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Impact of Personal Traits and Government Incentives on the Intention of Rooftop Solar Photovoltaic Installation in Sri Lanka

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ABSTRACT

Sri Lanka, as a developing country, faces a significant obstacle of energy shortage due to efforts in economic development and enhancement of the living conditions of the citizens. However, the country accounts for a comparatively low carbon footprint, which at present is slowly increasing due to the development of the country and increasing power demand, as the country has taken desperate measures like burning fossil fuels to meet the rising demand. The country now intends to find more sustainable and environment-friendly measures to meet the demand. The introduction of renewable energy has made an effort to change the way that energy is produced. A non-depleting and renewable source of power, renewable energy is also referred to as green energy. It's common to refer to environmentally friendly energy sources as "green products" (in this case, "energy"). Fossil fuels are currently being replaced with renewable energy sources. Solar has been identified as the most promising renewable energy source, yet the land shortage has made the choice questionable. However, considering these issues and the country's economic condition, the implementation of smaller-scale rooftop solar photovoltaic panels for individual houses may be the best solution. The research purpose of this study is to investigate and understand the impact of personnel traits and government incentives on the intention of rooftop solar photovoltaic (PV) installation in Sri Lanka. The data for the study was gathered using 401 questionnaires dispersed around the country. The questionnaire was self-administered. The IBM SPSS Statistics 23 software was used to analyze the data that had been gathered. The findings demonstrate that consumer innovation, ecological lifestyle, environmental concern, and government incentives have a favorable influence on the public's propensity to install rooftop solar panels. In order to determine the influence of these elements on customers' installation intentions, this research examines the consumer perception theory-based model based on planned behavior theory. Local legislators, solar industry executives, and other stakeholders may greatly benefit from the study's findings.

Keywords: *Consumer Innovativeness, Ecological Lifestyle, Environmental Concern, Government Incentives, Rooftop Photovoltaic, Solar Energy*

1. INTRODUCTION

In comparison to the past century, the global energy environment will experience more significant changes in the future. Energy is frequently acknowledged as a necessity for a nation's economic prosperity and as one of its most crucial resources. The demand for energy has increased recently because of shifting consumer behavior and the growth of the global economy. One of the major problems facing the world today is how to produce electricity in a sustainable and environmentally friendly manner. Because of the production of greenhouse gases, the Earth's temperature has been rising steadily. The combustion of fossil fuels is mostly to blame for the 40% rise in atmospheric carbon dioxide concentration since pre-industrial times, according to the United Nations Climate Panel (IPCC) (Gadenne, Sharma, Kerr, & Smith, 2011). Action must be taken right away to achieve the goal of a temperature increase of no more than two degrees. To stabilize the climate, scenarios show that worldwide emissions of greenhouse gases must peak in 2020 and then sharply decline (Gadenne, et al., 2011). Despite widespread knowledge of the issue and a universal understanding that greenhouse gas emissions must be reduced, emissions continue to rise. Further, it is important to encourage consumers to use renewable energy sources to maintain the world's ecological balance. Given that energy prices are always rising, the human population is growing, the environment is becoming more polluted, and resources are running out, sustainable energy is a very intriguing and unique idea that requires significant consideration. The global population is slowly moving toward using renewable energy sources due to the rapidly rising energy demand and mounting concerns. Renewable energy sources refer to natural sources of energy which do not replenish over time and are abundantly available. Some such renewable energy sources are wind power, hydropower, solar power, tidal energy, geothermal energy, biomass combustion, etc.

Sri Lanka, situated in the south-eastern part of Asia, is a developing country and faces various challenges like poverty reduction, economic development, rising energy

demand, improvement of the living conditions, inability to invest in very large-scale projects, and land shortage. Despite these challenges, 53.38% of the country's total electricity needs were met by renewable energy sources in 2017, with major hydropower accounting for 46.56% of that total and small hydro, wind, biomass, and solar power providing the remaining 6.83% (Patabendi, Darshika, & Silva, 2020). Expanding renewable energy sources would replace fossil fuels, which would lessen the environmental impact and perhaps even have other positive economic effects. A long-term transformation to more renewable energy would both lessen Sri Lanka's dependence on the import of foreign oil and lead to an increase in the number of skilled jobs available in the nation. Sri Lanka's economy has been gradually rising in recent years, with GDP averaging 4.5% per year between 2013 and 2017. This upward trend is projected to continue. According to a trend study of gross electricity generation, demand for energy generation is predicted to rise at a somewhat quicker pace throughout the project implementation period of 2018-2022.

