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Public Awareness Analysis on Renewable Energy in Malaysia

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Abstract Renewable energy is growing rapidly and becoming a popular alternative source of energy. Malaysia is looking forward to achieve 50% implementation of renewable energy (RE) by 2050. Sustainable energy development has been related to environmental issues, which can be eradicated by replacing fossil fuels with natural resources such as hydropower, solar, and wind to generate electricity. Public awareness is important towards accomplishing the goal in implementing renewable energy. Thus, this study focused on the survey of renewable energy awareness which was conducted randomly in urban and rural areas in Malaysia. The aims of the study were to identify and explore public awareness of renewable energy based on the respondents' educational level and area of residence. The perspective on renewable energy by each residential area is related to knowledge and technologies. The survey data was analysed using probability sampling and stratified technique. The results indicated that most of Malaysians realized and are informed about renewable energy which is gradually increasing in terms of sustainability awareness. Therefore, this study is expected to be useful in spreading understanding among citizens about the application of renewable energy by obtaining data on public knowledge and opinions. There were concerns about the environment with 90.3% of the responses showing that the public were aware of the negative impacts of pollution, which indicated a positive use of alternative energy. However, the implementation of renewable energy technologies was not optimised due to the expensive costs involved (98.8%). In achieving the government target, excellent and smart initiatives should be taken to attract the Malaysian public of every level in society by increasing public awareness of renewable energy as well as encouraging the people to adopt renewable technologies in their daily lives and help save the environment.

Keywords: Public Awareness; Renewable energy; Alternative Energy

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1. Introduction

Throughout the world, energy is indispensable in our daily activities and surroundings. Conventional sources such as coal, fossil fuels, and gas are processed daily to provide energy and electricity for buildings, households, and industries which are essential for the development of a country. However, natural resources will soon be depleted and will last less than 100 years. Due to the high demand for energy [1-3], natural resources are massively consumed which leads to a rise in cost. Carbon dioxide, which is released from fossil fuels, has been causing climate change and global warming [4-5]. Therefore, nowadays, humans cannot rely on conventional sources anymore and should progress into more friendly energy sources especially from nature [6]. The cost-saving measures could be achieved by exploring other clean and recyclable sources of energy [7-8].

Renewable energy has been known as environmentally friendly and has an infinite quantity. For instance, solar, hydro, wind and biomass energy [9-11] are prominent energy sources in generating electricity. The Ministry of Energy, Green Technology and Water of Malaysia (MEGTW) is increasing their efforts on RE and energy efficiency so that the environment and natural resources can be preserved for a long time. RE usage in generating electricity is emphasised by the Ministry together with the Five Fuel Policy. This policy was suggested in the Eighth Malaysian Plan (2001−2005) and became prominent under the Ninth Malaysian Plan (2006−2010) [12].In achieving the government goal, the community should support the government by ensuring50% implementation of renewable energy by 2050. However, public awareness of environmental problems in Malaysia remains low coupled with the lack of exposure [13-14] of alternative energy. In addition, encouraging people to move towards using renewable energy in their daily activities is not as well-practised as in developed countries. Thus, the efforts in applying green technology have to be done persistently so that people can change their lifestyle to support a sustainable environment [15-16].

The utilisation of fossil fuels for a long time ago enables the community to live in a comfort zone in which the dependency on this energy has led to excessive carbon dioxide emission. This phenomenon will lead to negative effects in the future. However, the public has shown little concern about the effects, which indicate their lack of awareness about environmental issues [17-18].Thus, it is necessary to act significantly to replace conventional energy source with alternative energy. Raising public awareness on this issue involves educating the society and by taking the initiative to encourage people to use alternative energy [19-21].

In this study, the survey was focused on public awareness, basic knowledge and proposal suggestions on renewable energy. From our knowledge, there is no previous survey cover the whole Malaysia who lives in rural and urban area. Even though rural area not much develops as an urban area, the renewable energy information must be known by all level of people so that people will concern the latest technology that will be implemented soon. The most study specifically on secondary students, university students and pre-service teacher [22-25] which are not including veteran whose age more than 50 years old. This survey is important to recognize public concern and awareness towards renewable energy knowledge and government's effective initiative in replacing the current energy sources. Therefore, this study aims to identify and explore public awareness of renewable energy according to their educational level and residential area in the various range of age. The perspective taken concerning knowledge of renewable energy based on residential areas is related to knowledge of renewable energy and technology. This

survey can evaluate the extent of the public's concern regarding the importance of renewable energy for better sustainability of the future. The government will gain information about the public's awareness level and come up with better ideas to encourage people to use renewable energy technologies in their daily life activities to help save the environment.

