FACTORS AFFECTING THE ADOPTION OF SOLAR POWER SYSTEMS BY DOMESTIC USERS IN WESTERN PROVINCE, SRI LANKA

S A D S SUBASINGHE

(228244K)

Degree of Master of Business Administration in Management of Technology

Department of Management of Technology

Faculty of Business

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Dissertation submitted in partial fulfilment of the requirements for the degree

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DECLARATION

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The above candidate has carried out research for the Masters Dissertation under my supervision. I confirm that the declaration made above by the student is true and correct.

…… 24.07.2024

Signature of the supervisor: Date: …….

Dr. Thesara Jayawardane

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ABSTRACT

Renewable energy, harnessed from sources like sunlight, wind, and water, offers a promising path towards a sustainable energy future. Unlike fossil fuels, these resources are naturally replenished and generate minimal emissions. This shift towards clean energy can combat climate change, enhance energy security, and provide economic benefits. This study was mainly focused on solar energy adoption by domestic households and the main objective is to identify factors affecting the adaptation of solar power systems by domestic households of the western province of Sri Lanka. The study was employed the quantitative method and used various statistical analyzing tools such as MS Excel, SPSS and Smart PLS to analysis the survey data. Researcher conducted in-depth literature review to clearly identify and develop the research gap and other theoretical aspects of the research along with conceptual framework and study model. Through the study, it was made the effort to identify current intention level of domestic households to install solar power systems in the Western province. Further, based on a descriptive analysis of specific survey questions, and it has been identified that there is prevailing positive attitude towards solar power adoption within the province. The majority households, expressed satisfaction with the concept of adopting solar power systems in their households, highlighting their belief in the benefits of reducing electricity bills. Further, the researcher identified the factors affecting the adoption of solar power systems by domestic users in the western province. Some negative factors are negative social influence, low system characteristics, degraded facilitating methods, and individual differences such as low-income rates and a lack of education on system benefits. Finally, the recommendations were made by the researcher, in view of enhancing the adoption level of solar power systems by households in western province as well as island wide. Accordingly, these will be immensely benefitted to achieve energy related goals and objectives in line with the national interests of the Sri Lanka.

Key words: Renewable energy, solar photovoltaic (PV), electricity demand, social influence, System characteristics, Individual differences, Facilitating Conditions, Perceived ease of use, Perceived usefulness.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

Abbreviation	Description
SLAF	Sri Lanka Air Force
UoM	University of Moratuwa
PV	Photovoltaic
BDMM	Behavioral Decision Making Model
DoI	Diffusion of Innovation
TAM	Technology Acceptance Model
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
LED	Light Emitting Diode
CI	Confidence Interval

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

"One of the most exciting opportunities created by renewable energy technologies like solar is the ability to help the world's poorest develop faster - but more sustainably too."

- *Ed Davey* (Davey, 2023)

1.1 Background of the Study

Over the recent past, the energy demand has been rapidly increased in par with population growth in several countries in the world. Accordingly, providing sustainable energy to the growing population is a challenge faced by many countries. Presently, the majority of the world's energy demand is being covered through fossil fuels. However, with the rapid depletion of fossil fuel resources in the world and with the huge emissions of carbon dioxide gas that come with the use of fossil fuels, many countries have paid their attention towards renewable energy sources. Renewable energy provides clean energy as well as removes the dependency on fossil fuel imports (Rawat and Sauni, 2015).

For several years there has been much interest in renewable energy (Marek and Tomasz, 2021). Both developed and developing countries are advocating for and making changes to related policies to improve renewable energy usage on a large scale. However, presently only a small percentage from total production of the energy is produced from renewable sources. Accordingly, several challenges have been encounter in this situation by limiting the large scale acceptance of renewable sources. Identified challenges make it problematic and obstruct the realization of the required expansion of renewable energy usages.

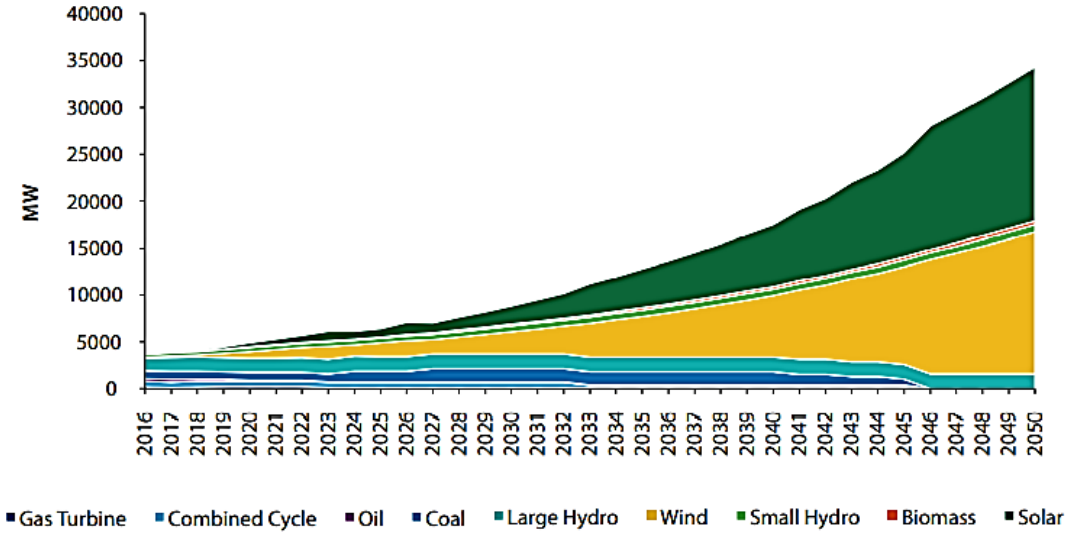

Fig.1.1: Energy generation plan of Sri Lanka 2016- 2050
(Ceylon Electricity Board, 2022)

According the forecasting of Asian Development Bank (Assessment of Sri Lanka's Power Sector, 2022), it predicts to fulfill the total electricity power generation process from renewable energy by the year 2050.

Based on future forecasts related to Sri Lanka's electricity sector, it should set its own renewable energy goals. According to future forecast, the country will be fossil fuel independent by the year 2046. Sri Lanka has planned to achieve this goal by investing in many renewable energy sources such as wind, mini-hydro, large hydro, biomass and Solar.

The falling expenses of solar related equipment and the developing range and flexibility of innovations related to solar, has made solar an attractive technology in the quest to create pathway to developed and sustainable energy (Ankit Kumar and Raihana, 2018). Solar photovoltaic (PV) has a wide range of uses, including solar farms, concentrated solar power systems, street lighting, floating systems, and public utility buildings. Rooftop solar PV systems are quite successful in the residential market while other types are limited. However, the behaviour of the domestic users that intends to employ the technology will ultimately determine whether these deployments are successful or not. Domestic households who are active participants in this technology adoption, control whether and to what extent the ongoing solar systems expansion projects are successful.

1.2 **Research Problem**

The utilization of solar power systems has gained significant attention as a renewable energy source with the potential to address energy security and environmental

concerns. Sri Lanka as a developing nation, seeks to transition towards sustainable energy sources is more convenience. However, slow growth rate in solar energy acceptance within domestic users could be identified as a major issue in Sri Lanka.

Most researches related to this field, the implementation of solar power in Sri Lanka concluded by recommending policy changes and highlighting the deficiencies in finance. The cost of solar energy is gradually reducing due to its rapid technological development and mass production of solar panels in China. On the other hand, with the introduction of special loan schemes such as 'Solar Loan' initiated by the 'Soorya Bala Sangramaya' programme in Sri Lanka, the solar technology is still not widely spread across the local community. As such, through introducing solar power systems to the existing electrical power consumers is challenging, it is paramount importance to overcome the same in view of addressing the upcoming energy crisis in Sri Lanka.

Accordingly, the research was mainly focused to identify the factors affecting the adoption of solar power systems by domestic users. However, with the several identified limitations, the study was limited to western province in Sri Lanka. In line with that, the research problem was '**What are the factors affecting the adoption of solar power systems by domestic users in western province of Sri Lanka?'**

1.3 Research Objectives

The objectives of the research are as follows;

a. To identify the current intention level of domestic households to install solar power systems in western province, Sri Lanka.

b. To identify the factors affecting the adaption of solar power systems by domestic users in western province, Sri Lanka.

1.4 Significant of the study

As a developing country, it is required to differentiate the country's energy generation in the direction of more renewable and sustainable means (Wijesena and Amarasinghe, 2018). Accordingly, it helps to reduce the spending of foreign currency on energy generation. When considering the sustainable energy, main focus goes on renewable energy sources. Among all renewable energy resources, solar power is a less costly option that can be easily implemented even at the domestic level. Further, solar power is a clean green energy source with no emission and limited recurrent cost.

Sri Lanka is located closer to the equator and it is a main geographical advantage for the country, where sunlight is available almost throughout the year, 7 to 9 hours per day is a comparatively larger intensity for producing of solar energy within the region.

Accordingly, it should be understand that solar power has a huge potential as future main energy producing source in this country.

Several past researchers from this field, have concluded their researches with recommending policy changes and highlighting the deficiencies in finance. Even thought, with the introduction of special programme such as 'Soorya Bala Sangramaya' in Sri Lanka the dynamic of solar energy implementation has not widely spread across the local community. Due to several limitations in the research, the study was limited to the western province since it has large number of domestic users with high population density comparatively other provinces. As such, the researcher is mainly focusing to find the factors affecting the adoption of solar power systems by domestic users in western province, Sri Lanka.

1.5 Thesis Outline

This research thesis is consisted with five chapters namely, the first chapter is 'Introduction' and it provides the background and overview of this thesis. The second chapter describes the 'literature review'. It provides an extensive discussion of the theories used to build the research model devoted to the research conceptual framework as well as the hypotheses development. The third chapter is 'Methodology' and it is designed to introduce, describe, and justify the method employed to investigate the research questions. The fourth chapter presents the Data presentation and Hypothesis testing of this study. The fifth chapter interprets the findings and discussion of the whole research. Finally, the chapter six provides a summary of the research and conclude with the implications of the findings to theory and practical needs under appropriate recommendations.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Electricity requirement is perceived as the worldwide energy transporter and the groundwork of working with modern society. Electrical energy provides access to essential required facilities such as communications, water supply, lighting…etc; social service requirements such as education, public health, institutions, and infrastructure; and income-producing industries such as manufacturing and food related producing companies (Practical Action, 2013). However, averagely 1.2 billion population or one-fifth of the total world population, do not have electrical power facility (Practical Action, 2014). The global population's lack of access to power is not distributed evenly. More than 95% of the global total is accounted for by Africa and Asia, with over 85% residing in village areas (SE4All, 2013). Providing widespread access to clean and inexpensive energy is thus critical for eradicating all types of poverty, combating inequities, and addressing several climatically differences.

