

Barriers Towards Renewable Energy Development In Housing Areas In Serdang, Malaysia

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ABSTRACT

Nowadays, new and renewable sources of energy are among the most crucial factors in achieving sustainable development of nations. The aim of this research is to investigate the current barriers to renewable energy development in Serdang, which are: financial, technical, and policy barriers. This study survey is located in Serdang area. Total sample of 346 respondents participated in this study. The finding of this study revealed a significant positive relationship with the financial barriers ($r=0.501$, $p<0.05$), technical and technological barriers ($r=0.349$, $p<0.05$), policy barriers ($r=0.338$, $p<0.05$), and renewable energy development. Also a significant impact from the financial barriers, technical barriers, policy barriers, and renewable energy development. As high cost of renewable energy technologies forms one of the financial barriers, it is recommended that the import taxes be reduced and local manufacturing of these technologies be encouraged.

Keywords: financial barriers, technical and technological barriers, policy barriers, renewable energy development

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I. INTRODUCTION

Renewable energy has become an important area of research for many recent researches, and promoting the integration of cooperation between society and government is essential to ensure the effective and successful implementation of renewable energy. Several renewable energy technologies are today cost-competitive with conventional generation technologies; the environment and other externalities are taken into account. Unprecedented growth in renewable energy markets and their global spread has resulted in a significant increase in the number of manufacturers, the scale of manufacturing, and provide more jobs as well. This is particularly true for the solar photovoltaic and wind power industries, despite experiencing industry consolidation, driven by decreasing costs (Bazilian et al., 2013).

The promotion of new and renewable sources of energy has become one of the main pillars of sustainable development, although the main motivations have differed so far between developed and developing countries. While in the developed countries the main motivation has been related to the objective of reducing carbon dioxide emissions (CO₂), in many developing countries the main purpose is more related to the need to increase the energy supply and increased access to electricity in remote areas. The energy literature has dealt extensively with the discussion regarding the greater or lesser efficiency of the energy policy instruments used to promote these sources (Kardooni, Yusoff, & Kari, 2016).

There is currently a scenario of awareness in the world about the use of renewable energies as sources of electric energy, in order to allow savings in the consumption of non-renewable resources, to reduce the impact of the greenhouse effect that produce, and to reduce costs both for the generation of green energy, and for the installation by users of alternative systems based on the use of renewable energies. In this context, some countries, especially developed ones, promote the development of renewable energies from their regulatory bodies and promote ventures through concrete plans of their government agencies, achieving the installation of wind and solar parks, and the emergence of diverse applications of renewable energies these energies that satisfy the need of humanity to find sustainable businesses (Yusoff & Syafiq Rosli, 2015).

II. METHODOLOGY

The methodology design of this study is along with its main objective, which is to investigate the barriers of renewable energy development in Serdang city, Malaysia. For the purpose of achieving the study objectives, three assigned barriers have been adopted from previous studies. These barriers are the financial, technical, and policy barriers. The quantitative approach will be used for this study to answer the study questions, as quantitative research is suitable for drawing the public perception about an social issue, which related to clarifying to which extent these barriers affect the renewable energy development in Serdang city.

III. Reliability Test

Reliability test is used for this study measure the internal consistency of the research instrument. Cronbach alpha is one of the internal consistency measurements, which has a scale from 0 to 1, as the Cronbach alpha coefficient higher than 0.6 and close to 1, as the instrument has good internal consistency(Tavakol & Dennick, 2011).Table 3.1 shows the reliability test for a sample of 30 respondents for the pilot study. The result showed a good internal consistency for the variables, where Cronbach alpha value for financial barriers (0.728), technical barriers (0.718), policy barriers (0.898), and renewable energy development (0.791).

