

Awareness and Usage of Solar Products during COVID-19 Pandemic: A Pilot Study

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Abstract

Purpose: This study aims to explore the awareness level of customers towards solar products, the impact of the solar products and to discover the needs of promotional activities for solar products.

Design/methodology/approach: This research is using a pilot study method. It is conducted in a small-scale preliminary study to evaluate the research feasibility to be improved upon the study design prior to performance of a full-scale research project.

Findings: Findings have shown a significance results on solar products awareness, impact of solar products and the importance of developing a good promotional activities for solar products.

Research limitations/implications: This study will be extended to a full scale of research for generalisation purposes and for future data reference in future policy-making.

Practical implications: From this pilot survey, it will lead into a precise and concise type of full scale research in the future as the researchers have taken an early corrective action by running a pilot study survey prior to a real sample set.

Originality/value: This study reflects the awareness, the impacts and the need of promotional activities for solar products based on the point of view from different type of users' background. Therefore, the results have created a new scenario for the government and producers to put serious attention for corrective actions in delivering and providing information, knowledge, inputs and approaches used in order to let the society to become well aware about the solar products and accepting to use them in the future.

Paper type: Research paper

Keywords: Awareness of solar products, Usage of solar products, COVID-19 Pandemic

Introduction

The history of solar power has started in the 7th Century B.C. During this time, magnifying glasses used the sun's rays to make fire. The Greeks and Romans were the first to use passive solar designs. Buildings with south facing windows allowed the sun to heat and light indoor spaces. To be noted, Da Vinci predicted solar industrialisation as far back in 1447. Another success story of solar product is when Edward Weston received his first US patent for a Solar cell in 1888. Whilst in 1922, Albert Einstein has won the Nobel Prize for his services to Theoretical Physics and especially for his discovery of the law of the photoelectric effect. As time flies and technology intervene, solar panels first appeared in the market in 1956 to researchers at Bell Laboratories where they demonstrated the first practical silicon solar cell in 1954. The importance of solar based product has been proven to be significant in the market when space programs started using photovoltaic powered systems in 1958 and they are still in use up to today. For the latest invention of solar based product, in May 2015, Tesla Motor Company announced its intention to launch a lithium ion battery storage product at a price point that would make it economical for American homes to store solar power generated during the day for the use at night. The use of solar is not a trend but it is an advantage to those who are really know how to work with it. Therefore, solar products should not be rejected by any party as many evidences have shown significant results to their existence and need.

Problem Statement

Malaysia government introduces energy policy to warrant the sustainability of energy, environment, economy and social. Moreover, firms are encouraged to implement firm-oriented green innovation as to their practice as well as customer- oriented green innovation in order to increase their company efficiency. There are many compelling reasons to go for solar products and these have made solar products to become increasingly accepted not only to business customers but also to end customers. Amongst the reasons that lead into the push of running this pilot study is due to the below mentioned reasons:

1. Solar products can drastically reduce or totally eliminate electric bills.
2. Solar energy is an investment, not an expense.
3. Solar provides guaranteed performance.
4. Solar can pay you money while you're earning back your investment.
5. Eliminates exposure to rising energy costs.
6. Boosts Malaysia energy independence.
7. Create jobs and help your local economy.

8. Take advantage of incentives.
9. Protect the environment & reduce carbon emissions.
10. Low maintenance
11. Solar works in many climates.

Objectives of the Study

1. To explore the consumers' awareness towards solar products.
2. To study on the impact of solar products to the consumers.
3. To discover the needs of promotional activities for solar products.
4. To offer valuable suggestions based on the findings of the study.

Contribution of the Research

In this study, the results are expected to reveal the awareness level of solar products by every residence in Malaysia. Through this study, it can also discover the level of awareness of current solar product users and potential users for adaptation and for future purchases. This study will determine the major impacts that become the main concerns for the users and potential users to accept solar products or to reject it for future daily use. Lastly, this study will disclose the importance of promotional activities to determine future usage and the type of promotional activities that need to be offered to the society in order to change their mind setting from rejecting solar products to becoming a heavy user and supporter to every solar product produced.

