka has undertaken of challenges proactive stance in setting a commendable target to augment the contribution of renewable energy to 70% of its energy mix by 2030. This ambitious goal is geared towards mitigating pollution and fostering the adoption of sustainable energy sources across the nation (Ministry of Power and Energy, 2023).

Therefore, there is an urgent need to implement policies and strategies that promote sustainable development and protect the environment in these countries (Halder, et al., 2015; Syarafina, et al., 2010). It requires collective efforts to promote 'Renewable Energy' and to implement 'Energy Efficiency measures' which may need to transit from fossil-based to carbon neutrality to slow down the climate change.

Although, despite having a high potential for renewable energy sources, according to the country's geographical position, Sri Lanka still does not supply 100% of the electricity to the people.

To realize this transformative shift towards sustainability, the Government of Sri Lanka has initiated strategic measures, collaborating with diverse projects aimed at fostering the exchange of expertise in renewable energy technologies (UNDP, 2018).

These efforts are instrumental in harnessing innovative solutions for more sustainable energy practices within the country.

Central to the solar power concept is to focus on energy conservation and efficiency to reduce significantly the dependence on non-renewable energy sources.

However, it is questionable whether converting to renewable energy like solar power would be a financially and economically viable option for the investors on solar power projects.

All these factors motivated Ceylon Electricity Board (CEB) to purchase the solar energy from potential small, medium and large scale investors.

II. BACKGROUND OF THE ELECTRICITY IN SRI LANKA

Sri Lanka mainly utilizes the national grid for electricity supply, which covers the whole country. The national grid consists of overhead transmission lines interconnecting large-scale power plants. Sri Lanka already achieved 98% of grid connectivity, which is commendable by South Asian standards. According to the Ministry of Power and Renewable Energy, Sri Lanka has 7,500,000 electricity consumers, and the last fifteen years average electricity demand rises about 4.2 % annually (Annual report, 2023 Ministry of Power & Energy).

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The national grid generates electricity from renewable and non-renewable energy sources. The Electricity is generated approximately 61% from fossil fuels and Coal while Hydro power generate 28%. The balance electricity powers are generated from wind, ground mounted solar, floating solar, biomass (dendro and agro waste) and industrial waste power plants.In the meantime, Sri Lanka has already declared its policy of achieving 70 % of electricity from Renewable Sources by 2030 and carbon neutrality by2050.

The total electricity installed capacities by different energy sources are approximately 4,991 MW, fulfilled from 900 MW of coal power, 924 MW of oil-burning thermal power, 1,972 MW of hydropower, and 742 MW of rooftop solar, 140 MW of ground mounted solar, 265 MW wind power and 48MW of other energy sources (Annual report, 2023 Ministry of Power & Energy). In 2023, the total energy generation reached 10,341 GWh, with major hydro generation accounting for 22% of the total, while coal power generation represented 35%. Thermal oil contributed 26% to the overall energy mix, with other renewable sources comprising 18%.

Due to the increase in the price of fossil fuel and coal in the world market, the cost of the electricity generation is increased. Due to the depreciation of the rupee against US Dollar and the prevailing financial deficit in Sri Lanka, the suppliers of fossil fuel and coal are reluctant to come forward to supply it.

Further, due to the decrease in water capacity in the catchment areas of the hydro power plants, the electricity had to be interrupted. The fossil fuels have significant environmental and health impacts due to the emission of pollutants, such as carbon dioxide, sulphur dioxide, and nitrogen oxides. These pollutants contribute to various environmental problems, such as air pollution, acid rain, and climate change. Also, it creates and traps the heat of the sun, contributing to global warming (Ismail, et al., 2015) has also inflicted a considerable economic toll on the country.

However, the renewable solar energy system provides a long-term solution for rising electricity costs, power crisis and environmental problem. The solar energy system provides significant cost savings on the consumption of electricity over time and also it is a clean and renewable energy source that emits no greenhouse gases to the environment. By investing commercial solar power generation, investors can earn alternative sources of income and contribute to mitigating climate change and promoting environmental sustainability.