Due to the fact that electricity generation from fossil fuels accounts for 55% of the total energy generating mix, resulting in high fuel import costs, Sri Lanka has been actively diversifying to renewable energy sources to maintain energy security while improving environmental circumstances. Sri Lanka has significant solar energy potential: solar radiation varies from 4.0 to 4.5 kilowatt-hours per square meter per day (kWh/m2/day) throughout more than two-thirds of the land mass, which is regarded favorable for solar energy generation. Effective demand over the next few years is thus likely to reflect a combination of income effect reflecting faster growth in energy demand commensurate with economic growth and a substitution effect reflecting a switchover of power generation from fossil fuel to renewable energy, further driven by technology-induced cost reduction in the renewable space.

The use of solar energy is regarded by many experts as one of the most promising technologies available today. Solar energy is the most plentiful energy source on earth and is derived from the sun in the form of solar radiation. An extremely dependable, clean, and renewable energy source is the sun. Studies conducted in tropical regions express that solar energy is a considerably reliable source of energy, especially for

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the countries in the region. Due to Sri Lanka's location near the equator, solar power may be the most obvious alternative. Recent findings of studies conducted in Sri Lanka indicate that there exists a substantial potential for generating solar energy in the country.

The need for solar power has increased and with it the technology's efficiency and cost. Rooftop PV systems could decrease land costs when compared to ground-mounted PV system power stations, which require significant quantities of land. This feature is particularly useful in metropolitan areas; thus, many nations are committed to encouraging rooftop PV to produce more renewable energy. In Sri Lanka, the Ministry of Finance and Economic Affairs and the Ceylon Electricity Board has joined hands and introduced special financial support schemes for the general public so as to support and encourage the installation and utilization of rooftop solar photovoltaic panels. The government has also introduced attractive incentive programs to promote the installation of these small-scale solar panels. Some of the interested general public and companies have utilized these schemes to install rooftop PV panels which have benefited them financially.

Numerous researchers from different countries, however, have discovered that the adoption of residential solar energy systems is influenced by other factors. The primary reason for adopting small-scale PV electricity production has been discussed as the environmental concern of the citizens. (Birch, 2014) Meanwhile, other studies also show that the use of solar power and green electricity initiatives seems to appeal to consumers with various lifestyles. The attribute of innovation, according to Setiawan and Singh (2019), would hasten the adoption of PV. Various research and studies showed that, in addition to government incentive policies, consumer adoption of PV is influenced by human characteristics like environmental concern, an eco-friendly lifestyle, and consumer innovativeness. This research focuses on customers' demographic variables along with personal traits such as environmental concern and ecological lifestyle which enables the possibility of adding psychological benefits to the model along with the traditional studies on rooftop solar PV panel installations, such that intentions regarding installation are studied. The study is primarily focused

on achieving the aim of monitoring the impact of personality-related factors like environmental concern and ecological lifestyle on the intention to install rooftop PV panels among the general public. The second main goal of this study is to check the impact of customer innovativeness on the installation intention of small-scale residential rooftop solar PV installation and the third objective of this research is to explore the influence of government incentives and specialized schemes as a motivating factor to Sri Lankan citizens and the efficiency of the incentive programs introduced by both the Ceylon Electricity Board and the Ministry of Finance and Economic Affairs. On the whole, this study intends to contribute to the country's economy and the citizens by providing feasible ideas to both the policymakers and solar PV panel marketers so that this cost-effective and environmentally friendly power generation method can be made a desirable solution to the public.

2. RESEARCH GAPS AND LIMITATIONS

Existing literature lacks a comprehensive analysis of the combined influence of personal traits and government incentives on the intention to install rooftop solar photovoltaic (PV) panels in Sri Lanka. While studies have separately examined factors like environmental concern, lifestyle, consumer innovativeness, and incentive policies, there is a lack of empirical research that holistically explores their interconnected impact on individuals' inclination towards adopting rooftop solar PV technology in the Sri Lankan context. This research aims to fill this gap by investigating how these factors collectively contribute to the intention to embrace rooftop solar PV systems, thereby addressing the nuanced dynamics in the decision-making process in Sri Lanka.

Regarding the limits of the available data, the validity, reliability, and availability of significant enough datasets in a given study region were strongly correlated with the quality of the completed research on residential PV adopters. Few well-structured models have been produced thus far, and conclusions about causal linkages have been

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weakly supported, which has been a major problem for many researchers. In several research, it was unclear where the input data came from or how it was gathered and verified. Some modeling studies didn't even describe the input information used to construct their models.

3. SIGNIFICANCE OF THE STUDY

Numerous social, economic, residential, and environmental aspects have been shown in the literature as having an impact on the uptake of photovoltaics (PV) in industrialized nations. However, the potential of micro-generation PV as a mainstream renewable energy source for decarbonizing the electricity grid has yet to receive much attention in developing nations. This study sheds light on how residential PV adoption functions in a developing nation. This study contrasts the influencing variables of PV adoption in lower-middle income Sri Lanka's Colombo district with the established factors of PV adoption in industrialized nations using a zero-inflated negative binomial regression model (ZINBM).