This was already highlighted in the creation of Sustainable Development Goal 7, which aspires to provide all people with sustainable and reliable energy. Developing infrastructure for modern electricity producing tools is a key component of this goal. There is currently a corpus of literature that supports the need for having facility of electricity power and attaining expansion goals (Practical Action, 2014; United Nations, 2013).

Moreover, the environment impact of electricity generation could be due to few or several factors including ; particles emission; gaseous emissions (CO, NOx & SO2); hot water releases into rivers, lakes or sea; liquid and solid waste …etc (Wijesena & Amarasinghe, 2018). Furthermore, Mills (2006) estimates that 77 billion litters of gasoline are utilized globally each year only for illumination. This produces 192 million metric Tons of Carbon Dioxide gases emissions per year, accounting for 7% of world black carbon emissions (Lam et al., 2012). General fuel consumption resulted in around 6.5 million hectares of jungle areas being destroyed annual basis to fulfill demand, in addition to carbon emissions (Practical Action, 2014).

Major developments in power storage battery production, Light Emitting Diode, and solar PV technology, along with the large scale usage of several modern phones, have resulted in a significant increase in market driven residential electrical power producing devices (Rippey and Nelson, 2011). Globally, an estimated one million gadgets were sold, and the existing market is expected to rise by up to 300 percent over the coming decades (Lighting Africa, 2012). According to the statistics of International Finance Corporation, the global domestic level lighting requirement for the underprivileged could be worth $37 billion (IFC, 2012).

To achieve low-carbon communities and sustainable systems, switching from conventional energy to renewable resources, known as energy transition, has become one of the world's Millennium Goals (Alipour et al. 2020). Solar PV technology support to enhance environmental sustainability by lowering carbon related gases emissions and ensure energy security by differentiating the prime 'fuel' mix by generating power from the local and renewable resources of insolation. It can also be utilized to increase fairness by lowering electricity costs in places lacking centralized infrastructure. To properly enable and control residential solar PV adoption, a better knowledge of the incentives driving households' solar adoption decisions is required (Bondio et al., 2018).

2.2 Theories Supporting the Research

As per the literature, affecting different factors for the adoption of solar power systems by domestic users are based on few or a combination of the many identified key determinants highlighted through related theories and models. Those are implicated in a wide range of social issues, represent a more comprehensive psychological explanation of human behaviour. These models are based on the fundamental principle of bounded rationality, which states that human decisions are not rational (Simon, 2000). The ultimate purpose of Behavioural Decision Making Models (BDMMs) are to construct successful interventions to influence a group of people's emergent behavioural patterns in a society. Previous researches provide important key analytical information which create clear pathway to play a major role in sustainable energy generation. In line with that, different related models and theories were utilized to elaborate the several challenges of solar PV adoption by domestic users. The most applicable and common theories and models in the literature are;

a. Diffusion of Innovation theory, (Rogers, 2003) : (DoI)
b. Technology Acceptance Model, (Davis, 1989) : (TAM)
c. Theory of Planned Behaviour, (Ajzen, 1991) : (TPB)

These class of theories and models elaborate lengthy that how different people actually take their decisions, rather than how they should take related decisions in line with normative models. Further, it is elaborated that people are not perfectly rational decision makers, and that they are influenced by a variety of cognitive biases. As a result, the researcher analysed these theories and models in view of selecting the best ultimate option for the study.

2.2.1 Diffusion of Innovation Theory (DoI)

The theory explains that how innovations are adopted by a population. It can be used to elaborate how, why, and at which rate new technologies and ideas spread across several cultures (Rogers, 2003). This theory consider the

characteristics of innovation adopters in addition to the variables that influence innovation adoption.

2.2.2 Technology Acceptance Model (TAM)

TAM developed by Fred Davis in year 1989, is a theory used to explain why people adopt or reject new technologies. It's particularly useful for understanding user behavior towards information systems and technological advancements. Further, it remains a valuable and widely used model for clearly predict user acceptance levels of new technological innovations. It creates a backgrounds for elaborating the factors that stimulus decisions to adopt or reject new technological advancements.

2.2.3 Theory of Planned Behaviour (TPB)

TPB is a psychology theory that explains human behavior. It focuses on the idea that our intentions are the strongest predictor of our actions. According to TPB, there are three things influence our intentions; attitude, particular norm and perceived behavioral mechanism.

Out of the above theories, TAM is the frequently used and more relevant approach for recent past researches on solar power adoption. As a result, the researcher employed the TAM for this study.

2.3 Challenges on adoption of solar power systems by domestic users

Based on the literature, the researcher found the following facts as correlated impact variables for adoption of solar power systems by domestic users.

2.3.1 **Social Influence** : According to many researches, it is understood that 'Social Influence' is playing a significant role in the adoption of solar power systems by domestic users. When people see their friends, family or neighbours adopting solar panels, they are more likely to consider doing the same. However, if people do not see anyone they know using solar panels, they may be less likely to adopt them. By understanding its impact and implementing appropriate strategies, stakeholders may leverage the power of social networks to promote wider adoption of solar power systems.

2.3.2 **System Characteristics** : As per the literature, system characteristics which is encompassing the features and functionalities of solar power systems, can significantly impact on solar system adoption by domestic users. It plays a crucial role in shaping user perceptions and influencing adoption decisions. By focusing on affordability, user-friendliness, efficiency,

and social acceptance, solar power systems may become attractive and viable option for domestic users.

2.3.3 **Individual Differences** : According to the literature, people's decisions to adopt solar power systems may be influenced by their individual characteristics. These differences can play a role on technical knowledge, financial position, and social differences. Understanding these individual differences are crucial for policymakers and industry stakeholders when developing strategies to promote wider adoption of solar power. By addressing concerns, providing clear information, and potentially offering financial incentives, they can encourage individuals with varying backgrounds and perspectives to consider the benefits of solar power for their homes.

2.3.4 **Facilitating Conditions** : Widespread adoption of solar power systems hinges on creating favourable conditions that address existing barriers. The key facilitating conditions and their impact are Economic Incentives, Technical Support, social influence and policy reforming …etc.

2.3.5 **Perceived Usefulness** : People are more prefer to adopt solar power systems if such people believe them to be useful and beneficial. It is included with economic benefits, environmental benefits, reliability, efficiency, social and lifestyle benefits …etc. A strong perception of usefulness is a critical driver for solar power adoption by domestic households.

2.3.6 **Perceived Ease of Use** : The TAM includes perceived ease of use (PEOU) as one of its variables. PEOU measures how easily and easily an individual can use new technology. The Malaysian study used independent comparative advantage variables, easy use, testability, observable, and attitudes, perceived behavioural control, subjective norms, cost, awareness, and government initiative (S.S. Alma & A.S. Othma, 2021). A study conducted in Sri Lanka using independent variables considered perceived ease of use, perception, and cost of equipment or supplies (U.C. Bandara, 2020).

2.4 Technology Adoption Model (TAM) and Renewable Energy

The report in year 2017 says, an average 1.2 billion population has not been facilitated with electricity, according to Barrie and Cruickshank (2017). Further, 'Sustainable Energy for All' concept of the United Nations, highlighted the urgency with which this issue must be addressed. Technological advancements made in solar systems, LED, and battery related technology have led to the rise of reasonable and novel residential electrical technologies, yet expansion is low due to the several limitations and complexities associated with distribution.

W. Cheam, L.L. Lau and C. Wei (2021) used TAM to analyse factors influencing the households' intention to adopt solar PV technology in Malaysia. As per the study, the government of Malaysia had been targeted to achieve approximately 20% renewable energy generation goal by the end of year 2025. Although the government of Malaysian had been implemented several mechanisms in promoting the use of several renewable energy sources for more than a decade, still more than 75% of the electricity supply in that country is generated from the means of fossil fuels sources. Actually, the growth of renewable energy in Malaysia was slow and in its infancy level. At last, several implications had been highlighted to develop the related policies and improve solar PV adoption rate among households.

As per the research study in Pakistan, it was identified that the energy condition is deteriorated as a result of a lack of planning in the energy sector (Khalil et al., 2018). Long-term power outages have an impact on all sectors, which can be mitigated by implementing solar PV systems in an individual capacity. Solar PV was recognized as a secondary source of energy in many nations because it contributes to the national grid, but it has not been yet available at the household level in Pakistan. The average solar global insolation in Pakistan is 5-7 KWh/m2/day. The study outlines the elements that commonly influence a household's decision to acquire solar energy for their home in Peshawar, Pakistan.

In Indonesia, a study had been done to identify the different factors which would be able to influence households' intention to adopt rooftop solar panels in their homes (M. Bilal & E. Andajani, 2023). This research study used the combined concepts of TAM theory and the DoI theory. Respondents in that study were 300 household decision makers in the country. The study has found that perceptions of ease of use do not have a significant impact on intent to use of solar systems. The research result show that awareness has a positive as well as significant impact on intention to use solar systems. Conversely, perceived costs negatively impact usage intent and have a significant impact. Additionally, it has been proven that the relative Advantage, Initiatives of central Government, and Life patterns all positively and significantly influence the Intention to Use.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter mainly elaborate the research methodology and it focuses on the conceptual framework, hypotheses, operationalization, population, sample and method of data analysis. A self-administrated questionnaire was created using TAM theory and it was developed to collect the data for this study. The questionnaire was prepared in both English and Sinhala medium separately since that was helpful for domestic householders to provide their responses. The investigation into this study was made through formulating hypotheses, which were then followed by data collecting that either confirmed or denied the idea. Further, the researcher utilized the deductive approach for this study.