III. Statement of Problem

Many potential investors interest in installing solar power to achieve a sustainable, equitable solution and affordable cost reduction in power consumption.Although the benefits of solar energy are significant, investors on solar energy face several challenges in implementing small, medium and large-scale solar projects. Integrating solar energy into the existing electrical grid can pose technical challenges. Further, there is a substantial upfront costs of solar panel installation and the limitation in adoption solar power due to the capacity of Transformer. The limited capacity of transformers in the particular area poses a significant obstacle to the widespread adoption of solar photovoltaic (PV) systems.

This constraint directly impacts the intention of individuals and small and medium scale investors to embrace solar energy, towards a sustainable energy future in Ampara District.

The findings of this study could inform policymakers and practitioners that promoting sustainable energy use can contribute to Sri Lanka's broader goal of achieving energy self-sufficiency. This study will also provide information to private investors seeking investment opportunities in renewable solar power energy.

IV. Objective of the Study

The main objective of the study is to examine the possibilities of achieving a sustainable, equitable solution and affordable cost reduction in power consumption. The second objective is to provide investment opportunities for many potential investors to invest in commercial solar power generation to earn alternative sources of income and contribute to mitigating climate change and promoting environmental sustainability. And the last objective is to identifying alternative solution for transformer space constraints on solar PV adoption.

V. Research Questions

These are the specific research questions addressed by this study.

Is the adoption of solar energy financially benefitical to households, businesses, Government and communities?

Is the adoption of solar energy contribute to fulfill the electricity demand in Ampara District?

What factors are mostly influence on intention of people to adopt solar energy?

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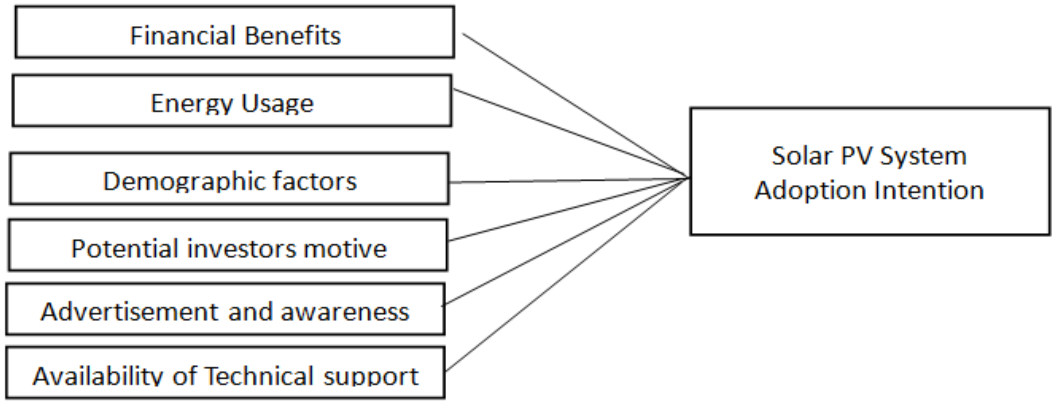
VI. Conceptual Framework

The conceptual framework was established from the research questions. Then, it is focused on research questions and hypotheses.

The hypotheses include independent variables such as Financial benefits, energy usage, demographic factors, potential investors motive, advertisement & awareness and availability of technical support. The dependent variable of the study is solar PV system adoption intention.



VII. Hypothesis

The hypotheses were developed from the conceptual framework which are typically used in experiments in which the researcher compare variables. In this quantitative study, researcher used the research questions and made it as hypotheses to shape and specifically focus the purpose of the study to seeks answer. The hypotheses, on the other hand, are predictions the research holds about the casual relationship among independent and dependent variables.