Table 3.1: Reliability test (pilot study)

Factor	Items	Cronbach Alpha
Financial barriers	5	0.728
Technical barriers	7	0.718
Policy barriers	4	0.898
Renewable energy development	9	0.791

Table 3.2 shows the reliability test for the entire study. The result showed a good internal consistency for the variables, where Cronbach alpha value for financial barriers (0.861), technical barriers (0.866), policy barriers (0.825), and renewable energy development (0.740).

Table 3.2: Reliability test (actual study)

Factor	Items	Cronbach Alpha
Financial barriers	5	0.861
Technical barriers	7	0.866
Policy barriers	4	0.825
Renewable energy development	9	0.740

Study location

This study location is Serdang city as shown in figure 3.2, which belongs to Selangor state. The total population of this city is 150,000 people based on MajlisPerbandaran Seri Kembangan(MPSJ, 2016)

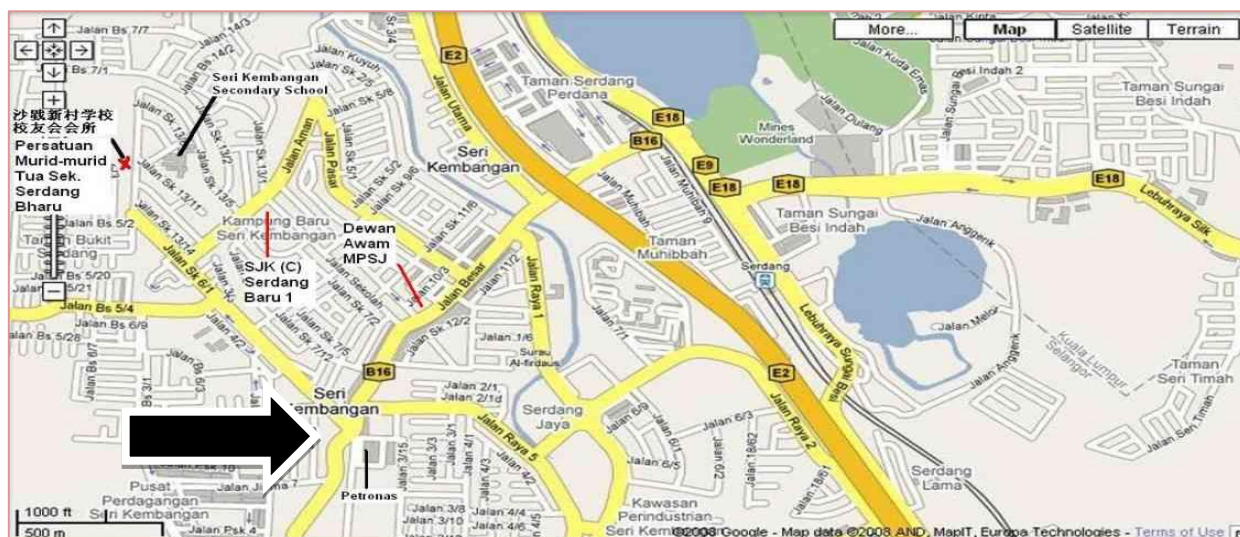


Figure 3.1: Study location Source: Google map

Population

Population and sample investigation are groups of individuals who share common characteristics and are analyzed by statistics to obtain data of interest. The population can be understood as a group of individuals or elements to be observed. A population is the general or total group of elements, individuals, or measures that share common features in a particular context. These features should be taken into consideration when selecting individuals who will be part of the study community. The total population of this study is 150,000 people forms the total population of Serdang based on MajlisPerbandaran Seri Kembangan(MPSJ, 2016). The Serdang area is selected for collecting the data, as it is considered an important part of Seri kembangan city. Serdang area has witnessed rapid development during the last decade; a huge infrastructure transformation has taken place within the area. It includes several large facilities, such as the University Putra Malaysia, besides many new residential projects(Okafor, et al . 2010).

Sample size

A sample is a selection of the chosen respondents who represent the total population. The sample size is a significant portion of the population that meets the characteristics of the research, reducing costs and time. Defining the size of the sample before starting an investigation is a statistical principle that helps to avoid bias in the interpretation of the results obtained.