2. Methodology

2.1 Sample

In the development stage of renewable energy implementation, the study on public awareness must be emphasised to ensure that the people understand the purpose and benefit of renewable energy in their daily activities. Thus, a set of questionnaire was prepared to determine the level of public awareness about renewable energy based on their educational level and residential area. The questionnaire was distributed within the months of August and September 2018. The survey questionnaires were distributed through e-mails and social media to family, neighbours, students, academicians, and senior citizens. A total of eighty-three valid responses were collected and analysed. The respondents who answered the survey were Malaysian citizens between the age of 16 and 55 years old from various levels of educational qualifications with approximately 70.7% female and 29.3% male. The percentage of respondents according to age range is as follows: 16–25(39.8%), 26–35(28.9%), 36–45(12%), and 46–55(19.3%). The information obtained included the respondents' living address whether in the urban or rural area, which affected their knowledge and information about renewable energy. From the collected data, most of the respondents were degree holders, indicating that they might be exposed to the current issues on green energy.

2.2 Measure

The questionnaire was designed based on public concern on the existence of renewable energy. The questions in the questionnaire discussed briefly on the knowledge of current issues on renewable energy and technology which covered the impact of renewable energy, opinion on the implementation of renewable technology, concern on government initiatives, knowledge of renewable energy, cost of green technology, and suggestions for enhancing public awareness towards renewable energy.

3. Results

3.1 Public awareness on renewable energy

The data analysis shows that the majority (90.1%) of the respondents have heard and knew about renewable energy while 9.9% have not (Figure 1). This result shows that public concern on renewable energy is high and information about renewable energy was received by the people who live in both urban and rural areas. The information could be gained through friends, teachers, advertisements, and events. This shows the information on renewable energy was successfully delivered in both urban and urban areas. Moreover, easy internet access nowadays facilitates people especially those living in rural areas to receive the latest news instantaneously. This data can be used by the government to enhance people awareness towards renewable energy to ensure people understanding on the importance of renewable energy. In addition, the survey found that 78.3% of the respondents preferred to employ renewable energy in generating electricity in their daily lives. This data demonstrates that people are ready to implement renewable energy in their daily life activities in order to create a sustainable country. The majority of the respondents support the idea of replacing conventional energy sources with renewable energy sources as they realised the benefits that the citizens and country could gain from the RE implementation. Even though most of them supported the use of renewable energy, 21.7% of respondents still chose fossil fuel as their energy source to generate energy, as shown in Figure 2. These respondents might have less awareness of the remaining fossil fuel reserve, which is not enough for long-term usage. Hence, various

parties should act accordingly to enhance the community's concern for renewable energy. Early education at the school level is also very important in providing knowledge on the importance of renewable energy. This step is crucial to ensure the sustainability of nature and the preservation of the environment for future generations.

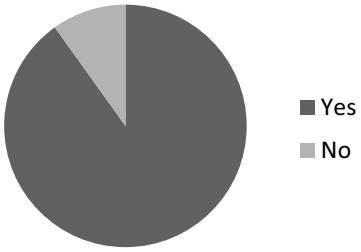

Figure 1. Respondents who have heard and know about renewable energy

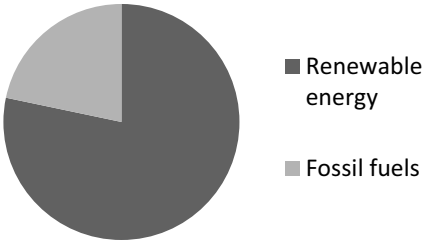

Figure 2. Respondents who prefer renewable energy usage in generating electricity

3.2 Renewable Energy Knowledge and Information

Questions on the types of renewable energy sources were asked to the respondents to identify public knowledge on the sources of renewable energy in generating electricity. The most chosen source of renewable energy source is solar (92.8%), followed by water (79.5%), as depicted in Figure 3. This result shows that people are knowledgeable about natural energy. Moreover, the solar panels are rapidly deployed in industries and buildings including houses, making solar energy as the most familiar energy as compared to others. Wind energy was known by 74.7% of the respondents, followed by 55.4% for biomass 55.4%, which was not familiar among the public. Moreover, geothermal energy was the least known with only 48.2%. It might not be popular in Malaysia compared to other countries due to the different earth surface types and climate seasons of the country.

As the country is surrounded by the sea and located near the equator, Malaysia naturally receives much sunlight. However, direct sunlight is rarely present throughout the day due to the presence of clouds except during drought. Clouds can reduce sunlight. On average, Malaysia receives six hours of sunlight in a day. Therefore, Malaysia is a well-suited country to generate electricity from solar energy, and solar technology has a high potential to be developed in this country. Furthermore, biomass is one of the major sources in producing energy in Malaysia but fewer people either rural or urban area aware on the matter. Malaysia is rich with agricultural resources such as wood, plant crop and animal crop. The waste materials from farming, garbage, food process can be reused in various industries especially in energy production. This knowledge should be spread out to the public to increase their understanding and awareness on biomass energy as well as to increase the awareness on renewable energy.