H_0: There is no significant relationship between demographic variables and Solar PV System Adoption Intention

H_1: There is a significant relationship between demographic variables and Solar PV System Adoption Intention

H_0 : There is no significant relationship between Financial benefits and Solar PV System Adoption Intention

H_1: There is a significant relationship between Financial benefits and Solar PV System Adoption Intention

H_0 : There is no significant relationship between Energy usage and Solar PV System Adoption Intention

H_1: There is a significant relationship between Energy usage and Solar PV System Adoption Intention

H_0 : There is no significant relationship between Potential investors motive and Solar PV System Adoption Intention

H_1: There is a significant relationship between Potential investors motive and Solar PV System Adoption Intention

H_0 : There is no significant relationship between Advertisement & awareness and Solar PV System Adoption Intention

H_1 : There is a significant relationship between Advertisement & awareness and Solar PV System Adoption Intention

H_0 : There is no significant relationship between Availability of technical support and Solar PV System Adoption Intention

H_1 : There is a significant relationship between Availability of technical support and Solar PV System Adoption Intention

VIII. Significance Of The Study

Studying about the Financial and Economic Feasibility of transforming to solar energy in Sri Lanka. This study attempts to provide empirical evidence about the financial and economic feasibility of transforming to solar energy in Sri Lanka and an attempt will be done to provide empirical evidence regarding whether there is a significant and financial and economic benefit of transforming to solar energy in Ampara District of Sri Lanka. This study has an empirical value. Also, perhaps this may be the first study of this nature indicating that the study has a contextual value. The findings of this study may be useful for motivating other investors, organizations and communities to adopting renewable energy technologies and driving the transition to a sustainable future.

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IX. METHODOLOGY

Research methodology is a plan that will assist in investigation on research in order to answer the research questions then achieve the objectives of the study (Jackson, 2010). Research methodology also helps in executing the research in a systematic format (Jackson T., 2002). Meter readers of Ceylon Electricity Board are the people who always interacts with consumers of electricity and solar power users' consumers. These Meter readers were used to collect data. Further, the electronic form of questionnairein Tamil language (email & google form), and call conversation also used to gather data as some respondents might not familiar with the e-sources.

This non-experimental quantitative study is based on the research questions mentioned above. The variables are numeric estimates of population values based on data collected from samples. Testing of hypotheses employs statistical procedures in which the investigator draws inferences about the population from a study sample of the potential investors and other related staff of the solar installation companies.

Population, sample size and Data collection

The population of the study consists of all the customers who have installed solar PV system in all the solar companies located in Ampara District. Accordingly, Nine of the 20 Divisional Secretarial (DS) Divisions in Ampara District were selected for the study. (Addalaichenai, Akkaraipattu, Kalmunai, Sainthamaruthu, Sammanthurai, Karaithivu, Ampara, Thirukovil, Pottuvil). There are nearly 420 Customers have installed Solar PV System in 2024 from the companies such as East-West solar, Solaris Energy Ampara, Hayleys Solar, Fn Solar, Modern Solar, Rem Solar, Stellate Lanka Engineering (Pvt) Ltd, Net West Solar. Simple Random sampling technique was employed to draw the sample from the population. This research has selected 166 Consumers as a sample size to gather data from them. The Sample Size was Calculated by visiting Calculator net Website.

Both primary and secondary data collections are crucial part of this study. The primary data were collected by using structured questionnaire developed by the researcher while the secondary data gathered from annual reports and from previous studies, the other people used for other researches.

More than 175 questionnaires consist of 50 printed forms, more than 100 google form and approximately 25 call conversation were used randomly among all the consumers who have installed solar PV system in selected solar company. As a result, a total of 127 (76.5%) of questionnaires were returned.

This response rate is considered sufficient since Sekaran (2003) says a response rate of 30% is acceptable for surveys. Then, the questionnaires were screened and incomplete questionnaires were rejected. Accordingly, 127 questionnaires were forwarded for the data analysis.