4. LITERATURE REVIEW

Rooftop solar PV is greatly related to the green energy concepts. Due to this, when considering the perspective of environmental psychology, a connection is made between feelings toward green energy and intentions to use it. (Claudy, Peterson, & O'Driscoll, 2013, & Fishbein & Middlestadt, 1987) As per the Theory of Reasoned Action (TRA) proposed by Fishbein & Ajzen (1975) a person's action is influenced by their intention to carry out an activity, which is dependent on the available information and their attitude toward the behavior and subjective standards. The whole range of behavioral ideas that may be accessed and relate a conduct to numerous outcomes and other features determine one's attitude toward an activity. A

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person's impression of a specific conduct is their subjective standard, which is impacted by the opinions of important persons. (Amjad, N., & Wood, A. M., 2009) However, the self-determination hypothesis contends that intentions based on opinions will predict behavior more accurately than intentions based on subjective standards. (Amjad, N., & Wood, A. M., 2009) By improving perceived behavioral control, or perceptions about having the necessary resources and chances to accomplish a certain conduct, Ajzen (1991) advanced the theory of random action (TRA) to the theory of planned behavior (TPB), which also impacts intentions and subsequent behavior. This study will examine the connection between perceived behavior control, and behavior intention in the context of rooftop PV installation, drawing on TPB and self-determination theory as a foundation. The intellectual underpinnings of this investigation are shown in Figure 1. It is important to note that consumers' views about rooftop PV installation are influenced by both personal characteristics; this attitude then affects the desire to install. Additionally, the government's incentive scheme also affects individuals' intentions to install rooftop solar panels. Our main premise is that customers' intentions for rooftop PV installation—the immediate precursor to behavior are influenced by their approaches to rooftop PV and their understanding of the government's incentive programs. Customers buy and install rooftop PV with the intention of using their attitude toward it as a way to distinguish themselves via their environmental care and psychological gain. The TPB claims that the government's incentive for rooftop solar is seen as a form of behavior modification to change people's intentions about rooftop solar installation.

4.1. Environmental Concerns and Rooftop Solar Installation Intention

Balderjahn (1988) shows how a consumer's concern for the environment affects the things they choose to buy. Concern for the environment has traditionally been viewed as an assessment of one's own conduct in light of its effects on the environment (Takala, 1991). 'Green purchasing' was inspired by consumers' environmental concerns (i.e., buying products that are environmentally beneficial) (Albayrak,

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Aksoy, & Caber, 2013). Consumers who care about the environment will engage in energy-saving practices. A favorable correlation was established between environmental concern and thoughts toward paying more for renewable energy, which has developed as an alternative energy source (Saidur, Rahim, Islam, & Solangi, 2011). Environmental concerns were used by Schelly (2014) to forecast the uptake of home solar thermal technology in the USA. Palm and Tengvard (2011) discovered that the key motivation for adopting small-scale PV power production was environmental concern.

4.2. Ecological Lifestyle and Intention toward Rooftop PV Installation

The study of the link between an ecological lifestyle and ecologically responsible conduct is gaining popularity. It has been seen, for example, that lifestyle has a large impact on energy use that is not explained by income or energy pricing (Schipper et al., 1989). People who live an ecological lifestyle are environmentally concerned; they choose and recycle items, engage in environmental activities, and strive to develop themselves and take on new challenges (Fraj & Martinez, 2006). This feature is particularly advantageous for a new, novel product, such as a household solar energy system, which segments the market based on ecological lifestyle. Researchers have investigated lifestyle behaviours and discovered that solar panels and green energy initiatives tended to interest customers from various lifestyle clusters for various reasons. Palm and Tengvard (2011) discovered that homes that used electricity had an environmentally conscious lifestyle when it came to small-scale PV power production. Living sustainably is favourably related to the goal of installing solar electricity for homes.

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4.3. Consumer Innovativeness and the Intention Toward Rooftop PV Installation

To determine whether consumers in a target market have the capacity to accept a new product, marketing managers will periodically assess consumer innovativeness (Goldsmith and Hofacker, 1991). According to Rogers (2010), being innovative was a helpful indicator of a predisposition for early adoption. The notion of innovation dissemination and customer acceptance is frequently used by marketers of new goods to identify and attract early adopters (Kilgour, 2006). Utility companies will inevitably switch from using traditional energy sources to producing power using renewable sources, with PV systems being the most advanced renewable technology now available (Kaplan,1999). Residential solar power system providers and manufacturers should collaborate closely with "early adopters" to enhance the operational economic elements of the goods, according to Faiers and Neame (2006), who thought that customer innovativeness affected the decision to use domestic solar power. When deciding whether to accept an invention, like green power, people take into account the innovation's personal significance as well as its functionality, usability, price, and expected effects (Ozaki, 2010). An unexpected trait that the early adopters of household solar power have in common and which they recognized as inspiring adoption is an interest in technological innovation and a love of the technical facets of energy systems. Chen (2020) found that customers' inventiveness has an impact on their decision to build a household solar power system.