3.2 Conceptualization

After proper analysing of the related literature on similar field, the researcher recognized social influence, system characteristics, individual differences, and facilitating conditions as independent variables, and perceived ease of use and perceived usefulness as mediators. Further, it was identified that ‘adoption of solar power systems’ as the dependant variable. The researcher developed a conceptual framework based on the identified independent variables, mediators and dependant variable as Figure 3.1.

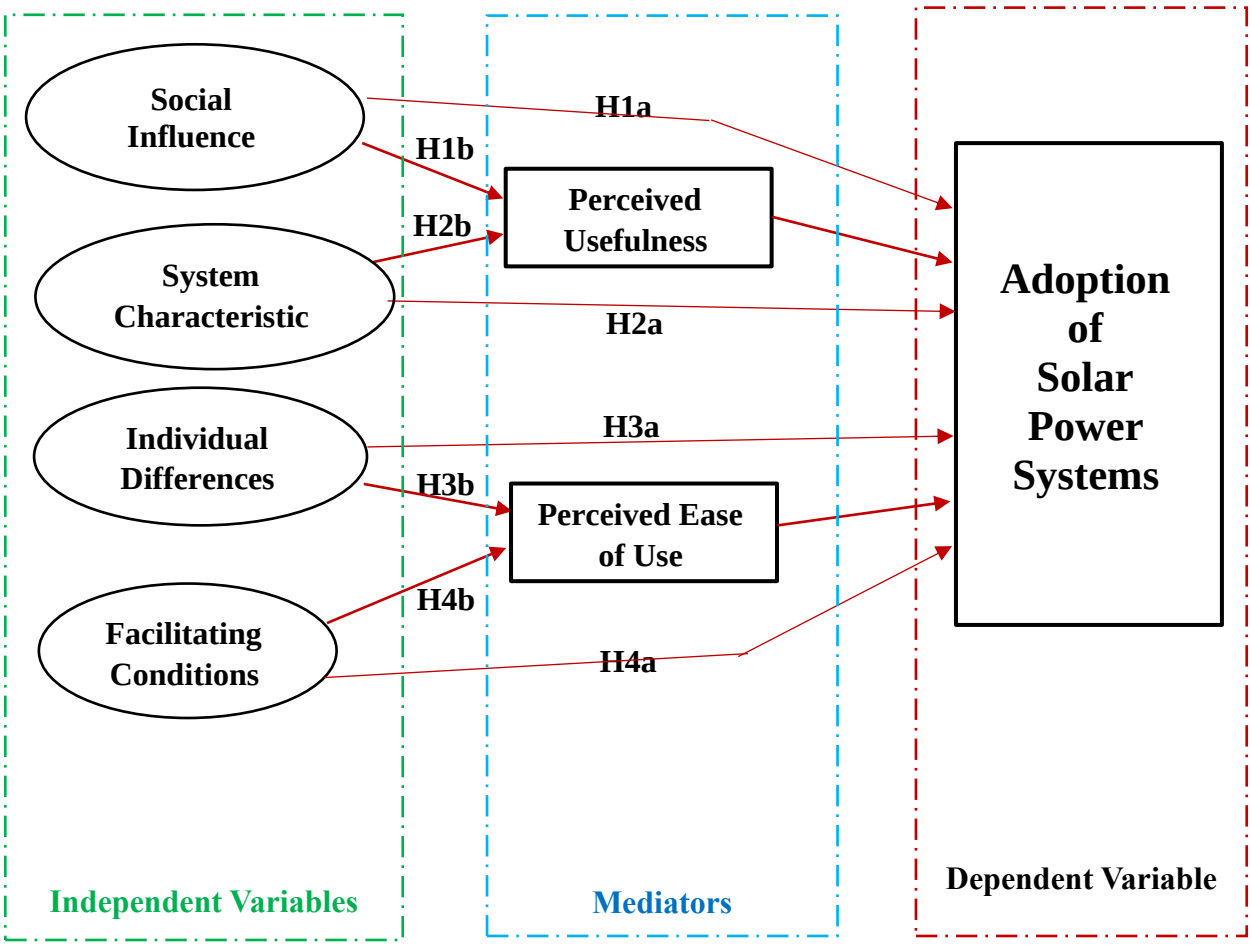

Figure 3.1. : Conceptual Framework
Source: Developed by the researcher

3.3 Operationalization

The operationalization of this study indicates how to proceed with the research, while collecting, processing and analysing and how to derive recommendations of the research. Dawes (2012) has proposed that five-point or seven-point likert scale would provide comparatively better results than higher point scales (Dawes, 2012). The researcher included demography data and a five-point likert scale to measure seven variables of the study.

3.4 Research questionnaire

The research questionnaire was developed based on the conceptualization of this research and attached as annex 'A'. The demographic data of the responders were collected through seven questions of the part I. The part II of the questionnaire was focused to collect responses on seven variables of the research. Question number 01 to

19 of part II, were generated based on four independent variables and question number 20 to 30 of part II were developed based on two mediators which were identified through literature review. Question number 31 to 35 of part II, were focused on dependant variable of the research. Variables related questions of the questionnaire have been coded from 1 to 5 and strongly disagreed is represented by '1' and strongly agreed is represented by '5'.

Table 3.1: Demographic variables

S/ No	Variable/ Dimension	Indicator	Category of data	Measurement
1.	Demography	Age	Interval data	1. 18 to 29 years old 2. 30 to 39 years old 3. 40 to 49 years old 4. 50 to 59 years old 5. 60 years and above
		Gender	Nominal data	1. Male 2. Female
		Roof size of House	Nominal data	1. No roof (Due to apartment building) 2. Small (Approx. less than 50 m^2) 3. Medium (Approx. 50 m^2 to 100 m^2) 4. Large (Approx. more than 100 m^2)
		Occupation	Nominal data	1. Employed 2. Self-employed 3. Unemployed 4. Student 5. Retired
		Monthly household income	Interval data	1. Less than Rs. 50,000 2. Rs. 50,000 - Rs. 99,999 3. Rs. 100,000 - Rs. 149,999 4. Rs. 150,000 and more
		Level of education	Nominal data	1. No formal education 2. Primary education 3. Secondary education 4. Tertiary education
		Location of your residence belongs	Nominal data	1. Colombo 2. Gampaha 3. Kalutara

Source: Developed by the researcher

Table 3.2: Operationalization and measurement of variables

Variable/ Dimension	Indicator	Category of Data	Measurement	Question No
Social Influence	Influence of others, Perception of societal norms , Influence of media	Ordinal data	5-point Likert scale	Q1, Q2, Q3 and Q4
System characteristics	Capacity & storage, safety features, performance	Ordinal data	5-point Likert scale	Q5, Q6, Q7, Q8 and Q9
Individual differences	Technical Knowledge , Risk Aversion, Environmental Concern	Ordinal data	5-point Likert scale	Q10, Q11, Q12, Q13 and Q14
Facilitating Conditions	Government Incentives, Availability of Financing, Approval Process	Ordinal data	5-point Likert scale	Q15, Q16, Q17, Q18 and Q19
Perceived Ease of Use	Installation process, Complexity, Compatibility, Financial considerations	Ordinal data	5-point Likert scale	Q20, Q21, Q22, Q23, Q24 and Q25
Perceived usefulness	Economic Benefits, Environmental Benefits, Operational Benefits	Ordinal data	5-point Likert scale	Q26, Q27, Q28, Q29 and Q30
Adoption of solar power systems	Installation, Payback period, Financing Options, Environmental impact, Social impact, Existing Policies	Ordinal data	5-point Likert scale	Q31, Q32, Q33, Q34 and Q35

Source: Developed by the researcher

3.5 Hypotheses

It was developed the following hypotheses in line with related theory models from the literature review.

3.5.1 Hypotheses based on correlation between Independent variables and dependent variables.

H1a: There is a positive correlation between 'Social Influence' and 'adoption of solar power systems' by domestic users in western province, Sri Lanka.

H2a: There is a positive correlation between 'System Characteristics' and 'adoption of solar power systems' by domestic users in western province, Sri Lanka.

H3a: There is a positive correlation between 'Individual Differences' and 'adoption of solar power systems' by domestic users in western province, Sri Lanka.

H4a: There is a positive correlation between 'Facilitating Conditions' and 'adoption of solar power systems' by domestic users in western province, Sri Lanka.

3.5.2 Hypotheses based on mediators' impact on correlation between variables

H1b: The correlation between 'Social Influence' and 'adoption of solar power systems ' is mediated by 'Perceived Usefulness'.

H2b: The correlation between 'System Characteristic' and 'adoption of solar power systems ' is mediated by 'Perceived Usefulness'.

H3b: The correlation between 'Individual Differences' and 'adoption of solar power systems' is mediated by 'Perceived Ease of Use'.

H4b: The correlation between 'Facilitating Conditions' and 'adoption of solar power systems' is mediated by 'Perceived Ease of Use'.

3.6 Population

All domestic households in western province, Sri Lanka was the targeted population of the study. The number of householders' present according to districts are as follows;

Table 3.3: Population of the study

Provinces	No of Householders
Colombo District	673,604
Gampaha District	663,512
Kalutara District	351,997
Western Province (Total)	1,689,113

Source: Department of Census and Statistics in Sri Lanka

According to the reports by the Department of Census and Statistics in Sri Lanka, the population of the study was identified as total number of 1,689,113 householders.

3.7 Sample

The creation of a representative sample with a minimal sampling error was more crucial. A smaller, more targeted subset from a larger population is chosen for scholarly inquiry by sampling. The sample's size and homogeneity of its constituent parts were taken into consideration during sample design. It is also known that larger samples have lower sampling error than smaller samples. As a result, homogeneous population samples exhibit lower sampling errors than diverse population samples (Babbie, 2009).

The researcher used the non-probability sampling approach to gather required primary data from householders in western province Sri Lanka. Total households in Western province, Sri Lanka 1,689,113 considered as the study's population. The required minimum sample size of the study is indicated as 385 according to the Krejcie and Morgan's sample size chart constitute the sample with a 95% confidence interval and a 5% margin of error.

3.8 Method of data analysis

A sample questionnaire was distributed among 27 households from three Gramasewaka divisions in Gampaha district as a pilot survey to test the questionnaire. Researcher requested comments on the questionnaire and made few adjustments on questions according to the feedback received from the pilot survey.