The structured questionnaire containing forty-five close ended questions to gather data for key analytical part. Likert Scale was used with five-point on a basis of 5 – 1 rating scale with strongly agree being the highest and strongly disagree the lowest.

Statistical Analysis

Collected and sorted data will be analyzed by means of statistical method using SPSS. In the analysis descriptive statistics, Chi-squared test, correlation test and multiple regression techniques will be performed to meet the objective of the study. Multinomial Logistic regression with model fitting information, ANOVA and Pearson correlation will be used to show level of influence of each independent variable of the conceptual model. Respondent demographic factors will be considered to identify the impact in installing solar system. The study listed geographical location, type of residential differences, gender, age, marital status, ethnicity, educational background, employment status, type of employment and monthly income distributional pattern factors as contributing to constructing demographic factor. In testing the significance of the demographic sub variable, in installing solar system of the respondents has been taken as referenced factor.

Moreover, Some financial Analysis and Economic Analysis also are undertaken to identify the Financial Benefits for customers through the Adoption of Solar Energy. Types of analysis are IRR analysis, NPV Analysis, ROI Analysis and Pay back Period Calculations, etc.

X. LITERATURE REVIEW

Energy is the primary input for almost all economic activities; hence, it has become vital for improving the quality of life (Hossain, 2015; Pehl et al. 2017). According to the Global Energy reported that global energy demand increased to 2.3%, growth within the last decade (International Energy Agency, 2019). This rapid energy growth results from population growth, technological improvement, and increasing human needs and wants. People predominantly use non-renewable energy sources such as fossil fuels (coal, petroleum, gas, and nuclear) to meet global energy needs (Oleiwi, et al.,2021).

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Electricity consumption is closely related to the consumption of primary energy sources, such as fossil fuels, which are often used to generate electricity (Hossain, 2015). However, producing electricity from these sources results in significant environmental and health impacts due to the emission of pollutants, such as carbon dioxide, sulfur dioxide, and nitrogen oxides. These pollutants contribute to various environmental problems, such as air pollution, acid rain, and climate change. Also, it creates and traps the sun's heat, contributing to global warming (Ismail, et al., 2015).

Using non-renewable energy sources such as gas and oil has significant environmental impacts that can pose major challenges for countries that rely heavily on these sources for their energy needs (Center for Resource Solutions, 2016). Therefore, there is an urgent need to implement policies and strategies that promote sustainable development and protect the environment in these countries (Halder, et al., 2015;Syarafina, et al., 2010).

Currently, approximately 51% of Sri Lanka's energy stems from fossil fuels, exacerbating environmental pollution levels (Ministry of Power and Energy, 2023).

To realize this transformative shift towards sustainability, the Government of Sri Lanka has initiated strategic measures, collaborating with diverse projects aimed at fostering the exchange of expertise in renewable energy technologies (UNDP, 2018). These efforts are instrumental in harnessing innovative solutions and knowledge- sharing platforms to facilitate the transition towards cleaner and more sustainable energy practices within the country.

Central to this concept is a focus on energy conservation and efficiency while transforming to renewable energy sources like solar power—this can significantly reduce the dependence on non-renewable energy sources. However, it is questionable whether converting to renewable energy like solar power would be a financially and economically viable option.

The devices that convert daylight without delay into power are called solar photovoltaics (PV) or solar cells or simply PV. In the year of 1954, the modern shape of the solar cell was invented at Bell Telephone Laboratories. The conversion of light (photons) to electricity (voltage), is a physical technique of is the term "photovoltaic" impact and it is so-referred to as "PV impact". (Taylor, et al., 2014). Global PV production ability was exceeded as much as 500 kW within the year of 1997. Total installed solar PV capacity changed into 2 GW and in year 2002, and 10 years later, in 2012, it exceeded 100 GW. New additions of Photo Voltaic solar cells in 2013 came alone with 39 GW and according to the Tylor et al, for the first time it exceeded the new capacity additions of wind in a given year.