4.4. Government Incentive Policies and Rooftop PV Installation Intention

According to several research, the solar PV system markets rely substantially on government assistance programs. High prices are the principal impediment to installing solar PV systems, therefore, capital incentives to minimize investment costs are strongly preferred (Parker,2008). Subsidies and incentives are important drivers

of worldwide solar PV system deployment (Hsu, 2012). Financial incentives, government-led efforts, and lower investment costs are critical drivers in the spread of solar energy systems. Rai and McAndrews (Rai V and McAndrews K, 2012) discovered that, as a result of a mix of favorable federal, state, and municipal financial incentives, residential PV technology adoption has advanced. The growth of solar and rooftop solar power generation was based on the Government of Sri Lanka's strong policy effort. The government established the "Battle for Solar Energy" campaign in September 2016, with the goal of increasing solar photovoltaic generating capacity from the present level of roughly 61.4 megawatts (MW) to 200.0 MW by 2020 and 1,000.0 MW by 2025. The rooftop solar energy development program was spearheaded by the Prime Minister's Office and the Ministry of Power and Renewable Energy. The strong government commitment to creating a favorable business climate for rooftop PV system financing is the foundation of this project design (Bob, 2018).

5. HYPOTHESES DEVELOPMENT

Based on the above literature following four hypotheses were developed to continue the research discipline related to the PV installation intention in Sri Lanka.

- H1. Personal traits positively influence the intention towards rooftop PV installation.
- H1a: Environmental concern positively influences the intention toward rooftop PV installation.
- H1b: An ecological lifestyle will positively influence the intention toward rooftop PV installation.
- H1c: Consumers' innovativeness will positively influence their intention toward rooftop PV installation.
- H2: The government's incentive program will positively influence the intention toward rooftop PV installation.

Table 1- Operational Table

Variable		Measurement indicators	Source	Response Format
Environmental concern	1	Awareness to the abuse to the environment by the humankind	(Sun, Wang, Huang & Ho, 2018)	5-point Likert scale
	2	Humankind's consideration of the potential environmental impact of their action when making decisions		
	3	Harm to the environment by the products used by humankind	(Chen, 2022)	5-point Likert scale
	4	People's concern about wasting the resources		
	5	Individuals consider themselves environmentally responsible		
	6	Willingness to be inconvenienced to be environmentally friendly		
Ecological Lifestyle	1	Preference to energy-saving products.	(Sun, Wang,	5-point Likert scale
	2	Preference to recycled products	Huang & Ho, 2018)	
	3	Separation of recycle waste from others	(Chen, 2022)	5-point Likert scale
	4	Participation in environment conservation tasks		
	5	Concern about human activity's consequences on climatic change		
Consumer Innovativeness	1	Intension to trial at available opportunity	(Chen, 2022) & (Sun, Wang, Huang & Ho, 2018)	5-point Likert scale
	2	Curiosity to know about rooftop installation	(Sun, Wang, Huang & Ho, 2018)	5-point Likert scale
	3	Intension to trial new technology regardless even as the first in the circle		
Government Incentive	1	Attractiveness of government incentive programs	(Sun, Wang, Huang & Ho, 2018)	5-point Likert scale
	2	Encouragement from the policy.		
	3	Lasting of the incentive policy for rooftop PV		

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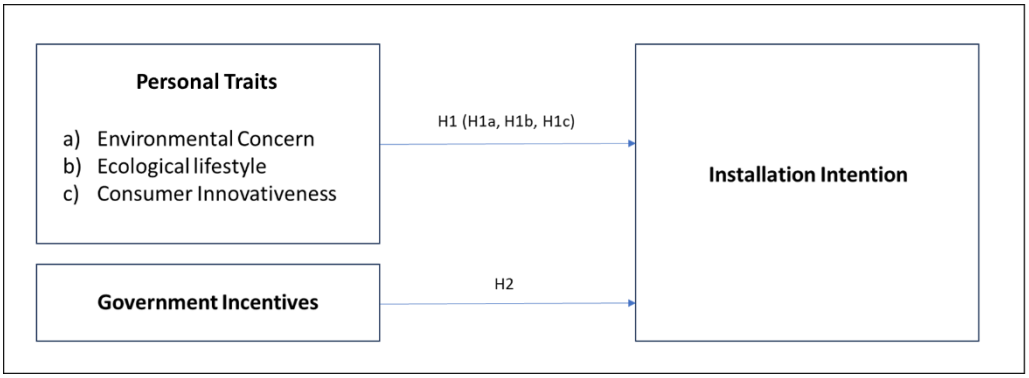
Figure 1 - Conceptual Framework



6. METHODOLOGY

6.1. Sampling Strategy

The sampling strategy is a pivotal aspect of this research, as it determines the representativeness and generalizability of the findings. The target population for this study was citizens of Sri Lanka who were potential candidates for rooftop solar photovoltaic (PV) installation. Given the diversity of the population and the aim to capture a broad spectrum of perspectives, a convenience sampling approach was adopted.

