Determinant Factors That Influence Implementation of Renewable Energy Development (A case of Indonesian's Energy Policy)

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Abstract— **Despite the importance of renewable energy there is dearth empirical evidence on the factors that influence the implementation of renewable energy development projects in Indonesia. This study aims to determine how much influence the financial resources, stockholder's involvement and new technology / innovation on the renewable energy development. The method in this study is using a study design that is explanatory survey by using a quantitative approach, which simply refers to the collection and analysis of statistical information, using multiple regression statistic tests. The scale used is Likert scale that is useful to know the degree of disagreement or employee of agreement to a statement on the questionnaire. From the results of research through SPSS approach can be explained that the financial resources, stockholder's involvement and new technology / innovation has a direct relationship and impact significantly on the renewable energy development. With these expected results of this study can provide inputs for Ministry of Energy and Mineral Resources to further enhance the renewable energy development.**

Index Terms— **Renewable Energy, financial resources, stockholder's involvement and new technology / innovation.**

I. INTRODUCTION

Renewable energy is simply defined as the energy that can be obtained over (renewable) such as sunlight and wind. Renewable energy sources are environmentally friendly energy sources that do not pollute the environment and does not contribute to climate change and global warming as in other traditional sources. This is the main reason why renewable energy is strongly associated with environmental and ecological issues in the eyes of many people. Many people usually refer as the antithesis of renewable energy for fossil fuels. Fossil fuels have a long tradition of use, while the renewable energy sector is just beginning to evolve and this is the main reason why renewable energy is still difficult to compete with fossil fuels.

Renewable energy still needs to be improved competitiveness, because of renewable energy sources still requires a subsidy to remain competitive with fossil fuels in terms of cost (although it should also be mentioned that the development of technologies in renewable energy continues to lower the price and only a matter of time renewable energy will have a price competitive without subsidies compared to traditional fuels).

In terms of cost, renewable energy also needs to be improved efficiency. For example, solar panels have an average efficiency of around 15%, which means a lot of energy will be wasted and transferred into heat and not into other forms of useful energy to be used. However, there are many ongoing researches with the aim of improving the efficiency of renewable energy technologies, some of them really promising, although it has not seen a solution that is highly efficient renewable energy and high commercial value. The renewable energy sector could decide to "wait and see" because fossil fuels will eventually run out and renewable energy would then be the best alternative in order to satisfy the world's thirst for energy. But this would be a bad strategy for two reasons: energy security and climate change. Before you run out of fossil fuels, renewable energy sector should be developed to adequately replace coal, petroleum, and natural gas and this can only be done if the continued advancement of renewable energy technologies in the years to come.

In addition, the development of renewable energy in Indonesia to replace conventional energy is characterized by a lot of development of alternative energy to replace conventional energy, such as power plant, solar power, and hydropower replaces electricity generation comes from   fuel   oil and coal. Indonesia optimizes the development of alternative energy sources in order to reduce dependence on energy sources are not renewable (fossil).

Of the current status of utilization of renewable energy, the global position of Indonesia is still far from other countries that have tapped their potential for renewable energy as a source of electrical energy. The position of Indonesia, in the utilization of renewable energy to gas, bio-fuels, water, and diesel respectively - were 3%, 0.2%, 1.1%, 0.03%, compared with four countries as follow:
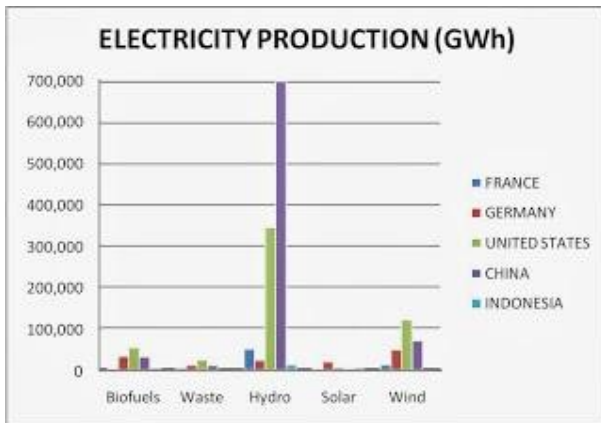
Figure 1. Renewable Electricity Production (process from data EIA 2012)

Based on the results of research conducted by Park Young Soo (2014) stated factors affect the successful implementation of energy conservation policies is the disposition factors, environmental factors, communication factors, and factor structure of the bureaucracy. While Edwards III (1980, Budi Winarno, 2012) offer and consider four factors in the implementation of public policy, namely: communication, resources, disposition and bureaucratic structure. Model of public policy implementation of van Meter and Van Horn (1975, Riant Ngroho, 2012) has six factors, namely: standards and policy goals, resources, characteristics of the executing agency, the disposition, the relationship between the organization and the conditions of economic, social, and political.