Year 2014 was estimated as the year with records according to Tylor et al, with total installed PV capacity of 180 GW at the end of the year world widely. (Taylor, et al., 2014).

Energy is the primary input for almost all economic activities; hence, it has become vital for improving the quality of life (Hossain, 2015; Pehl et al. 2017). People consume energy for various purposes, such as transportation, industrial works, and domestic and commercial activities (NREL, 2017). According to the Global Energy and CO2 Status Report of the International Energy Agency 2019, In 2018, it was reported that global energy demand saw a 2.3% increase, which represented its most rapid growth within the last decade (International Energy Agency, 2019). This rapid energy growth results from population growth, technological improvement, and increasing human needs and wants. People predominantly use non-renewable energy sources such as fossil fuels (coal, petroleum, gas, and nuclear) to meet global energy needs (Oleiwi, et al.,2021).

Renewable and non-renewable energy sources such as coal, oil, natural gas, nuclear, hydropower, solar power, and wind are necessary to generate electricity (International Energy Agency 2023). Electricity generation is the world's largest energy consumer, and primarily, the world uses non-renewable energy sources to generate electricity (International Energy Agency, 2019). The Global Energy and CO2 Status Report for 2018 by the International Energy Agency noted that in 2017, electricity consumption, constituting 19% of total final energy consumption, experienced a growth rate of 3.1%, which marked an increase from the previous year's 1.3%. Additionally, gross electricity production grew by 2.5%, slightly below the 3.1% growth rate observed in 2016 (International Energy Agency, 2018).

Electricity consumption is closely related to the consumption of primary energy sources, such as fossil fuels, which are often used to generate electricity (Hossain, 2015). However, producing electricity from these sources results in significant environmental and health impacts due to the emission of pollutants, such as carbon dioxide, sulfur dioxide, and nitrogen oxides. These pollutants contribute to various environmental problems, such as air pollution, acid rain, and climate change. Also, it creates and traps the sun's heat, contributing to global warming (Ismail, et al., 2015).

Using non-renewable energy sources such as gas and oil has significant environmental impacts that can pose major challenges for countries that rely heavily on these sources for their energy needs (Center for Resource Solutions, 2016).

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However, high population growth, limited economic development, and increased pollution have resulted in a significant vulnerability to environmental degradation and declining environmental quality in developing countries. This situation can potentially cause substantial harm to human health and well-being and the natural systems on which we depend. Therefore, there is an urgent need to implement policies and strategies that promote sustainable development and protect the environment in these countries (Halder, et al., 2015;Syarafina, et al., 2010).

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With the growing concerns about Green House Gas (GHG) emissions and consequent climate change, renewable energy sources have become more attractive options for power Generation around the world. (Luthra, et al., 2015).

Factors affecting adoption of Solar Energy technology is based on any one or a combination of the following key determinants, as per the literature. Past findings provide guidance to the researcher to draw links between current situations and the literature which play a major role. During the research of Shah Alam et al they have drawn attention to few factors affecting adoption of renewable energy sources using few of the theories. (Shah Alam, et al., 2014) Different theories have been used to explain the determinants of PV adoption. The most common theories applied in the literature are Diffusion of innovation DIT (Rogers, 1983) , Technology Acceptance Model, TAM (Davis, 1989) , Theory of Planned Behaviour (TPB) (Fishbein & Ajzen, 1975) and Transaction cost economies theory (TCE) (Williamson, 1979)

XI. Financial And Statistical Analysis

Financial analysis is crucial when considering an investment in a solar system, whether for your home or business. It helps you understand the financial viability and potential return on your investment. By conducting a thorough financial analysis, you can make an informed decision about investing in a solar system, ensuring it aligns with your financial goals and provides long-term benefits. Here's a breakdown of the some financial analysis tools to consider:

IRR Calculation

Table-1

Year	ACF (5Kw)	ACF(10Kw)	ACF(20Kw)	ACF(25Kw)	ACF (40Kw)
0 (Rs)	(1,200,000)	(2,100,000)	(3,000,000)	(3,900,000)	(5,000,000)
1-20(Rs)	300,000	600,000	1,200,000	1,560,000	3,000,000
NPV(Rs)	**1,354,069**	**3,008,138**	**7,216,276**	**9,381,159**	**20,540,691**
IRR	**25%**	**28%**	**40%**	**40%**	**60%**
ROI	**400%**	**471%**	**700%**	**700%**	**1100%**
Payback Period	4 Years	3.5 Years	2.5 Years	2.5 years	1 Year & 6 Months

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Annual cash flow (ACF) for different categories of investment projects and resulting NPV, IRR,ROI and payback periods are explained Table -1. 5Kw is selected, immediate investment is about Rs. 1,200,000. This investment can be returned within 4 years with ROI 400% and IRR 25% while 40Kw provides payback period 1 year and 6months. The investors can decide with the availability of financial capacity, which project is more suitable for them.

XII. HYPOTHESIS

The hypothesis tests carries financial benefits as significant impact on individual intention to adopt solar PV system. H1: financial benefits significantly predicted individual intention to adopt solar PV system (system capacity in kW). The model is significant. F (1, 125) = 2.611, p < 0.109, which indicates that the financial benefit has no significant relationship in shaping individual intention to adopt solar PV system. (b = 0.017, p <.109). These results clearly direct the negative affect of the financial benefits. Moreover, the R^2 = 0.020 depicts that only 2% of the variation in financial benefits is explained by the individual intention to adopt solar PV System (System Capacity in kW).

Financial Benefits = 3.337 + 0.017* System Capacity in Kw

The hypothesis tests carries Energy usage as significant impact on individual intention to adopt solar PV system. H2: Energy usage significantly predicted individual intention to adopt solar PV system (system capacity in kW). The model is significant. F (1, 125) = 25.724, p > 0.001, which indicates that the Energy usage has significant relationship in shaping individual intention to adopt solar PV system(system capacity in kW). (b = 5.748, p > .001). These results clearly direct the positive affect of the Energy usage. Moreover, the R^2 = 0.171 depicts that only 17.1% of the variation in energy usage is explained by the individual intention to adopt solar PV System (System Capacity in kW).

Energy usage = 123.504 + 5.748* System Capacity in kW

The hypothesis tests education knowledge carries as significant impact on individual intention to adopt solar PV system. H3: Education knowledge significantly predicted individual intention to adopt solar PV system (system capacity in kW).

The model is significant. F (1, 125) = 0.538, p < 0.465, which indicates that the education knowledge has no significant relationship in shaping individual intention to adopt solar PV system (system capacity in kW) (b = -0.008, p < .465). These results clearly direct the negative affect of the education knowledge. Moreover, the R^2 = 0.004 depicts that only 0.4% of the variation in educational knowledge is explained by the individual intention to adopt solar PV System (System Capacity in kW).

Education knowledge = 2.571– 0.008* System Capacity in kW

The hypothesis tests carries Income level as significant impact on individual intention to adopt solar PV system. H4: Income level significantly predicted individual intention to adopt solar PV system (system capacity in kW). The model is significant. F (1, 125) = 5.148, p >0.025, which indicates that the Income level has significant relationship in shaping individual intention to adopt solar PV system (system capacity in kW). (b = 1583.447, p > .025). These results clearly direct the positive affect of the Income level. Moreover, the R^2 = 0.04 depicts that only 4% of the variation in income level is explained by the individual intention to adopt solar PV System (System Capacity in kW).

Income level = 73009.568 + 1583.447* System Capacity in kW

H0: There is no significant relationship betweenadvertisement and awareness and intention of Solar PV System adoption.