To maximize the reach and engagement of the survey, an online survey using Google Forms was employed. This method allowed for widespread distribution and easy participation through electronic and social media platforms. While convenience sampling does introduce an element of self-selection bias, it provides a practical means of gathering a sizable dataset within the scope of the study's resources and timeline.

6.2. Data Collection

The online survey was designed to investigate the influence of personal traits and government incentives on individuals' intention to install rooftop PV panels. The survey questionnaire included items related to environmental concern, ecological

lifestyle, consumer innovativeness, and perceptions of government incentives. Respondents were asked to rate their agreement with each item on a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

The survey was widely disseminated across social media platforms and electronic channels to encourage voluntary participation. The digital format allowed respondents to complete the survey at their convenience, avoiding potential constraints associated with face-to-face interviews.

6.3. Data Analysis

The collected data underwent rigorous analysis using the IBM SPSS Statistics 23 software package. Descriptive statistics were utilized to summarize participants' demographic characteristics, such as gender, marital status, age distribution, and income level. The Likert scale responses were analyzed using appropriate statistical techniques to assess the influence of various factors on individuals' intention to install rooftop PV systems.

7. FINDINGS AND DISCUSSION

As per the data collection, it was observed that 98% of the participants were aware of solar energy. However, out of all the respondents, 76.8% haven't installed rooftop PV panels in their houses, whereas the remaining 23.2% have already installed solar panels in their houses. Based on the data collected, 75% of the population was already aware that the government encourages the use of solar panels.

Furthermore, almost 90% agree that solar panels are the solution to the current power crisis that is prevailing in Sri Lanka. It is evident that this study is a necessity for the current status quo.

The internal consistency of the sum scores for each scale was assessed by a reliability analysis using Cronbach's Alpha Coefficient (Table 2). Based on the investigated data, the Cronbach's Alpha coefficient of the variable "Environmental Concern" was

0.833, while the "Ecological lifestyle" was 0.885. "Consumer innovativeness" had a Cronbach's Alpha coefficient of 0.818, whereas "Government Incentives" displayed a value of 0.776. The Cronbach's Alpha coefficient of the dependent variable, "Installation Intention," was calculated to be 0.894. Overall, all the factors considered for the research exhibited Cronbach's Alpha coefficient values that exceeded the threshold of 0.7. As a result, the data on these five factors is acknowledged as reliable and dependable.

Table 2- Reliability Test

Constructs	**Cronbach's Alpha**
Installation Intension	0.894
Environmental Concern	0.833
Ecological lifestyle	0.885
Consumer innovativeness	0.818
Government Incentives	0.776

The mean and standard deviation of individual items as well as the average of each variable were calculated using descriptive statistics. Environmental concern is a very important construct in this study, and it received an average mean value of 3.86 (in the range of 3.67 and 5) and a standard deviation of 0.86663, as demonstrated by the descriptive statistics in Table 3. Based on the data collected, environmental concern is at a high level. Therefore, it can be claimed that the majority of people exhibit strong concern about the environment and are prepared to be inconvenienced during the process.

Table 3- Frequency Table: Environmental Concern

Environmental Concern	**Mean**	**Std. Deviation**
It is important to me that the products I use do it harm the environment.	4.25	1.102
I consider the potential environmental impact when making many. decisions.	3.95	1.120
My purchase habits are 0t affected by my concern for our environment.	3.14	1.342
I am concerned about wasting the resources of our planet.	4.00	1.193
I would describe myself as environmentally responsible	4.04	1.071
I am willing to be inconvenienced to be more environment.		

friendly	3.79	1.195
Environmental Concern	3.8620	.86663

The Ecological Lifestyle construct has an average mean value of 4.13 (within the range of high level, in the range of 3.67-5) and an average standard deviation of 0.92571, according to the descriptive statistics presented in the table. The frequency scale indicates that the majority prefer and have already adapted to a sustainable and eco-friendly way of living. Lifestyle impacts consumption patterns as well as approaches toward new innovations. People who live an ecological lifestyle are environmentally sensitive; they choose and recycle items, engage in environmental activities, go green programs, strive to improve themselves, and take initiatives that provide new challenges. (Reference 19). When segmenting the market for a new, innovative product such as rooftop PV, this ecological lifestyle attribute is very significant. In terms of rooftop PV, it may be asserted that an ecological lifestyle, as a practice of conserving the environment, influences views toward rooftop PV installation.