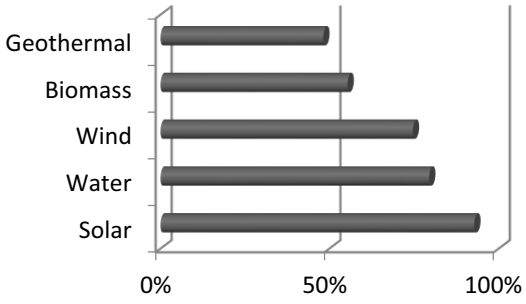

Figure 3. Respondents what energy can be used in generating electricity

3.3 Impact of Renewable Energy

Almost 98.8% of the respondents agreed that renewable energy will give positive impacts especially in helping to preserve the environment while 1.2% disagreed. The data displayed in Figure 4 below proves that the public are aware of the benefits of renewable energy as they perceive that Malaysia is moving towards renewable energy, which can save the earth from carbon dioxide emission and global warming. The fossil fuels can be preserved to ensure the balance in nature and its environment.

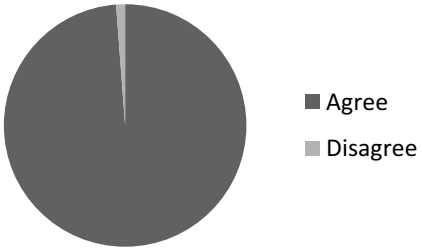

Figure 4. Respondents on did renewable energy give positive impact

3.4 Government initiative about RE

Since the government target is to implement 50% of renewable energy by 2050, the question on the government initiative was included in the survey questionnaire. Most of the respondents (50.6%) did not know about the government's effort to enhance the implementation of renewable energy, as depicted in Figure 5. Only49.4% of the respondents knew about the government initiative. Most of the people who knew about the initiative were those who worked for the government or the private sector with exposure to the latest government news and projects. As for the respondents who did not know about the initiative, the reason could be either they were less exposed or not concerned. To ensure that the action plan is acceptable to the people, they should be given the knowledge and education from the beginning so that they are prepared to accept the changes. It is also important to ensure the community is able to support this proposal and work together to bring it into realisation. Government also has to expand the latest renewable energy news to the public for better understanding on what progress going on.

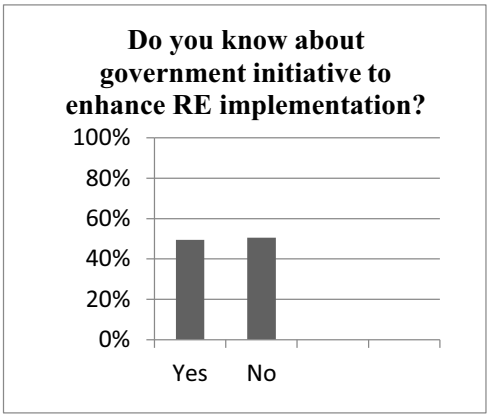

Figure 5. Respondents on government initiative to enhance RE implementation

3.5 Price of Renewable Energy Technology

As shown in Figure 6, RE technologies are expensive (80.7%), which could explain why the people are not concerned about the government initiative (Fig 6).A majority of Malaysians are still earning an average income rate that is enough just for their daily needs. Thus, the government should develop the RE technology at an affordable price so that the people could afford and deploy it anywhere without any doubt about purchasing it. Meanwhile, 19.3% of the respondents stated that the price of RE technology is low. These people could be from a wealthy family as they can afford RE technology.

The RE technology is still new in Malaysia, resulting in a high cost of implementation. However, with results from research and cooperation from all parties, the cost of manufacturing can be reduced to make it affordable for the public. The studies on RE are expanding abroad and begin to be implemented in many developed countries. Hence, Malaysia should be more proactive in the implementation of the action plans as a first step in addressing the shortage of fossil-based fuel sources. Affordable technology could attract people to implement it and the government's goal can be achieved.

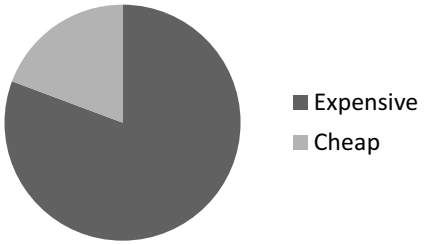

Figure 6. Respondents on price of RE technology

3.6 Public Support on Government initiative

In another question, the respondents were asked if they would support the government's initiative to implement renewable energy. A majority of them (98.8%) supported the government effort in emphasising the implementation of renewable energy as compared to 1.2% who was not supportive, as shown in Figure 7. This result shows positive feedback and the support from the public to enhance the RE technology. Additionally, people are ready to face and use renewable energy technology.