H5: There is a significant relationship between advertisement and awareness and intention of Solar PV System adoption.

The hypothesis tests carries advertisement and awareness as significant impact on individual intention to adopt solar PV system. The dependent variable advertisement and awareness was regressed on predicting independent variable individual intention to adopt solar PV system to test the hypothesis.

H5: advertisement and awareness significantly predicted individual intention to adopt solar PV system (system capacity in kW). F (1, 125) = 1.509, p <0.222, which indicates that the advertisement and awareness has no significant relationship in shaping individual intention to adopt solar PV system (system capacity in kW). (b = 0.013, p < .222).

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These results clearly direct the negative affect of the advertisement and awareness. Moreover, the $R^2 = 0.012$ depicts that only 1.2% of the variation in advertisement & awareness is explained by the individual intention to adopt solar PV System (System Capacity in kW). Table shows the summary of the findings.

Advertisment & Awarness = 2.917 + 0.013* System Capacity in kW

XIII. Conclusion

This research investigated the key factors influencing individuals' intentions to adopt solar energy technology. Findings reveal a multifaceted interplay between individual characteristics, knowledge, and perceived benefits.

Perceived financial benefits, such as long-term cost savings and potential government incentives, were strong motivators for solar adoption. But, according to the linear regression results "There is no significant relationship between financial benefits and individual intention to adopt Solar PV System".

Individuals with higher energy consumption were more likely to consider solar adoption, likely due to higher electricity bills and a greater perceived need for energy-saving solutions. So, according to the linear regression results "There is a significant relationship between energy usage and individual intention to adopt Solar PV System".

Higher levels of education were significantly associated with increased adoption intention. This suggests that knowledge and understanding of solar technology play a crucial role in decision-making. But, according to the linear regression results "There is no significant relationship between educational knowledge and individual intention to adopt Solar PV System".

Effective advertising campaigns and public awareness initiatives positively impacted adoption intentions. This highlights the importance of disseminating information about the benefits, costs, and feasibility of solar energy. But, according to the linear regression results "There is no significant relationship between Advertisement and Awareness and individual intention to adopt Solar PV System".

Income level emerged as a significant factor, with higher-income households demonstrating greater adoption intention. This may be attributed to the upfront costs associated with solar installation. According to the linear regression results "There is a significant relationship between income level and individual intention to adopt Solar PV System".

XIV. Implications Of The Study

The findings of this research have significant implications for policymakers, industry stakeholders, and individuals considering solar energy adoption.

Policymakers:

- Implement targeted educational programs to increase public awareness and understanding of solar technology.
- Provide financial incentives and subsidies to make solar energy more accessible and affordable, particularly for lower-income households.
- Create clear and consistent policies that support the growth of the solar energy market.

Industry Stakeholders:

- Develop innovative and cost-effective solar energy solutions tailored to the needs of different consumer segments.
- Invest in effective marketing and advertising campaigns to raise awareness and educate potential customers.
- Offer flexible financing options to make solar energy more accessible to a wider range of consumers.

Individuals:

- Conduct thorough research and gather information about different solar energy options.
- Evaluate the potential financial benefits and long-term cost savings of solar adoption.
- Seek expert advice from qualified solar installers to ensure a smooth and successful installation process.

Recommendation and Future Studies

Future research could delve deeper into specific barriers to adoption, such as concerns about grid reliability and maintenance costs. Additionally, exploring the role of social influence and community engagement in promoting solar energy adoption could provide valuable insights.

By addressing the identified factors and implementing appropriate strategies, we can accelerate the transition to a more sustainable and renewable energy future.

Following improvements can be done by the government for the purpose of transforming people to adopt solar PV system for future energy transition in ampara district.

Grid Infrastructure Upgrades:

- Transformer Capacity Expansion: Investing in transformer capacity expansions and upgrades can accommodate increased solar power generation and facilitate grid integration.