To achieve the research objectives, analysis presents the summary of gathered data and offers the results of the statistical analysis. It should achieve the research goals by the end of analysis chapter: To identify the current intention level of domestic households to install solar power systems, and to identify the challenges on adaption of solar power systems by domestic users in western province, Sri Lanka.

The researcher used data analysis tools/ software are MS Excel, Smart PLS 4 and IBM SPSS. The information about the respondent's demographic characteristics are presented using frequency analysis. Then the researcher screening data, and checks validity and reliability of data. The current intention level of domestic households to install solar power systems (first objective) is achieved using mean values and challenges on adaption of solar power systems by domestic users in Western province, Sri Lanka (second objective) is determined by using correlation and regression analysis.

CHAPTER 4

DATA PRESENTATION AND HYPOTHESIS TESTING

4.1 Introduction

The initial segment of this chapter provides a detailed overview of the collected demographic data of the survey participants. Afterwards, the rest of this section lengthly discusses about hypothesis testing and model examination process. The total number of 388 participants were involved as the sample population from the Western Province, Sri Lanka. Questionnaires were distributed via Google Forms, resulting in the collection of 388 completed responses. Data analysis has been conducted with the support of several analysis tools, such as MS Excel , Smart PLS 4 and IBM SPSS. Further, this section is included with the data collection and analysis procedures, assesses the reliability and validity of the survey instruments, explores the quantitative findings and offers a analitical summary of the quantitative review.

4.2 Quantitative Data Collection and Analysis Process

The numeric data collection process was comprised of distributing a questionnaire via Google Forms, resulting in the collection of 388 responses. These responses were converted into numerical values to facilitate subsequent quantitative analysis. Evidently, the use of Google Forms ensured there were no missing data points, enabling the presence of all collected data in the analysis. Subsequently, the collected data was coded using Excel and SPSS software. Demographic data was analyzed using SPSS, while Smart PLS 4 was utilized to test hypotheses, including both direct and indirect impacts of independent variables on dependent variables through moderating variables identified in chapters two and three of this study.

The research process then proceeded with an initial analysis, primarily focusing on the demographic characteristics of the respondents. This initial step was crucial in confirming the represent of population by the sample. Following this, a rigorous evaluation of the questionnaire's validity and reliability, as well as an assessment of the collected data, was carried out.

Finally, Smart PLS 4 used to test the hypothesis test. During initial stage conducted model fit test to check the model developed during the study and then check the direct and indirect effect of the variables.

4.3 Presentation of Demographic Factors of Survey Respondents

During study minimum variation sample selected to represent the target population. This method is deliberately chosen to generalize the result in to the population. In the context of this study, which aims to identify the challenges on adoption of solar power systems by domestic users in western province of Sri Lanka, homogeneous sampling was utilized. It is also known that larger samples have lower sampling error than smaller samples. As a result, homogeneous population samples exhibit lower sampling errors than diverse population samples (Babbie, 2009).

4.3.1 Age and Gender Factors of the Respondents

The data presented in Table 4.1 and 4.2 respectively provides a clear picture of the age and gender distribution among the 388 respondents.

Table 4.1 Age distribution of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-29	50	12.9	12.9	12.9
	30-39	189	48.7	48.7	61.6
	40-49	129	33.2	33.2	94.8
	50-59	14	3.6	3.6	98.5
	60 and above	6	1.5	1.5	100.0
	Total	388	100.0	100.0	

Source: Survey Data

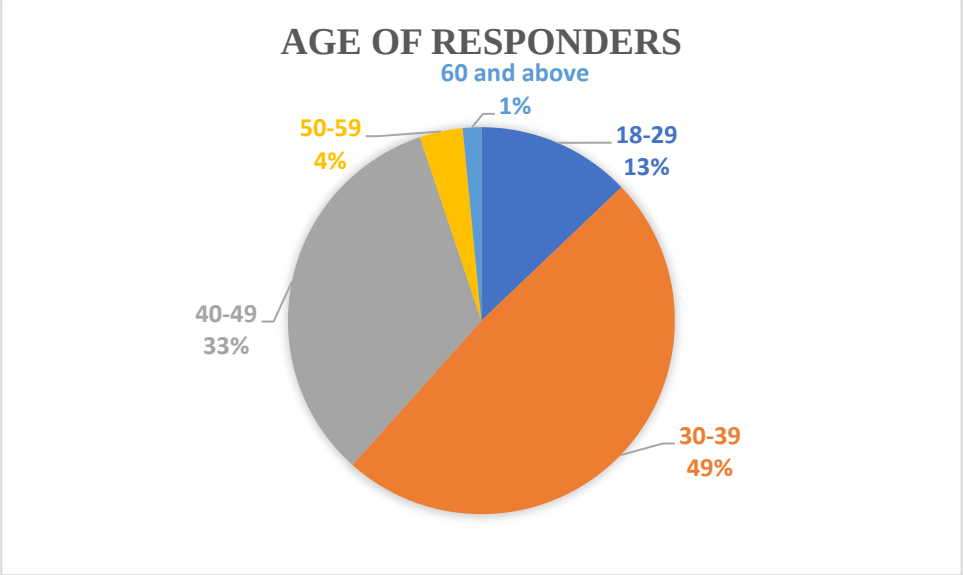

Figure: 4.1: Graphical representation of Age of responders

Source: Developed by the researcher

Table 4.2: Gender Distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	314	80.9	80.9	80.9
	Female	74	19.1	19.1	100.0
	Total	388	100.0	100.0	

Source: Survey Data

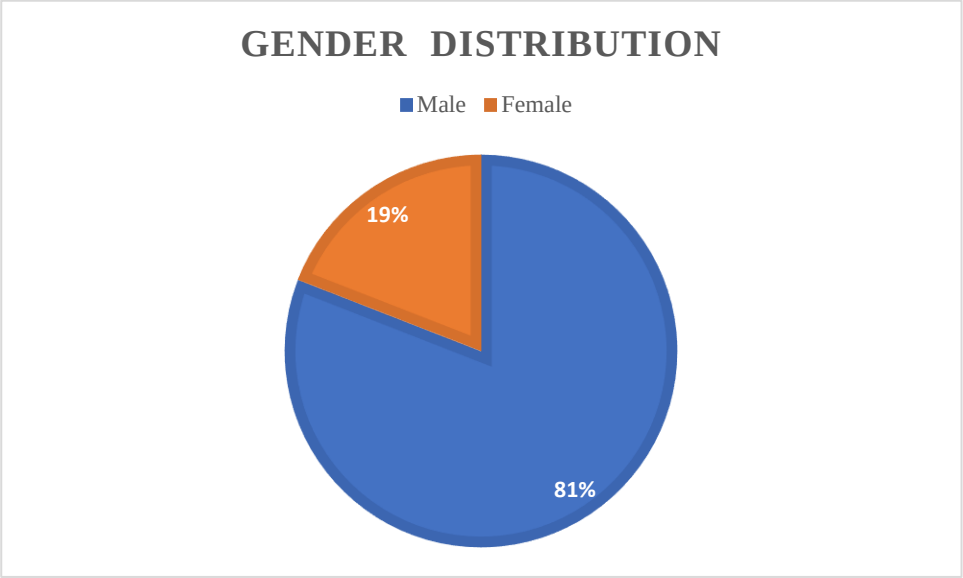

Figure: 4.2: Graphical representation of Gender distribution

Source: Developed by the researcher

As observed in Table 4.1, a significant majority, 81.9% of the respondents, fall within the age range of 30 to 49 years. Additionally, it's worth noting that only 20 respondent is older than 50 years and 50 respondents falls within 18 to 20 age group. Further out of 388 only 6 respondents fall in to 60 plus age group and this indicate majority of the respondent more than 98% of the respondent are falls within the workforce of the country.

Same time in Table 4.2 indicate that majority of households run by male respondents while only 19% respondent falls in to female selected sample was almost homogenies with respective to the gender.

4.3.2 Monthly Household Income

Table 4.3 provide insights into the monthly income of the households among the respondents.

Table 4.3: Monthly Household Income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than Rs. 50,000	4	1.0	1.0	1.0
	Rs. 50,000 - Rs. 99,999	87	22.4	22.4	23.4
	Rs. 100,000 -Rs. 149,999	151	38.9	38.9	64.4
	Rs. 150,000 and more	146	37.6	37.6	100
	Total	388	100.0	100.0	

Source: Survey data

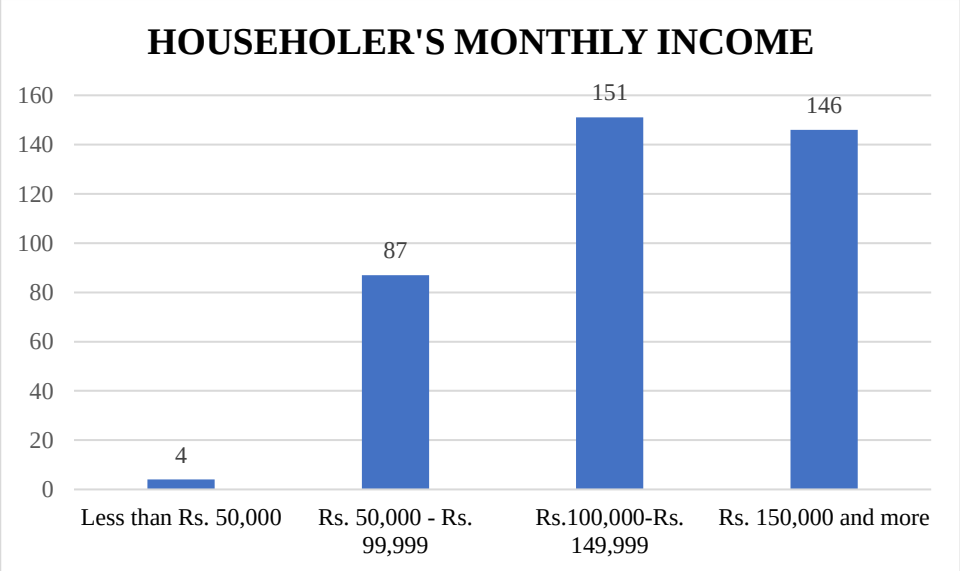

Figure: 4.3: Graphical representation of Householder's monthly income

Source: Developed by the researcher

As shown in Table 4.3, it is evident that 63% of respondent have more monthly household income in between Rs 50000.00 to Rs 150,000.00 and this indicate majority of the respondent had mid income status. However, 38% respondent had more than Rs 150,000.00 monthly income and this might be affected to the study results indirectly.