But, Ihtisham Abdul Malik et.al. (2014) examine the relationship between macroeconomic factors (i.e., population growth; urbanization, industrialization, exchange rate, price level, food production index and live stock production index) and renewable energy in Pakistan over a period of 1975-2012.

While Umi Chasanah (2003) states that the factors that influence the success of the development and utilization of ET are: regulation / legislation, energy prices, implementation, financial, tax / fiscal incentives, as well as cooperation among stakeholders. The results also nearly equal to the research conducted by Caroline Kinya Kiara (2013) who in her research determine the relationship between the factors affecting Increased energy supply and Socioeconomic development and the four independent factors namely: organizational strategy, financial resources, stockholder's involvement and new technology / innovation.

Based on the above problems, further discussion and research is needed on the factors that influence the implementation of renewable energy development in Indonesia by using three independent variables such as financial resources, stockholder's involvement and new technology / innovation and dependent variable is renewable energy development.

A. Literature Review

Renewable energy concept was introduced in the 1970s. The whole definition of renewable energy is also a sustainable energy, which means they are available in the time ahead the plan when they run out is not necessary. Renewable energy sources, among others: geothermal energy, solar energy / solar energy, wind energy, water energy, air power, biomass and liquid biofuels. However, various obstacles exist in developing such renewable energy sources depending on energy source, implementation location, and technology available (Geller, 2003; Mendonça, 2007; McCormick, 2007).

But across the planet, different countries use different energy sources to meet consumption demands, industry and support public infrastructure (i.e. public transport, public buildings, etc.). As a result of the consequences created by the primary sources of energy fossil fuels and in order to minimize present and future contributions to climate change, there are a variety of recommendations coming from the scientific community, as well as other significant actors, who call for the development of alternative solutions (Commission Proposal COM (2000) 796 final; IPCC, 2007; Mallon, 2006).

Meanwhile, according to the government regulation No. 79 of 2014, renewable energy is the energy that comes from renewable energy sources. While renewable energy sources itself is a source of energy produced from sustainable energy resources if properly managed, among others: geothermal energy, bio-energy, sunlight, water flow and waterfall, movement and temperature differences in the ocean layer.

But before, Government Regulation No. 5 of 2006 on National Energy Policy shows that government policy is also lacking support for alternative or renewable energy utilization for the year 2025 only about 15%. This can be seen in Chapter II, Section 2 of Government Regulation that targets energy consumption used in Indonesia in 2025, among others:

1. Petroleum less than 20%
2. Natural gas is more than 30%
3. Coal is more than 33%
4. Bio-fuel more than 5%
5. Geothermal more than 5%
6. The new and renewable energy, particularly biomass, nuclear, water energy, solar power and wind power more than 5%
7. Other fuels derived from coal liquefaction more than 2%

According to Geothermal Energy Association (2010), in 2008, about 19% of global final energy consumption came from renewable, with 13% coming from traditional biomass, which is mainly used for heating, and 3.2% from hydroelectricity. New renewable (small hydro, modern biomass, wind, solar, geothermal, and bio-fuels) accounted for another 2.7% and are growing very rapidly. The share of renewable in electricity generation is around 18%, with 15% of global electricity coming from hydroelectricity and 3% from new renewable.

II. RESEARCH METHODS

A. Method

This research method is explanatory survey, in an effort to collect information from respondents using a questionnaire. This study is intended to " test the rational answer to explaining the phenomenon of the problem " . In addition, the survey method used widespread and deep towards the object under study, at least partially, the overall approach is based on the system.

Researchers used the research method because it does not only describe and explain the empirical facts encountered in the field, but also to analyze the influence, either partially or simultaneously between one variable with another variable, which is the determinant factor for the renewable energy development through hypothesis testing.