Table 4- Frequency Table: Ecological lifestyle

Ecological lifestyle	**Mean**	**Std. Deviation**
I prefer energy-saving products	4.40	1.066
I prefer consuming recycled products	4.14	1.087
I throw garbage in a selective container	4.25	1.144
I participate in environment conservation tasks	3.71	1.178
I worry about human activity's consequences on climatic change and act consistently	4.13	1.116
P;[fw		
Ecological lifestyle	4.1262	.92571

According to the descriptive statistics of the Consumer Innovativeness scale shown in the table, the average mean value is 3.7664 (in the range of 3.67 and 5). Therefore, within the population, consumer innovation is at a high level. The standard deviation computed for Consumer Innovativeness was 0.97669.

Table 5- Frequency Table: Consumer Innovativeness

Consumer Innovativeness	**Mean**	**Std. Deviation**
If I heard that the rooftop PV installation services were available, I would be interested enough to try it.	3.89	1.118
Compared to my friends, I seek out a lot of information about rooftop PV installation services.	3.64	1.141
I would purchase a new rooftop PV installation service even if, in my circle of friends, nobody has trailed it before.	3.77	1.161
Consumer innovativeness	3.7664	.97669

According to descriptive statistics shown in the table, the Government Incentive Scale gets an average mean value of 3.2660 (in the range of 2.33-3.67) and a standard mean of 0.98413 which indicates that in the Sri Lankan context, the Government Incentive is in medium level. According to the frequency of the scale, Sri Lankans are very little concerned about Government Incentives when they consider installing rooftop PV.

Table 6- Frequency Table: Government Incentives

Government Incentives	**Mean**	**Std. Deviation**
The incentive program provided by the government is attractive to me	3.10	1.211
I think the incentive policy for the rooftop PV program will encourage people to install rooftop PV.	3.52	1.194
I think the incentive policy for rooftop PV will last.	3.17	1.146
Government Incentives	3.2660	.98413

The average mean value of the Installation Intention scale is 3.8828 (between 3.67 and 5) and the standard deviation is 1.06607, according to the descriptive data presented in the table. Therefore, it can be interpreted that the installation of rooftop PV panels is highly anticipated in the Sri Lankan setting.

Table 7- Frequency Table: Installation Intention

Installation Intention	Mean	Std. Deviation
If I buy an independent house, I will install a rooftop solar PV	4.02	1.167
I will strongly suggest to my family or my friends that they install a rooftop PV in their independent house	3.90	1.181
To me, rooftop PV installation is worthwhile despite its long simple payback periods and high capital costs	3.73	1.174
Installation Intention	3.8828	1.06607

As per the correlation statistics, installation intention and environmental concern have a positive relationship of 0.631, which is a strong relationship. But at a 99% confidence level, these two constructs have a positive relationship. The constructs installation intention and ecological lifestyle have a positive relationship of 0.606, which is a strong relationship. This relationship is also significant under a 0.000 significance level at a 99% confidence level. Similarly, the construct consumer innovativeness with the construct installation intention has a positive relationship of 0.699 with a strong relationship, while government incentives and installation intention have a positive relationship of 0.355 with a fairly moderate level of relationship. Both aforementioned relationships are significant at the 0.0001 significance level and the 99% confidence level. Therefore, based on the Pearson correlation analysis, it can be stated that environmental concerns, ecological lifestyle, and consumer innovativeness will strongly influence and lead to an increase in the installation intention of rooftop PV panels, while government incentives will also moderately influence the installation intention to increase.

Table 8- Correlations

Correlations Table						
		Environmental Concern	Ecological lifestyle	Consumer innovativeness	Government Incentives	Installation Intention
Installation Intention	Pearson Correlation	.631**	.606**	.699**	.355**	1
	Sig. (2-tailed)	.000	.000	.000	.000	-

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

According to the model summary table of the multiple regression analysis, the multiple R is 0.743, which indicates a fairly strong linear relationship between the predictors of environmental concerns, ecological lifestyle, consumer innovativeness, and government incentives and the response variable Installation Intention. The R-squared value obtained is 0.552, which indicates that 55.2% of the variance in Installation Intention is impacted by the predictors (environmental concerns, ecological lifestyle, consumer innovativeness, and government incentives). The Standard Error of the Estimate is 0.71729 which implies a 95% prediction interval would be roughly 2*0.71729 = +/- 1.43458 units wide, which is less than 6 and thus sufficiently precise to use for producing prediction intervals. Therefore, it is possible to determine that the regression model fits the dataset based on the model summary.