With a determined population for research, using the sample size tables is useful to identify the study sample. Study sample size is 384, according to Krejcie and Morgan, (1970), sample size tables as shown in table 3.3.

Table 3.3: Determining Sample Size from a Given Population

Population	Sample size
40,000	380
50,000	381
75,000	382
1,000, 000 and above	384

Source: Krejcie, V & Morgan, W (1970)

Research instrument

The questionnaire instrument is used by this study to collect the primary data. The measurements of this study instrument are adopted from previous studies(Ahlborg & Hammar, 2014; Luthra et al., 2015; Wiersma, 2016). The questionnaire of this study comprises five parts, which arranged as follows:

Part A: this part contains five questions about the respondents' background, which are nationality, age, gender, educational level, and occupation

Part B: this part contains five statements that about the financial barriers, these statements are adopted from the study of (Luthra et al., 2015). The purpose of these statements to examine to which extent financial resources form barriers for individual in term of renewable energy development, it focuses on several sources of financial supports that can gain by the individual to develop a renewable energy.

Part C: this part contains seven statements that about the technical barriers, these statements are adopted from the study of (Ahlborg & Hammar, 2014). These statements provide several obstacles that relevant to the technical support, which may impede the renewable energy development. Besides the potential obstacles that may resulted from the renewable energy development later on.

Part D: this part contains seven statements that about the policy barriers, these statements are adopted from the study of Luthra, et al., 2015. These statements are related to the public legislation that may supports or impede the renewable energy development, as well as to which extent the government policies support the renewable energy development.

Part E: this part contains nine statements that about the renewable energy development, these statements are adopted from the study of (Wiersma, 2016). These statements are related to which extent individuals look forward toward the renewable energy development.

Measurements scale:

Five points scale is used for parts B,C, and D: not very serious, not serious, moderate, serious, very serous

Likert-five point scale is used for part E: strongly disagree, disagree, neutral, agree, strongly agree.

Data collection

Collecting the primary data of this study will be conducted in Serdangcity. The analysis unit of this study will be represented in housing areas. The questionnaire is distributed to the participants. Distributing and collecting the feedback of the participants was at the same time. The random sample technique is used to distribute the questionnaire to the study participants.

Data analysis

For the purpose of analyzing the primary data, SPSS software version 22 is used to conduct the required tests. The descriptive statistic data will be used to determine the level of each variable in term of mean and standard deviation. The reliability of the study items will be measured relying on Cronbach Alpha, which measures the internal consistency of each variable of the study constructs .Along with the study objectives. Spearman Rho correlation test will be employed to identify the association between the financial barriers, technical barriers, policy barriers, and the renewable energy development .Meanwhile, the regression test will be used to examine the impact of each barrier (independent variables) on the renewable energy development (dependent variable).

Descriptive statistics

In the scientific field, descriptive statistics is the branch of mathematics that collects, presents and characterizes a set of data; it is responsible for organizing and grouping the data so that we can see them, and also to give certain statistics so that we can summarize the data in order to facilitate its use. For this purpose, the descriptive statistics of this study present the mean, standard deviation, minimum value, and maximum value of the study data.

Normality test

Before carrying out any statistical analysis,in almost all statistical analyzes. The parametric contrast suitable for the hypothesis will be applied. The goodness of fit tests are intended to determine if the data fit a certain distribution,and this study data is a significantly difference from the normal distribution,based on Kolmogorov-Smirnova test(Corder & Foreman, 2014), which means that the data of this study is a non-normal distribution, which is confirmed by Shapiro-Wilk as find ($p=0.000$). See the Appendix page(63) for the normality test.

Spearman Rho test

Statistically, correlation refers to the existence of a link between several factors within a study construct. It is one of the tools that allow us to infer whether this link exists is precisely the correlation analysis. This procedure aims to tell us if there is a relationship between two factors, the trend of relationship, and its strength(Schmid & Schmidt, 2007).