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- Smart Grid Technologies: Implementing smart grid technologies can optimize power flow, improve grid efficiency, and enable the integration of distributed solar PV system.

Community Solar Initiatives:

- Shared Infrastructure: Community solar projects can leverage shared infrastructure, such as transformers, to overcome capacity constraints and reduce the cost of solar PV adoption.
- Local Energy Storage: Integrating battery storage systems with community solar projects can further optimize the utilization of existing infrastructure and enhance grid stability.

Policy and Regulatory Support:

- Incentivizing Solar PV Adoption: Implementing supportive policies, such as feed-in tariffs and tax incentives, can encourage solar PV adoption and stimulate demand.
- Streamlined Permitting Processes: Simplifying permitting and regulatory procedures can reduce the administrative burden and accelerate the deployment of solar PV systems.

Long-Term Cost Savings:

- Highlight the long-term cost savings associated with solar energy, including reduced electricity bills and potential income from net metering.

Environmental Benefits:

- Emphasize the positive environmental impact of solar energy, such as reduced greenhouse gas emissions and decreased reliance on fossil fuels.

Energy Independence:

- Promote the idea of energy independence and self-sufficiency, particularly in areas prone to power outages.

Community and Social Impact:

- Encourage community-driven solar projects that can benefit entire neighborhoods or villages.

Subsidies and Tax Incentives:

- Government subsidies and tax incentives can significantly reduce the upfront costs of solar PV systems, making them more affordable for individuals and businesses.

Low-Interest Loans and Financing Options:

- Offering low-interest loans and flexible financing options can facilitate the purchase and installation of solar systems.

Offer Different types of Loan Options for Different Religion People

- Islam Religions peoples don't like to get a loan with interest. In such a situation an individual from islam religion prefer to install solar PV system, because of interest they back forward to install solar system. So offering loan with zero interest rate require to increase the likelihood of individual to adopt solar system from islam religion.

Solar Leasing and Power Purchase Agreements (PPAs):

- These innovative financing models allow individuals and businesses to access solar energy without significant upfront costs.

Community Solar Programs:

- Community solar programs enable individuals to subscribe to solar energy without installing panels on their own property.

Informative Workshops and Seminars:

- Conduct workshops and seminars to educate the public about the benefits of solar energy, the technology, and the installation process.

Online Resources and Tools:

- Provide easy-to-access online resources, including calculators and simulations, to help people assess the potential savings and feasibility of solar PV systems.

Technical Assistance and Support:

- Offer technical assistance and support services, such as system design, installation, and maintenance, to ensure the successful implementation of solar projects.

Public-Private Partnerships:

- Foster partnerships between government agencies, private companies, and NGOs to leverage resources and expertise.

Community Engagement and Empowerment:

- Involve local communities in the decision making process and encourage community-led initiatives.

Government's Fixed Tariffs Schemes for Solar System.

- Flexible tariffs rate for solar system may discourage people intention to adopt solar PV system. So government needs to have the fixed tariffs rate to increase the number of individual to install solar PV system.

Protecting solar PV system from natural disasters.

- Some peoples hesitate to install solar system due to the natural disasters for example, if a sudden cyclone occur, the panel may be throw away and it will occur part of loss for individual. For that, developing or introducing some natural disaster protection method will be appropriate or better option to motive people's intention to adopt solar PV system.

By implementing these strategies, it is possible to overcome financial barriers and motivate people to adopt solar energy in Ampara District. By empowering individuals and communities, we can accelerate the transition to a sustainable and resilient energy future.

As the future studies it is suggested to investigate on following areas.

- Deeply investigate about the relationship between Solar PV system adoption intention and education, advertisement & awareness, energy usage, income level, financial benefits.
- To identify the other factors which are impact to the intention of people to adopt Solar PV system.

To identify the best alternative solution to mitigate the space constraints issue in transformer.

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