Table 9- Regression Table

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.743[a]	.552	.547	.71729

a. Predictors: (Constant), Government Incentives, Environmental Concern, Consumer innovativeness, Ecological lifestyle

To test the overall significance of the regression model first ANOVA table is considered. As the F statistic value is 121.891 and the significance of F (p-value) is 0.000, it can be determined that the whole model is statistically significant and that the model is fit for the test. However, the regression output of individual variables (coefficient table) demonstrates that the Environmental Concern and Consumer innovativeness predictor variables are statistically significant because their p-values are equal to 0.000. Whereas Ecological lifestyle and Government Incentives are not statistically significant because their p-values (0.477 and 0.180 respectively) are greater than the usual significance level of 0.05.

Table 10- Anova Table

Anova						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	250.856	4	62.714	121.891	.000[b]
	Residual	203.746	396	.515		
	Total	454.602	400			
a. Dependent Variable: Installation Intention						
b. Predictors: (Constant), Government Incentives, Environmental Concern, Consumer innovativeness, Ecological lifestyle						

As proposed in H1a, we find that there is a positive and statistically significant relationship between the perceived Environmental Concern construct and the intent to install a rooftop solar photovoltaic system (t = 5.165; p = 0.000). Therefore, it is clear that the respondents intend to install the photovoltaic solar system, as they are under the impression that doing so will allow them to make a positive impact on the surrounding or natural environment. Even though environmental concern is a key construct in the study of personality traits and installation intention, the relationship can vary based on social backgrounds and cultures. There are research studies showing that environmental concerns both positively and negatively impact installation intention. For example, according to Sun et al. (2018), environmental concern negatively influences the intension toward the installation of Solar PV, while according to Bouaguel and Alsulimani (2022), environmental awareness showed a positive impact on installation intention.

The results contradicted those of a previous study by Chen (2014), which found a favorable relationship between ecological lifestyles and the likelihood of installing solar panels on the rooftops of houses. As a positive and significant influence on the purchase intention of the rooftop PV system was not established (t = 0.712; p = 0.477), the hypothesis H1b concerning the construct "ecological lifestyle" was not supported and therefore rejected. Inferring from this, we may conclude that one's way of living has no effect on one's perspective of a PV system installation on their roof.

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The hypothesis that H1c (the Consumer Innovativeness factor) is a determining factor in the willingness to adapt a solar photovoltaic system was verified as a positive and significant finding (t = 9.820; p = 0.009). This could be because the responders may view the rooftop PV as a revolutionary solution that will effectively meet their domestic energy consumption. Schelly (2014) noticed that the first people to use solar energy to power their homes liked both technology and energy systems. The fact that consumer innovation has a strong link to the intention to install is in line with what other research studies have found (Chen, 2014). Therefore, marketing managers can use consumer innovativeness to identify target-segment consumers who may be willing to buy the new product. PV systems are the renewable energy technology that is developing the fastest, and eventually, utilities will switch to them (Kaplan,1999). Faiers and Neame (2006) proposed that providers and manufacturers of household solar power systems collaborate closely with "early adopters" to develop the operational and economic elements of the products.

H2 (Government Incentive construct) was rejected as even though the t-value was positive, the p-value was more than the boundary of 0.05, therefore it is not statistically significant (t = 1.344; p = 0.180). This does not comply with the previous literature or research related to this topic (Gadenne, et al., 2011 Hsu, 2012).

Especially in the research from Sun et al. (2018), it is mentioned that government incentives had the strongest influence on the intention for rooftop PV installation from the perspective of consumers than any other construct. This variation may be because the previous studies weren't based on a country with an emerging economy like Sri Lanka, which has different social, cultural, and economic backgrounds. Also, a lack of awareness among the population regarding Government Incentives could be contributing to the contradictory results. The consumers may also not be able to appreciate the Government Incentives due to the excessive policy conditions that need to be fulfilled in order to obtain the relevant incentives.

Table 11- Coefficients

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.221	.183		1.205	.229
	Environmental Concern	.348	.067	.283	5.165	.000
	Ecological Lifestyle	.048	.068	.042	.712	.477
	Consumer Innovativeness	.516	.053	.473	9.820	.000
	Government Incentives	.054	.040	.050	1.344	.180
a. Dependent Variable: Installation Intention						

8. LIMITATIONS AND FUTURE DIRECTIONS

This research has certain limitations, as addressed in this section, despite its theoretical and practical contributions. Analyzing these limits will help future researchers discover ways around them and may help managers integrate solar energy technology as a home renewable energy source for future energy crises. This study's main downfall is geographical inequality. The Western Province's population was tallied and compared to provide a broad picture of Sri Lanka's population. However, since Sri Lanka is geographically diverse and has distinct social, economic, and cultural origins, this study may not represent all Sri Lankans who could purchase rooftop solar PV panels. Their lifestyle differences may also matter. Because of this, the findings may not be applicable to all Sri Lankan solar PV panel consumers. The minimal number of observations may limit the data to the survey questionnaire's area. In order to boost the response rate, other research methodologies and mailing lists can be used. The researcher gathered the necessary information for this study through the use of Google Forms, which were then sent to families in the Western province. On the other hand, if it were feasible to distribute questionnaires to random houses in a manner that was both more suitable and more frequent, that would be the most successful method.