4.3.3 Size of the Roof

Considering the effect of the roof site to install the solar system researcher assess the roof size of the respondent and table 4.4 shows the result and it is clear that 64% present respondent having medium size roof which can accommodate the solar system. This helped to mitigate the effect of space factor to the study findings.

Table 4.4 Size of the Roof

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No roof (Due to apartment building)	15	3.9	3.9	3.9
	Small (Approximately less than 50 m2)	53	13.7	13.7	17.5
	Medium (Approximately from 50 m2 to 100 m2)	247	63.7	63.7	81.2
	Large (Approximately more than 100 m2)	73	18.8	18.8	100.0
	Total	388	100.0	100.0	

Source: Survey data

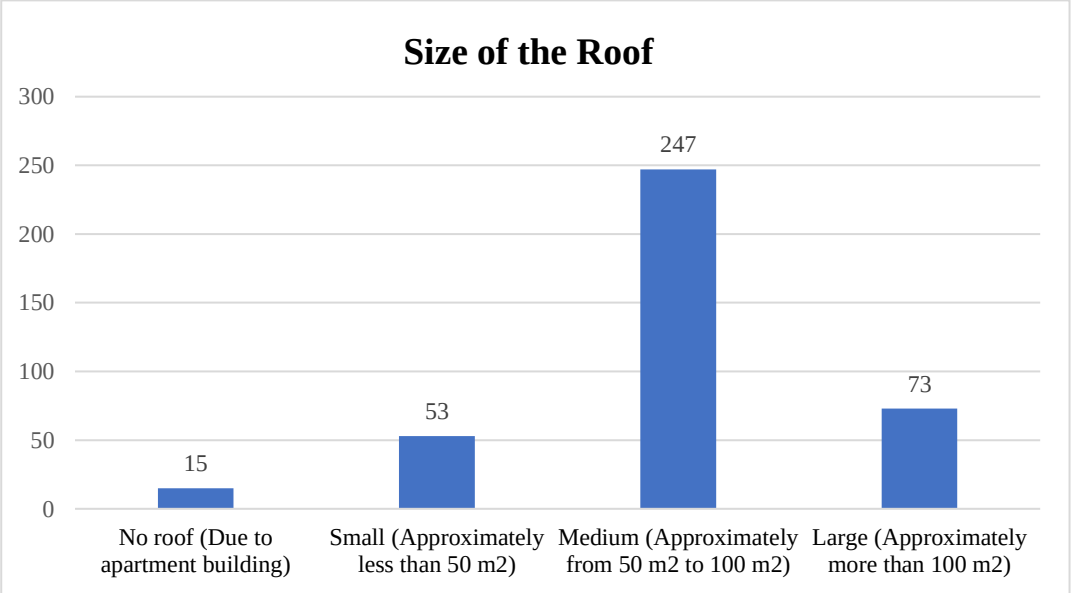

Figure 4.4: Graphical representation of Size of roofs

Source: Developed by the researcher

In summary, demographic data along with the roof size of the respondent observed similar in nature and this mitigate the effect of demographic factors and the space constrained to the study findings. However, it is observed moderate deviation among the respondents with respective to the household income.

4.4 Validity and Reliability

The quality of research heavily relies on the reliability and validity of the measurement instruments and tools utilized. This foundational requirement is emphasized by Mohajan (2017), who asserts that reliability and validity process stand as the important features to be consider prior to analysing of any collected data in effective research study. In this study, the researcher meticulously conducted tests for both validity and reliability on the measurement instruments employed, with the overarching goal of bolstering the overall quality and integrity of our research endeavour.

Result of validity and the reliability of the instrument shown in the table 4.5 below.

Table 4.5: Result of validity and the reliability Test

	Cronbach's alpha	**Composite reliability (rho_a)**	**Average variance extracted (AVE)**
Adoption of Power System	0.821	0.822	0.583
Facilitating Conditions	0.807	0.808	0.566
Individual Differences	0.747	0.753	0.498
Perceived Ease of Use	0.724	0.739	0.418
Perceived Usefulness	0.752	0.778	0.504
Social Influence	0.709	0.752	0.509
System Characteristics	0.77	0.77	0.520

Source: Survey data

According to guidelines of Streiner (2010), Cronbach's Alpha Coefficient value is ranged from 0 to 1. If the values are closed to 1, it indicates higher reliability. Further, 0.7 marginal value is considered as the minimum acceptable value. In this study, the minimum Cronbach's Alpha coefficient is calculated to be 0.709 it was given by Social Influence and maximum value is 0.821 in Adoption of power system this indicate that

the measurement instruments used for the research study has indicates that it has an appropriate level of reliability.

The acceptable composite reliability is being demarcated as value 0.7 or higher for a common threshold. Average Inter- Item Correlation (rho_a): it is a calculation value of the average correlation between different items of a construct. The main extracted information of this is how closely related the identified variables between each other (Wang at al, 2024). Details in the table 4.5 indicates that Inter-Item Correlation (rho_a) values are more than 0.7 and instruments are also existing with composite validity. Moreover, according to Shrestha & Noora (2021), “as per the Fornell and Larcker (1981), AVE ≥ 0.5 reflects the confirmation of convergent validity” and the table 4.4 indicates that all the AVE values are greater or equal to 0.5. Accordingly, it indicates that the instrument passed the validity test also. Based on the reliability and validity test researcher adjusted the model developed in metrology chapter and adjusted model used for the hypotheses testing shown in figure 4.1 along with external loading factors and the Cronbach's alpha values.

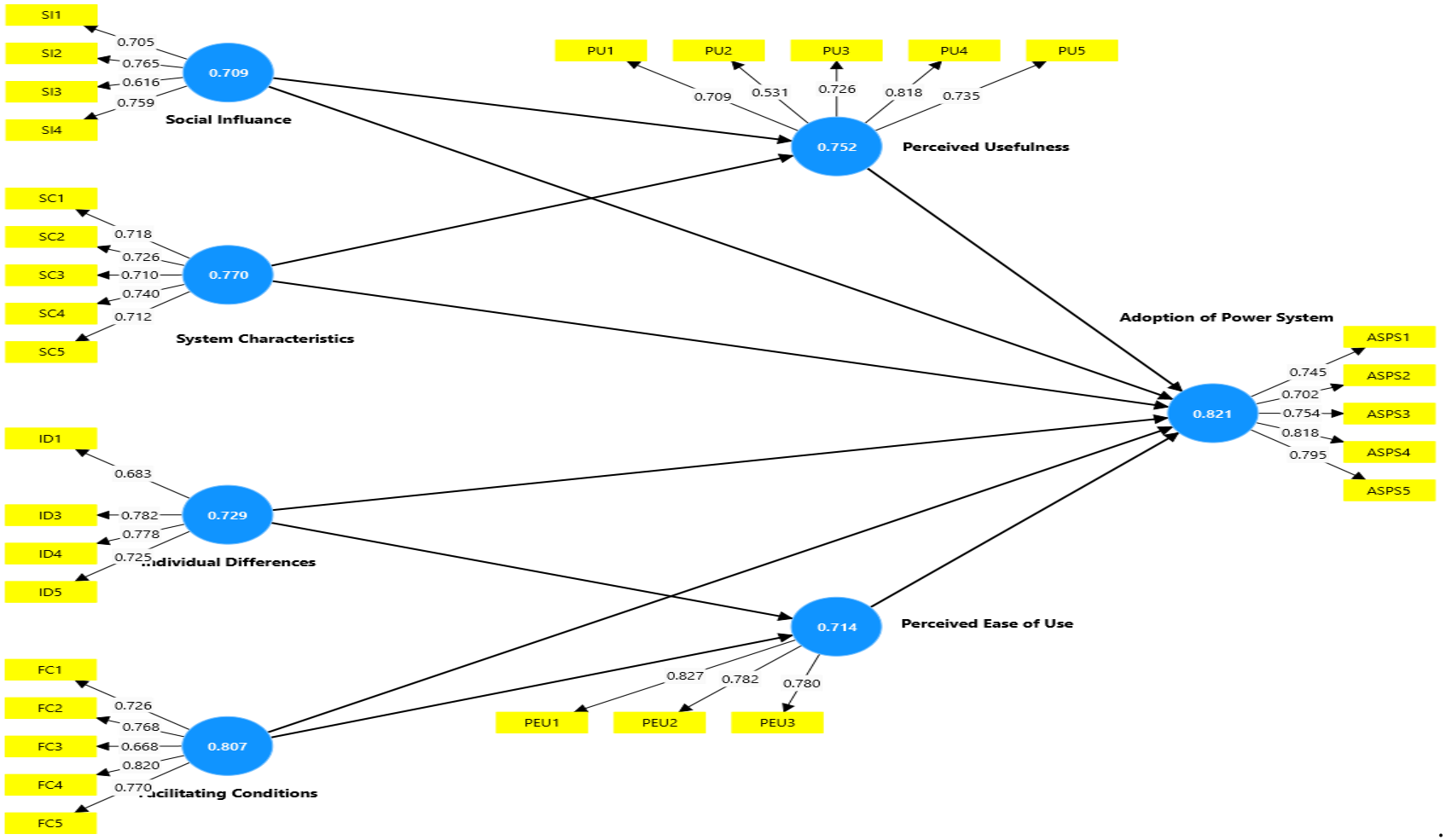

Figure 4.5: Hypothesis testing Model
Source: Developed by researcher

4.5 Hypotheses testing

To test the hypotheses researcher used the Smart PLS-4 and following result were fond with respective to each hypothesis. During the testing process, the researcher used values of Pearson's correlation coefficient (r) and P-values . According to the Armitage at al (2002) and Bland (2000), The Pearson correlation coefficient, ranging from -1 to 1, this coefficient indicates the quantified value of the relationship between two variables. Generally, correlation indicates the extent to which both variables incline to change related to each other. If one variable increases with the other increases, a positive correlation is observed between two variables, as such the correlation coefficient closer to 1 variables change similar rates.