Literature Review

All countries in this world are continuously searching an alternative for energy sources. This is for the sake of declining level of energy natural resources that has become our future generation agenda for reservation purposes. Most of the governments in the world have high awareness intensity level in environmental conservation concerns and this has made them to keep on discovering for more resourceful substitutes in reducing global warming impact especially in developed countries. One of the most widely encouraged programs to the society is the use of green technology products. Therefore, the drafted National Green Technology Policy is to provide direction and inspiration for Malaysians to continue their life in a healthy environment (Ministry of Energy, Green Technology and Water, 2015). Green technology is known as one of the technologies that are environmentally friendly and less energy consumed compared to other technologies (Dimash, 2011). The practice of using and adapting green technology can also reduce the dependence on fuels and electricity which have become our basic energy supplier since generations. There are many disadvantages of using continuous non-renewable resources without control and one of them is it will lead to exhaustion of energy sources where it cannot be easily to be replaced within a short period of time. The best part to use renewable resources is where it can provide a better economic return to the country not only economically but also to the healthy life of the society (Johar, 2013; Nazaruddin & Kamuruddin, 2014; Shaikh, Nor, Sahito, Nallagownden, Elamvazuthi, & Shaikh, 2017). The introduction of green technology is believed to be the best solution in meeting the growing demand for energy without worsening environment especially the nature as a whole (Kamarudin, Fazli, Sam, Md Nor Hayati, Ismi, & Norhana, 2011; UNEP, 2011).

Methods

Methodology for this research includes the procedures and techniques used to perform the research effectively in order to evaluate market response towards the awareness, usage of solar products and promotional activities of the solar products during COVID-19 Pandemic. This

research is a pilot study method where this pilot test is conducted in a small-scale preliminary study to evaluate the research feasibility to be improved upon the study design prior to performance of a full-scale research project. A set of questionnaire is designed to fulfill the need to conduct for this study. There are four sections in the questionnaire set up started with demographic, awareness level, impact of solar products and the needs of promotional activities for solar products. These four sections will play as a vital role to disclose the background of the respondents, awareness level and the intensity of future purchase and the use of solar products especially during COVID-19 pandemic. In the demographic section, age, gender, marital status, educational status, nature of family, occupational status, monthly income, type of residence and type of house presently living in this are asked and covered. Second section is referring to the awareness level and questions listed are as follow; awareness on the existence of solar products, awareness on the solar product appliances, willingness of buying solar products, exposure about solar products, period of using solar products, influence factors to buy solar products, satisfaction towards solar products used and subsidy support from central government. The third section of this questionnaire is focusing into the impact of solar products and the last section is about promotional activities for solar products. Both of section three and four are designed as in Likert scale rating. Related list of questions are asked in value starting with 1 is for strongly disagree, 2 is for disagree, 3 is for neutral, 4 is for agree and 5 as strongly agree. The varieties of question set up and design will lead into likability to the respondents in answering the questions without resistance. In this specific study, the researchers have targeted to get different views from the respondents that have been classified based on Area of the Residence (where they are staying). It is divided into three sub categories which is Urban, Semi-Urban and Rural. Through this sub categories, the results are expected to be varies and provide further justification for the research to be embarked in a bigger scale for full-scale research in the future. Simple Random Sampling is chosen to get a greater feedback from 13 respondents and all returned survey are rated as usable and run for a descriptive analysis to be elaborated in the findings section. Therefore, in this pilot study, the findings and the discussion in this research are at introductory level, which it is more into describing and elaborating every question listed in the questionnaire. This is to ensure the questions asked in the questionnaire are relevant and valid to be assigned accordingly.

Findings

Demographic

Table 1: Age

Year	No. of Respondents	Percentage
26 - 35 years	4	30.77%
36 - 45 years	5	38.46%
46 - 55 years	4	30.77%

Most of the respondents (38.46%) belong to the age group of 36 – 45 years and the remaining of the respondents belong to the age group of 26 – 35 years at 30.77% and another 30.77% of them are in the age group of 46 – 35 years. Hence, the majority of the respondents are in the age group of 36 – 45 years.

Table 2: Gender

Gender	No. of Respondents	Percentage
Female	10	76.92%
Male	3	23.08%

Majority of the respondents participated in this pilot study are female at 76.92% whilst male respondents are only at 23.08%

Table 3: Marital Status

Marital Status	No. of Respondents	Percentage
Divorced	1	7.69%
Married	7	53.85%
Single	5	38.46%

As based on the table above, 53.85% of the respondents are married, 38.46% of them are single and one divorced participant participated in this pilot survey. Therefore, majority of the respondents are married.

Table 4: Educational Status

Educational Status	No. of Respondents	Percentage
Degree	8	61.54%
Diploma	4	30.77%
Post-Graduate	1	7.69%

Majority (61.54%) of the respondents are degree holders, 30.77% of them are diploma holders and 7.69%. Hence, majority of the respondents are degree holders.