The general correlation analysis results in a number between -1 and 1, called the correlation coefficient. This result helps us to understand three things:

Whether or not there is a correlation between the variables. A coefficient that is zero indicates that our variables are independent

How strong is the correlation (if it exists).The more coefficients are 'moved away from zero,' the stronger the correlation between the two variables will be. Thus, correlations whose coefficient is closer to -1 or 1 will be more powerful.

Details on the nature of the correlation. There are correlations called direct (where both variables increase or decrease simultaneously) and inverses (where when one variable increases, the other decreases). A positive coefficient means that the correlation is of the first type, while a negative one indicates that it is the second.

The strength of correlation between variables is ranged as: $\pm 0.00-0.20$ slight, almost negligible, $\pm 0.21-0.40$ small, but definite relationship, $\pm 0.41-0.70$ moderate, and $\pm 0.71-0.99$ high, $\pm 0.91-1.00$ very strong (Hair, 2015).

The correlation coefficient is the result of dividing the covariance between the variables X and Y between the square root of the product of the variance of X and that of Y. This study follows the study of (T. Wang, Chiang, & Tanabe, 2016), which has adopted Spearman test. This study employed Spearman Rho correlation to test the relationship between financial, technical, policy barriers and the renewable energy development.

Multicollinearity test

Multicollinearity test clarifies the correlations among the study predictors' variables. The higher inter-correlation among these variables causes unstable estimation. The variance inflation factor (VIF) is one of the detection methods for diagnosing the Multicollinearity, as the VIF higher than 0 and less than 10; it refers to acceptable internal correlation range. The Variance Inflation Factor (VIF) measures the impact of collinearity among the variables in a regression model. The Variance Inflation Factor (VIF) value resulted from dividing one on the model tolerance, it is always greater than or equal to 1. There is no formal VIF value for determining presence of multicollinearity (Siddharthan & Narayanan, 2017). This study employed VIF and Tolerance to test the inter-correlation among financial, technical, and policy barriers.

Linear regression test.

Linear regressions allow generating a linear model in which the value of the dependent variable or response (Y) is determined from a set of independent variables called predictors (X1, X2, X3, Xn). It is an extension of simple linear regression. Linear regression models can be used to predict the value of the dependent variable or to evaluate the influence that predictors have on it, so as not to misinterpret cause and effect. It is important to bear in mind that the magnitude of each partial correlation coefficient depends on the units in which the predictor variable is measured, so that its magnitude is not associated with the importance of each predictor. In order to determine the impact of each of the variables on the model, we use the standardized partial coefficients, which are obtained by standardizing (subtracting the mean and dividing by standard deviation) the predictor variables after adjusting the model. This study employed the linear regressions to identify the contribution of financial barriers, technical barriers, and policy barriers toward the renewable energy development

IV. Conclusion

This study deals with one of the global issues that related to the renewable energy development. Energy becomes the main source of nation's development. Traditional renewable energy sources such as fossil fuels such as coal, oil and natural gas, cause pollution both when used and when producing and transporting them. This study strived to test three categories of barriers that impede the renewable energy technologies development in Serdang. This study found a significant impact of these barriers that financial, technical, and policy on the renewable energy development in Serdang area, Malaysia. All these factors formed real barriers toward developing the renewable energy in serdang area. As the renewable energy is considered a new concept for the millennium, most of the public lack to assess the advantages of the new technology of renewable energy, which hinder their decisions toward the transformation of the renewable energy, as well as adopting the renewable energy.

In general terms, the barriers to the implementation of renewable energy related to the efficient use of energy and renewable energy sources are well documented and classified into three barriers that: technical, financial, and policy. The detection of specific barriers along with other actions should form the basis of public policies in favor of renewable energy sources. Supposedly, based on this approach, successful policies were formulated in the industrialized countries unlike the developing countries.

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