However, in other hand the P-value can be considered as the likelihood that supported to find the current outcome, if the amount of correlation coefficient was in fact value 0, it can be considered as null hypothesis. Further, it increases where this probability is lower than the conventional 5% ($P < 0.05$), it means the correlation coefficient is interpreted as statistically significant.

During the study to distinguish between correlation and causation is mandatory. Even though, two variables may show a correlation, it doesn't necessarily mean that one causes the other. In some cases, even if a correlation exists, the relationship between the variables might be indirect. To infer relationship from correlation, there should be a proper logical or biological basis supporting such interpretation. The 95% confidence interval (CI) for the value of Pearson correlation coefficient represents a range of values within which the 'true' correlation coefficient lies with 95% confidence (Altman, 1991). Based on these, researcher tested the hypotheses to identify the study facts and their relations. Table 4.6 show the p values of each test cases while Table 4.7 show the correlation coefficient of the variables.

Table 4.6: Standard deviation, T statistics and p values

	Sample mean (M)	**Standard deviation (STDEV)**	**T statistics (|O/STDEV|)**	**P values**
Facilitating Conditions -> Adoption of Power System	0.187	0.048	3.873	0
Facilitating Conditions -> Perceived Ease of Use	0.152	0.056	2.675	0.008
Individual Differences -> Adoption of Power System	0.14	0.055	2.51	0.012
Individual Differences -> Perceived Ease of Use	0.404	0.06	6.763	0
Perceived Ease of Use -> Adoption of Power System	0.064	0.032	2.084	0.037
Perceived Usefulness -> Adoption of Power System	0.135	0.04	3.37	0.001
Social Influence -> Adoption of Power System	0.133	0.03	4.454	0
Social Influence -> Perceived Usefulness	0.124	0.042	2.899	0.004
System Characteristics -> Adoption of Power System	0.413	0.061	6.793	0
System Characteristics -> Perceived Usefulness	0.613	0.038	16.302	0

Source: Survey Data

Table 4.7: Correlation Coefficient

	Adoption of Power System	Perceived Ease of Use	Perceived Usefulness
Facilitating Conditions	0.186	0.15	-
Individual Differences	0.138	0.403	-
Perceived Ease of Use	0.066	-	-
Perceived Usefulness	0.133	-	-
Social Influence	0.133	-	0.121
System Characteristics	0.417	-	0.612

Source: Survey Data

4.5.1 **H1a: There is a positive correlation between 'Social Influence' and 'adoption of solar power systems' by domestic users in western province, Sri Lanka.**

According to the table 4.6, p value between the **Social Influence** and **Adoption of solar power system** is 0 and this value < 0.05. Therefore, relationship between two variables statistically significant. Further table 4.7 correlation coefficient of two variables is 0.133. This indicates the positive relationship among two variables. However, coefficient value is closer to 0 and therefore effect of variables on each other is minimal. Based on the result **H1a** was **true and proven**.

4.5.2 H2a: There is a positive correlation between 'System Characteristics' and 'adoption of solar power systems' by domestic users in western province, Sri Lanka.

According to the table 4.6, p value between the **System Characteristics** and **Adoption of solar power system** is 0 and this value < 0.05. Therefore, relationship between two variables statistically significant. Further table 4.7 correlation coefficient of two variables is 0.417. this indicates the positive relationship among two variables. However, coefficient value is closer to 0.5 and therefore effect of variables on each other is moderate and positive. Based on the result **H2a** was **true and proven**.

4.5.3 H3a: There is a positive correlation between 'Individual Differences' and 'adoption of solar power systems' by domestic users in western province, Sri Lanka.

According to the table 4.6, p value between the **Individual Differences** and **Adoption of solar power system** is 0.012 and this value < 0.05. Therefore, relationship between two variables statistically significant. Further table 4.7 correlation coefficient of two variables is 0.138. This indicates the positive relationship among two variables. However, coefficient value is closer to 0 and therefore effect of variables on each other is minimal but positive. Based on the result **H3a** was **true and proven**.

4.5.4 H4a: There is a positive correlation between 'Facilitating Conditions' and 'adoption of solar power systems' by domestic users in western province, Sri Lanka.

According to the table 4.6, p value between the **Facilitating Conditions** and **Adoption of solar power system** is 0 and this value < 0.05. Therefore, relationship between two variables statistically significant. Further table 4.7 correlation coefficient of two variables is 0.186. This indicates the positive relationship among two variables. However, coefficient value is closer to 0 and therefore effect of variables on each other is minimal but positive. Based on the result **H4a** was **true and proven**.

4.6 Regression Analysis on independent variables

Table 4.8: Regression Coefficients

Model		Collinearity Statistics	
		Tolerance	VIF
1	SI	0.905	1.105
	SC	0.734	1.363
	ID	0.752	1.330
	FC	0.903	1.107
a. Dependent Variable: ASPS			

Source: Survey Data

A multicollinearity diagnostic test has been done to see the level of correlation within independent variables. With the comparison of 'Tolerance values' and 'Variance Inflation factors (VIF)', the researcher was able to find that the Tolerance values are higher than 0.2. Further, VIF values are less than 5. In line with that, it was understood that the Tolerance values and the VIF values are between the expected value range that prevents the multicollinearity. Accordingly, it means that the Multi-regression analysis can be carried out.

Table 4.9: Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of Estimate	Change Statistics					Durbin-Watson
					R^2 Change	F Change	df1	df2	Sig. F Change	
1	.658	.433	.427	.374	.433	73.173	4	383	<.001	2.027
a. Predictors: (Constant), FC, SI, ID, SC										
b. Dependent Variable: ASPS										

Source: Survey Data

Table 4.9 depicted the summarized details of the model in which the important item is the R square statistics, which is 0.433 with a statistical significance value of $P < 0.05$. This indicates that, 43.3% of variants in the 'Adoption of Solar power by domestic households was predicted from independent variables. Addition to that, Durbin-Watson statistic value is 2.027 and it is in between +1 and +3 which illustrates that, it achieved the independence of the observations.

Table 4.10 Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig .	Collinearity Statistics	
		B	Std . Error	Beta			Tolerance	VIF
1	(Constant)	.484	.208		2.323	.021		
	SI	.147	.032	.187	4.612	<.001	.905	1.105
	SC	.330	.052	.284	6.321	<.001	.734	1.363
	ID	.374	.049	.335	7.561	<.001	.752	1.330
	FC	.099	.034	.119	2.947	.003	.903	1.107
a. Dependent Variable: ASPS								

Source: Survey Data

Considering the above table 4.10, the Unstandardized Coefficients, B value for Social Influence (SI) is 0.147. This indicates that for each one-unit increment of SI, there is an improvement in Adoption of solar power of 0.147 time units. The Unstandardized Coefficients, B value for System Characteristics (SC) is 0.330. This illustrates that for each one-unit increment of SC, there is an increase in Adoption of solar power of 0.330 time units. Further, the Unstandardized Coefficients, B value for Individual Differences (ID) is 0.374. Accordingly, it is indicated that for each one-unit increment of SI, there is an increase in Adoption of solar power of 0.374 time units. The Unstandardized Coefficients, B value for Facilitating Conditions (FC) is 0.099. This indicates that for each one-unit increment of SI, there is an increase in Adoption of solar power of 0.099 time units.

In line with above outcomes, it is evident that the Social Influence (SI), System Characteristics (SC), Individual Differences (ID) and Facilitating Conditions (FC) have Unstandardized Coefficient values 0,147, 0.330, 0.374 and 0.099 respectively.

4.7 Testing of Hypotheses developed based on mediators' impact on correlation between variables

"It is understood that the relations with different variables in the research are often more complicated than other bivariate relations between a predictor and a criterion. Slightly these relations may be modified by, the addition of a third variable in the design of the research study" (MacKinnon et al. 2000). As such during this study researcher study the specific indirect impact of the independent variables through identified mediators. To test the hypotheses specific indirect effect and total effect of the variables were checked. Table 4.8, 4.9 and 4.10 depicted specific indirect effect, total effect and path coefficients of each variable respectively.

Table 4.11: Specific Indirect Effect

	Original sample (O)	**Sample mean (M)**	**Standard deviation (STDEV)**	**T statistics (|O/STDEV|)**	**P Values**
Social Influence -> Perceived Usefulness -> Adoption of Power System	0.016	0.017	0.008	2.136	0.033
System Characteristics -> Perceived Usefulness -> Adoption of Power System	0.082	0.083	0.025	3.234	0.001
Facilitating Conditions -> Perceived Ease of Use -> Adoption of Power System	0.01	0.01	0.007	1.503	0.133
Individual Differences -> Perceived Ease of Use -> Adoption of Power System	0.027	0.026	0.013	1.975	0.048

Source: Survey Data

Table 4.12: Total Effect

	Original sample (O)	**Sample mean (M)**	**Standard deviation (STDEV)**	**T statistics (|O/STDEV|)**	**P Values**
Facilitating Conditions -> Adoption of Power System	0.196	0.197	0.048	4.07	0
Facilitating Conditions -> Perceived Ease of Use	0.15	0.152	0.056	2.675	0.008
Individual Differences -> Adoption of Power System	0.164	0.166	0.054	3.07	0.002
Individual Differences -> Perceived Ease of Use	0.403	0.404	0.06	6.763	0
Perceived Ease of Use -> Adoption of Power System	0.066	0.064	0.032	2.084	0.037
Perceived Usefulness -> Adoption of Power System	0.133	0.135	0.04	3.37	0.001
Social Influence -> Adoption of Power System	0.149	0.15	0.03	5.039	0
Social Influence -> Perceived Usefulness	0.121	0.124	0.042	2.899	0.004
System Characteristics -> Adoption of Power System	0.499	0.496	0.06	8.258	0
System Characteristics -> Perceived Usefulness	0.612	0.613	0.038	16.302	0

Source: Survey Data

Table 4.13: Path Coefficient

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Facilitating Conditions -> Adoption of Power System	0.186	0.187	0.048	3.873	0
Facilitating Conditions -> Perceived Ease of Use	0.15	0.152	0.056	2.675	0.008
Individual Differences -> Adoption of Power System	0.138	0.14	0.055	2.51	0.012
Individual Differences -> Perceived Ease of Use	0.403	0.404	0.06	6.763	0
Perceived Ease of Use -> Adoption of Power System	0.066	0.064	0.032	2.084	0.037
Perceived Usefulness -> Adoption of Power System	0.133	0.135	0.04	3.37	0.001
Social Influence -> Adoption of Power System	0.133	0.133	0.03	4.454	0
Social Influence -> Perceived Usefulness	0.121	0.124	0.042	2.899	0.004
System Characteristics -> Adoption of Power System	0.417	0.413	0.061	6.793	0
System Characteristics -> Perceived Usefulness	0.612	0.613	0.038	16.302	0

Source: Survey Data

4.6.1 H1b: The correlation between 'Social Influence' and 'adoption of solar power systems' is mediated by 'Perceived Usefulness'.