Table 5: Nature of Family

Nature of Family	No. of Respondents	Percentage
Extended Family	3	23.08%
Nuclear Family	8	61.54%
Single Family	2	15.38%

As mentioned in the above table, 61.54% of the respondents belong to nuclear family and 23.08% of them belong to extended family whilst the remaining of 15.38% of the respondents are single family. Hence, majority of the respondents belong to nuclear family.

Table 6: Occupational Status

Occupational Status	No. of Respondents	Percentage
Government Employee	8	61.54%
Private Sector Employee	3	23.08%
Professional	1	7.69%
Others	1	7.69%

Table 6 indicates 61.54 % of the respondents are government employees, 23.08% are private sector employees and the remaining represents professional and others at 7.69% each. Therefore, majority of the respondents are working as a government servants.

Table 7: Monthly Income

Family Monthly Income	No. of Respondents	Percentage
Less than RM10,000	10	76.92%
RM10,001 to RM20,000	2	15.38%
RM20,001 to RM30,000	1	7.69%

Majority (76.92%) of the respondents have a family monthly income of less than RM10,000, 15.38% of them have a family monthly income in the range of RM10,001 to RM20,000 and 7.69% of them is under RM20,001 to RM30,000 as their monthly income. Hence, majority of the respondents have a family monthly income of less than RM10,000.

Table 8: Area of Residence

Area of Residence	No. of Respondents	Percentage
Urban	6	46.15%
Sub-Urban	5	38.46%
Rural	2	15.38%

Table above indicates 46.15% of the respondents are located in urban area followed by 38.46% from sub-urban area and only 15.38% of the respondents belong to rural area.

Table 9: Type of House Presently Living In

Type of House Presently Living In	No. of Respondents	Percentage
Bungalow	4	30.77%
Semi-Detached	6	46.15%
Terrace	3	23.08%

Table 9 shows that 46.15% of the respondents living in semi-detached type of house whereas 30.77% of the respondents stay in bungalow and only 23.08% of the respondents are living in terrace house.

Awareness

Table 10: Existence of Solar Products

Existence of Solar Products	No. of Respondents	Percentage
Yes	11	84.62%
No	2	15.38%

As according to Table 10, only 84.62% of the respondents are aware about the existence of solar products.

Table 11: Level of Awareness towards Solar Energy Appliances

Level of Awareness	No. of Respondents	Percentage
High	1	7.69%
Moderate	7	53.85%
Low	5	38.46%

Table 11 summarised the results of only one respondent at 7.69% that have high level of awareness towards solar energy appliances, 53.85% are in moderate level of awareness whilst the remaining 38.46% claimed themselves of having low level of awareness towards solar energy appliances.

Table 12: Solar Products that You are Well Aware of Their Existence

Solar Products that you are well aware of their existence	Frequency	Percentage
Solar Water Heater, Solar Calculator, Solar Lamp, Solar Street Light, Solar Fan,	5	38.46%
Solar Water Heater, Solar Calculator, Solar Lamp, Solar Street Light,	3	23.08%
Solar Water Heater, Solar Calculator, Solar Lamp	5	38.46%

Table 12 indicates 38.46% of the respondents are aware about solar water heater, solar calculator, solar lamp, solar street light and solar fan, then 23.08% of the respondents are aware about solar water heater, solar calculator, solar lamp and street light, solar calculator and solar charger and another 38.46% of them are only aware of the existence of solar water heater, solar calculator and solar lamp.

Table 13: Willingness to Buy Solar Products

Willingness to buy solar products	No. of Respondents	Percentage
No	2	15.38%
Yes	11	84.62%

Based on the Table 13, majority of the respondents at 84.62% of the respondents are willing to purchase solar products in future.

Table 14: Exposure about Solar Products

Exposure about solar products	Frequency	Percentage
Colleagues	5	38.46%
TV/Radio	5	38.46%
Social Media	6	46.15%
Relatives	1	7.69%
Family	3	23.08%
Friends	3	23.08%

As the table above is referred, 46.15% of the respondents are aware about the solar products through the power of social media such as Instagram, Facebook, Twitter and Websites. 38.46% of them are being exposed through their colleagues and TV/Radio at each. Then 23.08% from their family and followed by another 23.08 % from their friends. Only one respondent at 7.69% got to know about solar products through the relatives. Hence, majority of the respondents are aware about solar products through social media.