The biggest problem with the government incentive for "solar photovoltaic panels" is that most people don't know about it, and the people who were asked about it didn't know much about it either.

Table 12- Pearson Correlation Table

	Environmental Concern_ENIV01	Ecological Lifestyle_ELIV02	Consumer Innovativeness_CIIV03	Government Incentives_GIIV04	Installation Intention_IIDV
Environmental Concern_ENIV01	1				
Ecological Lifestyle_ELIV02	.776**	1			
Consumer Innovativeness CIIV03	.629**	.689**	1		
Government Incentives_GIIV04	.371**	.382**	.390**	1	
Installation Intention_IIDV	.631**	.606**	.699**	.355**	1
**. Correlation is significant at the 0.01 level (2-tailed).					

Some results from previous studies based on other countries matched, whereas others didn't. Even though environmental concern is a key construct in the installation intention, there are prior studies proving either a significant or no significant impact. Even though the ecological concern is related to environmental concerns, it has shown a positive impact on the installation of these small-scale solar panels in the previous studies conducted in different countries around the world. Consumer Innovativeness has proved to have a positive influence on the installation together with the Government Incentive which showed a higher positive impact than any other constructs in other countries while cost related to the installation and maintenance of the panels had shown a negative impact.

Based on the survey analysis, in Sri Lanka, Environmental concern and consumer innovativeness are the two variables driving home solar PV installation intentions, with consumer innovativeness having a bigger effect than environmental concern. So, it is understood that solar PV manufacturers influence installation decisions. At the same time, the government incentives showed no significant effect on rooftop PV installation intentions, contrary to previous similar studies. This could be a result of poor publicity and low customer awareness. So, it is essential that government policymakers and the Ceylon Electricity Board work with rooftop PV manufacturers and customers to promote solar energy in a more attractive manner. Governments should ease policy rules and provide easy access to relevant information regarding PV panels and government incentives. As identified in the survey, environmentally conscious customers are more inclined to embrace green technologies and are willing to pay extra. The efforts of both government policymakers and manufacturers will positively impact the intention towards the installation of rooftop solar panels among Sri Lankan consumers.

9. CONCLUSION AND RECOMMENDATION

As the world awaits green energy sources in the next decade, solar energy is the most popular renewable energy source, as it is reliable and user-friendly. This study helps households grasp simpler technologies and it aimed to learn more about the impact on Sri Lankan customers' intention of rooftop solar PV installation based on personal traits such as environmental concern, ecological lifestyles, consumer innovativeness, and government incentives. Out of the four key elements of solar PV installation intention found in the study, the first and third hypotheses were supported by the data, whereas the second and fourth were shown to be false. Some of the findings matched with prior studies and literature, while others did not. This could have been due to the differences in the economic, social, and cultural status quo.

According to SPSS data analysis, the two most crucial factors influencing household solar PV installation intentions are environmental concern and consumer innovativeness. Consumer innovativeness has a greater influence on installation

intention than environmental concern. As a result, solar PV manufacturers play a significant role in installation intention. So, it is recommended that Solar PV marketers find more innovative ways to advertise and attract the attention of customers.

At the same time, the government incentives showed no significant effect on rooftop PV installation intentions. This could be a result of poor publicity and low customer awareness. The government's incentive scheme cannot work alone. So, it is essential that policymakers work with rooftop PV manufacturers and customers to promote solar energy. Governments should ease policy rules, simplify solar incentive applications, and promote rooftop PV sector information to consumers. Government obligations include community education, so it is the duty of policymakers and community leaders to work together and raise awareness, attract more people, organize further appearances at neighborhood events, talk with the local media about solar panels' environmental benefits, and distribute leaflets. As solar panel safety, repair, and cost are major issues, legislators could hold a workshop or community event to educate residents and business owners on the municipality's solar energy policy, permits, and installation procedures to ensure accuracy. The government also should provide easy access to relevant information regarding PV panels and government incentives. These efforts will make goal accomplishment easier for most individuals and boost the government's solar energy program. As it was identified that environmentally conscious customers are more inclined to embrace green technologies and are willing to pay extra, the efforts of both government policymakers and manufacturers will positively impact the intention towards the installation of rooftop Solar panels among Sri Lankan consumers.

It can be concluded that more attention should be paid to encouraging the use of rooftop PV panels as it may be the only hope in the near future for a clean, green environment and also to meet the increasing energy demands and power crises of the country. Since the installation of this small-scale solar panel is a useful investment, the relevant stakeholders should take responsibility for promoting the use of this sustainable alternative energy source.

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