As per the result shown in table 4.8 observed significant indirect effect between **Social Influence** and **Adoption of solar power systems** through **Perceived Usefulness** (H1b: β =0.016, t = 2.136, p = .0.033< 0.05). Total effect of the **Social Influence** and **Adoption of solar power systems** was significance with β =0.149, t = 5.039 and p = .0.0< 0.05. Further, with the inclusion of mediator was significant with values of β =0.133, t = 4.454 and p = .0.0< 0.05. Therefore, it is indicate that **Social Influenc**e and **Adoption of solar power systems** have correlation with the presence of mediating variable **Perceived Usefulness** and H1b was approved.

4.6.2 H2b: The correlation between 'System Characteristic' and 'adoption of solar power systems' is mediated by 'Perceived Usefulness'

As per the result shown in table 4.8 observed significant indirect effect between **System Characteristic** and **Adoption of solar power systems** through **Perceived Usefulness** (H2b: β =0.0820, t = 3.234, p = .0.001< 0.05). Total effect of the **System Characteristic** and **Adoption of solar power systems** was significance with β =0.499, t = 8.258 and p = 0.0< 0.05. Further, with the inclusion of mediator was significant with values of β =0.417, t = 6.793 and p = .0.0< 0.05. Therefore, it is indicated that **System Characteristic** and **Adoption of solar power systems** have correlation with the presence of mediating variable **Perceived Usefulness** and H2b was approved.

4.6.3 H3b: The correlation between 'Individual Differences' and 'adoption of solar power systems' is mediated by 'Perceived Ease of Use'

As per the result shown in table 4.8 observed significant indirect effect between **Individual Differences** and **Adoption of solar power systems** through **Perceived Usefulness** (H3b: β =0.027, t = 1.975, p = 0.048 < 0.05). Total effect of the **Individual Differences** and **Adoption of solar power systems** was significance with β =0.164, t = 3.07 and p = 0.002< 0.05. Further, with the inclusion of mediator was significant with values of β =0.138, t = 2.51and p = 0.012< 0.05. Therefore, it is indicated that **Individual Differences** and **Adoption of solar power systems** have correlation with the presence of mediating variable **Perceived Usefulness** and H3b was approved.

4.6.4 H4b: The correlation between 'Facilitating Conditions' and 'adoption of solar power systems' is mediated by 'Perceived Ease of Use'

As per the result shown in table 4.8 observed nil significant indirect effect between **System Characteristic** and **Adoption of solar power systems** through **Perceived Usefulness** (H4b: β =0.01, t = 1.503, p = .0. 133> 0.05), p value> 0.05 and therefore there is no statistical significance effect of the **System Characteristic** and **Adoption**

of solar power systems through **Perceived Usefulness.** Therefore, **H4b** disapproved due to nil significant indirect effect.

4.8 Summary of Hypotheses Testing

Out of eight hypotheses seven was approved except H4b and summary of the result depicted in table 4.14.

Table 4.14: Summary of Hypotheses Testing

	Hypotheses	**Result**
H1a	There is a positive correlation between 'Social Influence' and 'adoption of solar power systems' by domestic users in western province, Sri Lanka	Approved
H2a	There is a positive correlation between 'System Characteristics' and 'adoption of solar power systems' by domestic users in western province, Sri Lanka	Approved
H3a	There is a positive correlation between 'System Characteristics' and 'adoption of solar power systems' by domestic users in western province, Sri Lanka	Approved
H4a	There is a positive correlation between 'Facilitating Conditions' and 'adoption of solar power systems' by domestic users in western province, Sri Lanka.	Approved
H1b	The correlation between 'Social Influence' and 'adoption of solar power systems' is mediated by 'Perceived Usefulness'	Approved
H2b	The correlation between 'System Characteristic' and 'adoption of solar power systems' is mediated by 'Perceived Usefulness'	Approved

H3b	The correlation between 'Individual Differences' and 'adoption of solar power systems' is mediated by 'Perceived Ease of Use'	Approved
H4b	The correlation between 'Facilitating Conditions' and 'adoption of solar power systems' is mediated by 'Perceived Ease of Use'	Disapproved

Source: Survey Data

CHAPTER 5

FINDINGS AND DISCUSSION

5.1 Introduction

Based on the result of the quntitative analysis and hypoteses testing result resercher develop the finding and discussion chapter to elobrately discuss the reserch findings in line to research objectives and these discussion and finding used to develop the new knoweledge with respevtive to the study area.

5.2 Discusion in Line to Reserch Objectives

Resecher deeply study the result of hypteses testing to achive the reserch objectives and these discussions stregnthen with the previoues knoweledge prior to developed the reserch findings. Further, reserche used collected quntitative data to achive the reserch objectives and elobrated discriptively.

5.2.1 Identify the current intention level of domestic households to install solar power systems in western province, Sri Lanka

To identify the intent level of the domestic households to install the solar power system discriptive analysis of following five questions were used. Discriptive statics of the same questions shown in table 5.1

Table 5.1: Discriptive Statics

		I will be satisfy with the adoption of solar power systems in my household.	I believe that using solar power systems is beneficial for reducing my electricity bills.	I am confident in the reliability of solar power systems for meeting my household's energy needs.	I totally accept the adoption of solar power system in order to gain more benefits.	I am recommending the adoption of solar power systems to my neighbors/ relatives/ friends…etc.
N	Valid	388	388	388	388	388
	Missing	0	0	0	0	0
Mean		3.987	4.119	3.863	4.034	4.054
Median		4.000	4.000	4.000	4.000	4.000
Mode		4.0	4.0	4.0	4.0	4.0
Skewness		-.951	-.339	-.689	-.153	-.505
Std. Error of Skewness		.124	.124	.124	.124	.124
Kurtosis		3.848	.938	.813	.121	.843
Std. Error of Kurtosis		.247	.247	.247	.247	.247

Source: Suervey Data

According to the discriptive analysis shown in table 5.1 it is indicate that majority of respondent agreed with the question of "I will satisfy with the adoption of solar power systems in my household" with the mean = 3.987, mode = 4, skewness = -.951 and kurtosis = 3.848. this can be interprited that majority of respondents shown postive attiude towards adopting the solar power. Further Table 5.2 shows the frequencey distribution of the same. These frequecey distribution table prove the positive intention towards solar power system of the respondents.

Table 5.2: Frequecey distribution of response to "I will be satisfy with the adoption of solar power systems in my household"

		Frequency	Percent
Valid	Strongly Disagree	3	.8
	Disagree	3	.8
	Nutral	51	13.1
	Agree	270	69.6
	Strongly agree	61	15.7
	Total	388	100.0

Source: Survey data

According to the discriptive analysis shown in table 5.1 it is indicate that majority of respondent agreed with the question of "I believe that using solar power systems is beneficial for reducing my electricity bills" with the the mean = 4.119, mode = 4, skewness = -.339 and kurtosis = .938. this can be interprited that majority of respondents shown postive attiude towards adopting the solar power. This result further confirm the above fact. Same time positive attitude of the respondents towards the adopttation of solar power confirmed by the respondents reaction on qestions of "I am confident in the reliability of solar power systems for meeting my household's energy needs", "I totally accept the adoption of solar power system in order to gain more benefits" and "I am recommending the adoption of solar power systems to my neighbors/ relatives/ friends…etc." majority of the respondents provieds positive responds towards these queries and same was indicated in table 5.1. in overall it can be stated that intention of domestic households to install solar power systems in western province, Sri Lanka postive and more than 73% of respondent have identified there need of addopting solar power system. To identify the level of postive intention towards solar power system resercher consider the frequency of respondents agreed or strongly agreed to the above discuessed five queries. Out of 388 respondents more than 73% shows postive intention towards addopting solar power system and this proves that higer level of postive intention towards addopting solar power system by households located within the western province of Sri Lanka.

5.2.2 Identify the factors affecting the adaption of solar power systems by domestic users in western province , Sri Lanka.

As per the hypoteses test result reserch identified there is positive relationship exist 'adoption of solar power systems' with 'Social Influence ', 'System Characteristics ', 'Individual Differences' and 'Facilitating Conditions'. However indirect effect of the Individual Differences towards adoption of solar power system throgh Perceived Ease of Use is insignificant. This finding confirmed that respondents does not made any effect towards their attitude towards addopting solar power affected due to individual differences with the presence of Perceived ease of use of the system. Its mean that 'ease of use of the system' not that much made any affect to individual differences of the respondents.

In line of the review of the study findings it can be stated that majority of households in the western province of the Sri Lanka have postive attitude towards the addopting of solar power system. However, this will be depend on social influence, system characteristics, individual difference and facilitaing conditions. However, these factors can be affected by Perceived ease of use and Perceived Usefulness upto limited extend.

With these findings researcher identified that negative social influence, low grade of system characteristics along with degraded facilitating method and individual

differences such as low income rate, lack of education on the system benfits challenge the addoption of solar power system by western province in Sri Lanka**.**

5.2.3 Relative importance level of factors identified in the research

According to outcomes of the 'Regression analysis' on indipendant variables, the weightage of each individual variables; the Social Influence (SI), System Characteristics (SC), Individual Differences (ID) and Facilitating Conditions (FC) towards the adoption of solar power system (ASPS) are 0,147, 0.330, 0.374 and 0.099 respectively. As such, individual differences has highest relative importance while facilitating conditions has the lowest relative importance towards the adoption of solar power system.