Table 15: Period of Using Solar Products

Period of Using Solar Products	No. of Respondents	Percentage
1 year to 2 years	3	23.08%
2 years to 3 years	2	15.38%
3 years and above	2	15.38%
Less than one year	2	15.38%
None	4	30.77%

Majority of the respondents have been using solar products for at least less than one year to 3 years and above whilst there is 30.77% of the respondents who have not yet using at least any kind of solar products until now.

Table 16: Influence Factors to Buy Solar Products

Influence factors to buy solar products	Frequency	Percentage
Environmental Friendly	5	38.46%
Low Electricity Bills	9	69.23%
Pollution Free	6	46.15%
Price	6	46.15%
Quality	4	30.77%
Safety	4	30.77%

As to this pilot study, 69.23% of the respondents have chosen low electricity bills to become the main influencing factor for them to buy solar products. 46.15% chose price as a main factor to be considerate whilst another 46.15% chose pollution free to become the priority of owning the solar products. Environmental friendly factor has become the fourth influenced factor for the respondent to buy a solar product. Lastly, quality and safety are another reason on why respondent chose to buy solar products at only 30.77% each. Therefore, majority of the respondents buy solar products is for the sake of low electricity bill.

Table 17: Satisfaction towards Solar Products Used

Satisfaction towards Solar Products used	No. of Respondents	Percentage
Yes	11	84.62%
No	2	15.38%

Only 84.62% of the respondents are satisfied through their experience of using the solar products.

Table 18: Subsidy Support from Central Government

Subsidy support from Central Government	No. of Respondents	Percentage
Yes	1	7.69%
No	2	15.38%
Maybe	10	76.92%

From Table 18, 76.92% of the respondents were out of knowledge either there is a subsidy given by Central Government if we are to choose to either purchase or using solar products. Only one respondent noticed about the subsidy issued and 15.38% of the respondents stated no to the options.

Impact of Solar Products

Table 19: Solar Energy is a Good Solution for Environmental Impact

Scale	No. of Respondents	Percentage
Very agree	7	53.85%
Agree	6	46.15%

As according to Table 19, all respondents ticked agree and very agree to support the above impact statement that solar energy is good for environmental impact.

Table 20: Solar Energy Sources Do Not Deplete Natural Resources

Scale	No. of Respondents	Percentage
Very agree	6	46.15%
Agree	6	46.15%
Neutral	1	7.69%

For Table 20, majority chose agree and very agree to the statement of solar energy sources do not deplete natural resources. Only one respondent chose to become neutral towards this impact statement.

Table 21: It is the Safest Energy to Meet the Present Energy Needs

Scale	No. of Respondents	Percentage
Very agree	4	30.77%
Agree	7	53.85%
Neutral	2	15.38%

As based on Table 21, it indicates 84.62% of the respondents rated agree and very agree to support the impact statement of solar product is the safest energy to meet present energy needs. Whereas, two respondents at 15.38% chose to be neutral and not rating any positive or negative answer.

Table 22: Free from Energy Crisis and an Accessible Energy for the Future

Scale	No. of Respondents	Percentage
Very agree	5	38.46%
Agree	5	38.46%
Neutral	3	23.08%

Table 21 indicates 76.92% of the respondents opinion were choosing to support the statement of solar products are free from energy crisis and it is an accessible energy for the future. 23.08% of the respondents remains to become neutral in responding to this statement.

Table 23: Little or No Carbon or Other Greenhouse Gas Emissions

Scale	No. of Respondents	Percentage
Very agree	5	38.46%
Agree	8	61.54%

Table 23 shows a significant result of 100% respondents chose to agree on this statement, as there is little and no carbon or other greenhouse gas emissions when using solar products.

Table 24: Best Alternate to the Electrical Energy

Scale	No. of Respondents	Percentage
Very agree	6	46.15%
Agree	6	46.15%
Neutral	1	7.69%

Table 24 shows that majority of the respondents at 92.3% were agreed on the opinion about the impact of solar products is best alternate to the electrical energy. Only one respondent chose to remain as neutral.

Table 25: Reflecting the Modern Life Style

Scale	No. of Respondents	Percentage
Very agree	6	46.15%
Agree	7	53.85%

From Table 25, 100% respondents chose to agree on this statement, as solar product is reflecting the modern life style.

Promotional Activities for Solar Products

Table 26: Advertisement through Mass Media

Scale	No. of Respondents	Percentage
Very agree	5	38.46%
Agree	8	61.54%

As summarised in Table 26, 100% of the respondents chose to agree on this statement, as advertisement to mass media is important to promote solar products.