The government should organise many related activities to introduce and educate the public on renewable energy in order to ensure the community is willing to pursue RE. Examples of such activities

include a campaign to love the environment through energy conservation or to use RE at home, giving incentives to RE users, and installation of RE in public places such as parks, rural areas, and public transports.

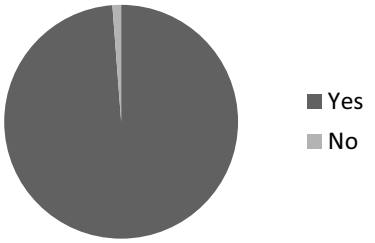

Figure 7. Respondent's opinion on government initiative to enhance RE technology

3.7 Public opinion to increase RE awareness

Some ideas were given on ways to increase public awareness about government initiatives. The results obtained from the data (refer to Figure 8) demonstrate that social media (90.3%) increases people's awareness as nowadays almost everyone has a smartphone and access to the internet. Respondents agreed that school subject and campaign approach (69.8% and 66.2%, respectively)can be applied by the government for its advertisement and education programme. Meanwhile, on education, many games and kits can be used during teaching and learning sessions to capture the students' interest in RE, especially through science subject. The approach should be interesting so that the students realise the importance of RE in the future. Furthermore, mobile applications received the least vote (49.4%) compared to others.

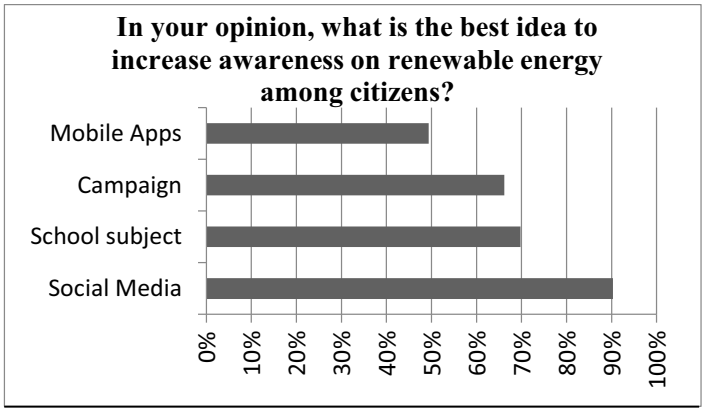

Figure 8. Respondent's opinion on government initiative to increase public awareness

Even though mobile applications can be used easily on smartphones, the data show that not many people tend to install the software related to renewable energy as it is not interesting to explore. Therefore, mobile applications with educational RE games should be developed to attract students and teenagers to understand more about the usage of RE. Moreover, it is easier for the community to get information through social media. In line with the advancement of information technology, the government needs to convey this information through social media so people will realize the country's efforts in moving towards renewable-energy-base industry for better future.

4. Conclusion

This study was conducted to determine public opinions about renewable energy and to explore the potential barriers against the efforts to find proper ways for explaining the benefits of renewable energy. Data were collected throughout Malaysia that included almost all age ranges. This study shows that Malaysian citizens in both urban and rural areas are adequately informed about renewable energy. Even though most of the respondents prefer to use renewable energy, the price of renewable energy technology is high, which reduces its affordability for moderate and poor families. The government has to discuss with the relevant ministries and researchers on ways to develop a high-quality technology at an affordable price. Thus, people will be able to afford the price of technology, and the government's goal can be accomplished by 2050 or earlier than that.

In addition, this study showed that the public's knowledge on the government's initiative on renewable energy is low either due to less exposure or simply being ignored by the people. However, a majority of the people are keen to support the government's efforts to emphasise the deployment of renewable energy. The finding also suggests that the government should act aggressively in enhancing public awareness through social media as it is easily accessible by the people especially teenagers. Meanwhile, the government can include the benefits and importance of renewable energy through advertisements and campaigns. Events and programmes on the application of the latest RE technology and how it can save cost and the environment can be organised for the public including through demonstrations. Thus, the government should focus on the idea to increase RE awareness to ensure that the aim of achieving 50% usage of renewable energy isattained.

The government should maximize the advertisement in organizing an event related to renewable energy in the future. Besides that, renewable energy syllabus in education for a young generation have to be designed and practiced since kindergarten appropriate with their thinking level. Learning from kids will enhance brain development in critical thinking. It will influence their mind for more challenging future in developing sophisticated technology.

Acknowledgments

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