5.3 Summary of findings

Reserch findings can summuraised as followes based on the above discussion and suervey results.

There is high level of postive intention shown by the households of the western province of Sri Lanka and this value is as higher as more than 73% of total households.

It is a positive but minimal relationship exist between 'Social Influence' and 'adoption of solar power systems' by domestic users in western province, Sri Lanka

Further, there is a positive and modarate relationship 'System Characteristics' and 'adoption of solar power systems' by domestic users in western province, Sri Lanka

There is a postive but minimal relationship between 'System Characteristics' and 'adoption of solar power systems' by domestic users in western province, Sri Lanka

It is a postive but minimal relationship between 'Facilitating Conditions' and 'adoption of solar power systems' by domestic users in western province, Sri Lanka

It was found that the indirect effect of 'Social Influence' and 'System Characteristic' towards 'adoption of solar power systems' in presence of 'Perceived Usefulness' is exist.

Therer is no indirect effect of 'Individual Differences' towards 'adoption of solar power systems' when present of 'Perceived Ease of Use'. However, there is indirect effect of 'Facilitating Conditions' towards 'adoption of solar power systems' when presnt of 'Perceived Ease of Use'.

Individual Differences (ID) has the highest correlation factor with the adoption of solar power system (ASPS). Further, System Characteristics (SC) has the second highest correlation and Social Influence (SI) has the third highest correlation with ASPS. Out of four independence variables, Facilitating Conditions (FC) has the lowest correlation with dependant variable.

Further, it is found that negative social influence, low grade of system characteristics along with degraded facilitating method and individual differences such as low income rate, lack of education on the system benfits as chalanges to addoption of solar power system by western province in Sri Lanka.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter aims to give an overall summary and the ultimate conclusion of the study. Furthermore, it includes an evaluation of the research with the states of achieving of research objectives, lessons learned from the study, ideas for further research, and finally the researcher suggesting several recommendations to enhance the adoption of solar power by domestic households addressing future energy demand in Sri Lanka.

6.2 Summary of Conclusion

This study conducted to identify the challenges facing during adaptation of solar power system to households of the western province of Sri Lanka. Research study employed the quantitative method and used various statistical analysing tools such as MS Excel, SPSS and Smart PLS to analysis the survey data during the study.

The researcher conducted an in-depth literature review to identify and develop the research gap and other theoretical aspects of the research along with conceptual framework and study model. During the study researcher made effort to identify the current intention level of domestic households to install solar power systems in the western province, Sri Lanka. Through a descriptive analysis of specific survey questions, and identified that there is prevailing positive attitude towards solar power adoption within the western province. The majority of households expressed satisfaction with the concept of adopting solar power systems in their households, highlighting their belief in the benefits of reducing electricity bills.

Further, the researcher identified the challenges associated with the adoption of solar power systems by domestic users in the western province. These challenges are negative social influence, low system characteristics, degraded facilitating methods, and individual differences such as low-income rates and a lack of education on system benefits.

6.3 Areas for future research

This research paper has been mainly focused to identify the factors affecting to the adoption of solar power systems by domestic households in Western province, Sri Lanka. However, following areas can be considered when carrying out further research on solar power systems related researches in future.

a. To conduct qualitative research to identify the effectiveness of related affecting factors to the adoption of solar power systems by households.

b. To identify the economic impact towards adoption of solar power systems under different financial assistance tools for the achieving sustainable energy goals in Sri Lanka.

6.4 Recommendations

The researcher revealed that a high level of positive intention among households in the western province Sri Lanka towards adopting solar power systems. Even though, the adoption process is influenced by various factors, including social influence, system characteristics, facilitating conditions, and individual differences. Based on these findings research made recommendations which contribute to an understanding of the challenges associated with solar power adoption in the Sri Lanka, paving the way for informed policy decisions and interventions aimed at promoting sustainable energy practices.

Based on the study findings, researcher recommended to introduce more user-friendly facilitating process for solar power adoption to reduce the household's burden. This will positively affect the solar power adoption and further this will assist to develop more social influence among communities. Further, researcher suggested to introduce community based solar power adoption system to increase the social influence while facilitating more households.

Considering the direct and indirect effect of system conditions, it is recommended to introduce more standard solar power systems specially reputed brands with warranty will reduces the uncertainty in system sustainability among households. Furthermore, it is suggested to standardize the solar system installation process also. Research findings leads to recommends conduct more awareness program along with this process to get more output during adaptations of solar power. Moreover, it is suggested to provide financial assistance to lower income households and this will directly and indirectly affect adoption of solar power system by households with lower income status.

Finally, the implementation of above recommendations would enhance the adoption level of solar power systems by domestic households in western province as well as island wide. As such, those will be immensely benefitted to achieve energy related goals and objectives in line with the national interests of the Sri Lanka.

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Appendix - I

RESEARCH QUESTIONNAIRE

Challenges on Adoption of Solar Power Systems by Domestic Users in Western Province, Sri Lanka.

Dear Participant,

I am Mr. S.A.D.S Subasinghe, currently pursuing a Master of Business Administration in Management of Technology (MBA in MoT) degree programme at the Department of Management, University of Moratuwa. As part of the academic requirements, I am researching that what are the **"Challenges on adoption of solar power systems by domestic users in western province, Sri Lanka".** I kindly request your participation in this study by completing the questionnaire provided below. Your honest responses are invaluable and will significantly contribute to the academic aspect of my research. Further, I ensure that the information provide by you will be kept strictly confidential and used only for the intended academic purpose. Please be kind enough to respond to all queries in this questionnaire accurately and completely. If you have any query, please feel free to contact me at 0718088755 or e-mail sanjeewa02630@gmail.com.

Thank you in advance.

Mr. S.A.D.S Subasinghe
MBA in MoT Degree Programme
University of Moratuwa.

NOTICE: ***Presently, only if you are resident in the western province of Sri Lanka, please be kind enough to proceed with following questionnaire by utilizing 10-15 minutes of your valuable time.***

PART –I

SECTION 1: DEMOGRAPHICS

Note: Please select most appropriate details for followings.

1.	Age (years):	a.	18-29	b.	30-39
		c.	40-49	d.	50-59
		e.	60 and above		
2.	Gender:	a.	Male	b.	Female

3. Roof size of House: a. No roof (Due to apartment building)
b. Small (Approximately less than 50 m^2)
c. Medium (Approximately from 50 m^2 to 100 m^2)
d. Large (Approximately more than 100 m^2)

4. Occupation: a. Employed b. Self-employed
c. Unemployed d. Student
e. Retired

5. Monthly household income:
a. Less than Rs. 50,000 b. Rs. 50,000 - Rs. 99,999
c. Rs. 100,000 - Rs. 149,999 d. Rs. 150,000 and more

6. Level of education: a. No formal education b. Primary education
c. Secondary education d. Tertiary education

7. You are a resident in which district of the western province, Sri Lanka?
a. Colombo b. Gampaha c. Kalutara

PART – II

Note: Please indicate your most appropriate grading for following statements related to the adoption of solar power systems by domestic users in Western province, Sri Lanka.

S/ No	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
SECTION 01: SOCIAL INFLUENCE						
1	I am more likely to consider installing solar panels if I see more of my friends/ relatives/ neighbors adopting them.					
2	If a friend/ relative/ neighbor recommend switching to solar power, I would be more likely to seriously consider it.					
3	My friends, relatives or neighbors would be impressed if I installed a solar power system in my home.					

4	People in my neighborhood who have already installed solar power systems seem happy with their decision.					
SECTION 02: SYSTEM CHARACTERISTICS						
5	Through a solar power system, it will generate enough electricity to meet most of my household's needs					
6	As far as I know, solar power systems are reliable and require limited maintenance.					
7	If I obtain a solar system, I will be able to handle the basic maintenance tasks for the system					
8	According to my knowledge, Solar panels are expected to long lifetime with less degradation in performance					
9	I am confident that the solar power system would be a worthwhile investment for my household in the long run					
SECTION 03: INDIVIDUAL DIFFERENCES						
10	Using a domestic solar power system in my house seems very low complicated.					
11	Monitoring and managing the energy production of a solar power system seems very less difficult					
12	Understanding basic maintenance needs for a solar power system seems straightforward					
13	I would be able to follow necessary instructions for troubleshooting minor solar power system issues in my house					
14	I would feel comfortable relying on a solar power system to meet my home's energy requirements					
SECTION 04: FACILITATING CONDITIONS						
15	I am well aware about financial incentives (eg: Surya Bala Sangramaya low interest loan scheme …etc) providing by the Sri Lankan government for adopting solar power systems.					
16	It would be easy to find qualified and experienced professionals to install a solar power system.					
17	I am confident that there are reputable companies available to handle the solar system installation process.					

18	Banks or financial institutions offer clear and attractive loan options for financing solar panel installations for domestic households					
19	Obtaining the necessary permits/ approvals for installing a solar power system at home seems like a straightforward process					
SECTION 05 : PERCEIVED EASE OF USE						
20.	I believe that solar power systems are easy to install and operate in household.					
21.	I am confident that I can learn how to use and maintain a solar power systems with less effort.					
22.	Monitoring and managing the energy production of a solar power system seems like a less work.					
23.	The process of obtaining financing for a solar power system seems straightforward.					
24.	The financial benefits of solar power seem clear and easy to understand.					
SECTION 06: PERCEIVED USEFULNESS						
25.	I believe that solar power systems can significantly reduce my electricity bills.					
26.	I believe that solar power systems are a reliable source of electricity.					
27.	I believe that solar power systems can help me to become more energy independent from the national grid.					
28.	I think that solar power systems can contribute to a more sustainable environment.					
29.	I believe a solar power system would be a very useful addition to my home.					
30.	Considering all the benefits, installing a solar power system seems like a worthwhile investment for my household.					
SECTION 07: ADOPTION OF SOLAR POWER SYSTEMS						
31.	I will be satisfy with the adoption of solar power systems in my household.					
32.	I believe that using solar power systems is beneficial for reducing my electricity bills					
33.	I am confident in the reliability of solar power systems for meeting my household's energy needs					

34.	I totally accept the adoption of solar power system in order to gain more benefits.					
35.	I am recommending the adoption of solar power systems to my neighbors/ relatives/ friends…etc.					

Thank you very much for your kind participation.