Table 27: Tax Exemptions for the Price of Solar Energy Products

Scale	No. of Respondents	Percentage
Very agree	5	38.46%
Agree	5	38.46%
Neutral	3	23.08%

According to Table 27, majority of the respondents chose tax exemption to be given to every purchase of solar energy products, as this is part of promotional campaign that can used to boost up the sales of solar products. Meanwhile, only three respondents remain as neutral to vote to any side of positive or negative answer.

Table 28: Incentives for Even Minimum Volume of Energy Users

Scale	No. of Respondents	Percentage
Very agree	7	53.85%
Agree	4	30.77%
Neutral	2	15.38%

Table 28 shows that majority of the respondents agreed to the promotional statement that to provide incentives to the energy users even at a minimum level used. Only two respondents chose to stand neutral from this statement.

Table 29: Free Demonstration

Scale	No. of Respondents	Percentage
Very agree	5	38.46%
Agree	6	46.15%
Neutral	2	15.38%

Majority of the respondents chose that free demonstration of solar products is a good choice for promotional activities to further enhance the knowledge and the usage of any kind of solar products. Two respondents chose not to vote to any side of the scale.

Table 30: Free Exhibitions to be Conducted to the Public

Scale	No. of Respondents	Percentage
Very agree	5	38.46%
Agree	6	46.15%
Neutral	2	15.38%

Based on Table 30, 84.61% of respondents chose to agree if there would be a free exhibition for the public as one of the promotional activities to be conducted in order to introduce the solar products for an acceptance and familiarisation of the society. Two respondents remain neutral in giving their response at 15.38%.

Table 31: Solar Products to be Provided as Freebie by the Government

Scale	No. of Respondents	Percentage
Very agree	5	38.46%
Agree	7	53.85%
Neutral	1	7.69%

Almost every of the respondent agree if one of the promotional activities is to provide a freebie of a solar product by the government to the people. Only one respondent chose to become neutral for this statement.

Table 32: Government Soft Loans to the Public to Purchase Renewable/ Green Energy Products

Scale	No. of Respondents	Percentage
Very agree	4	30.77%
Agree	7	53.85%
Neutral	2	15.38%

From the above table, 84.62% of the respondents voted for government soft loans to purchase any big scale/type of solar products. This could be a good initiative that will help the people to create solar-based society that can transform a better world in the future. There are two respondents that opt to become neutral for this promotional statement.

Discussion and Conclusion

Discussion

Awareness: Majority of the respondents are well aware about solar products. They know the details about solar products and they are using it in their daily routine life. Some of the respondents are having difficulty to retrace solar products in details but they were well informed after going through the answering process since few questions lead to solar products example. The varieties type of answer lead the researcher to be motivated in running this survey in a bigger scale.

Impact of solar products: As to this section, majority of the respondents choose to almost agree to all the impact questions, as they understood well on the questions asked. As a summary, they do believe in the positive impact of using solar products and this has shown a positive signal of future acceptance.

Promotional activities for solar products: Respondents are all well aware with the importance of promotion. This can be seen through the results in section four where majority of them highlighted the importance of advertisement must be conducted by using mass media, tax exemptions need to be given, promoting the issuance of incentives for energy users, free demonstrations and free exhibitions, solar products as a freebie as well as initiative of providing government soft loans to the customers.

Conclusion

Since this result is based on a pilot test, it cannot be generalised but the results can become a potential acceptance signal for future bigger scale research that soon to be conducted. It is hoped that the future results will justify the relevancy of this pilot test study.

Practical and Social Implications

Through this study, the government policy need to be amended in order to suit with the current needs of the users and potential users. The government financial support is expected to reach up to financial approval of soft loan to everyone who is interested to use solar products in a bigger scale. This will help to reduce the costs of installation or any related costs that will become a major constraint for our society to change to solar society as a whole. Suppliers are expected to control raw materials price as the solar products are now become household consumption product instead of luxurious type of product like before. Therefore, pricing strategy should be fixed and centralised control under one ministry. This will help our nation to become a leading example of solar society.

Limitations and Suggestions for Future Research

This pilot study will be extended to a full scale of research after the conference. All suggestions and recommendations gathered from the panels will be brought up into the team meeting and changes will be made if necessary. It is expected for the researchers to have many constraints in the future especially in the process of questionnaire distribution and when the returned questionnaire came back with many kind of responses. Therefore, the team will ensure to follow all steps in conducting research and carefully running the data analysis process.

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