With explanatory survey method used a quantitative approach, which simply refers to the collection and analysis of statistical information, using multiple regression statistic tests. Thus, the empirical world of the object under study will be known so that the information obtained, it can be useful to analyze the influence of variables such finding.

B. Determination Population and Sample

According to Ferdinand, is the combined population of all elements in the form of events, things, or people who have similar characteristics that became the center of attention of researchers, therefore regarded as a research universe. The populations in this study were all employees of Ministry of Energy and Mineral Resources.

The sample is a subset of the population, made up of some members of the population. In the study did not use sampling techniques since the sample studied is the whole of the population is called the census. Given the number of population is not limited, the research will be conducted using a random sample of a certain amount.

C. Multiple Linear Regression Analysis

This analysis is used to determine how much influence the independent variable, namely : financial resources (X1), stockholder's involvement (X2) and new technology / innovation (x3), against which the renewable energy development variable (Y) .

Multiple linear regression equation is as : $Y = a + b_1x_1 + b_2X_2 + b_3X_3 \, e$

Where:

Y = the dependent variable (renewable energy development) a = constant

b_1 , b_2 = coefficient of the regression line

X_1-X_3 = independent variables (financial resources, stockholder's involvement and new technology / innovation)

e = error / confounding variables.

III. RESULTS AND DISCUSSION

A. Research result

Before testing the hypothesis research first conducted multiple linear regression analysis. The summary of multiple linear regressions analyzes were performed with SPSS 17.0 aids are:

Table 1. Summary of Results of Multiple Linear Regression Testing

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	17.639	2.425		7.273	.000		
	FR	.049	.137	.050	2.460	.019	.501	1.995
	SI	.382	.152	.333	2.505	.014	.542	1.845
	TI	.048	.161	.042	2.573	.035	.484	2.065

a. Dependent Variable: K

Based on Table 4.4. Multiple linear regression equation as follows: $Y = 17.639 + 0.049X1 + 0.382X2 + 0.048X3$

From the multiple linear regression equation above is obtained a constant value of 17.639 That is, if the variable Renewable energy development (Y) is not affected by the three independent variables or financial resources (X1), stockholder's involvement (X2) and new technology / innovation (x3) is zero, then the magnitude of the average renewable energy development will be worth. Regression coefficients on the independent variables describe when the independent variable is expected to rise by one unit and the estimated value of other independent variables constant or equal to zero, then the value of the dependent variable can be expected to go up or down according to the sign of regression coefficient of the independent variable.

Regression coefficients for independent variables X1 (financial resources) is positive, indicating the existence of a direct relationship between financial resources (X2) with renewable energy development (Y). X1 variable regression coefficient of 0.049 implies for each increment financial resources (X1) of the unit will cause a decrease in renewable energy development (Y) of 0.049.

Regression coefficients for independent variables X2 (stockholder's involvement) is positive, indicating the existence of a direct relationship between stockholder's involvement (X2) with renewable energy development (Y). X2 variable regression coefficient of 0.382 means for every stockholder's involvement (X2) of the unit will lead to increased renewable energy development (Y) of 0.382.

Regression coefficients for independent variables X3 (new technology / innovation) is positive, indicating the existence of a direct relationship between innovation (X2) with renewable energy development (Y). X3 variable regression coefficient for 0048 implies for each increment of new technology /

innovation (X3) of the unit will cause a decrease in renewable energy development (Y) by 0048.

Furthermore, to test whether the effect of financial resources, stockholder's involvement and new technology / innovation on the renewable energy development of significant partial, conducted tests of significance. To determine which variables have a significant effect partial regression coefficient test performed using t-test statistics. Determination of test result (acceptance / rejection of H0) can be done by comparing the t-test with a t- table or can also be seen from the value of its significance. Partial results of hypothesis testing using SPSS are as follows:

Table 2 Testing og Partial Hypotesis
Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	17.639	2.425		7.273	.000		
	FR	.049	.137	.050	2.460	.019	.501	1.995
	SI	.382	.152	.333	2.505	.014	.542	1.845
	TI	.048	.161	.042	2.573	.035	.484	2.065

Dependent Variable: K

Based on the output we can see the t - table value obtained each variable. To make inferences accept or reject Ho, it must first be determined values of t- table to be used . This value depends on the magnitude of the degree of freedom (df) and the significance level used. By using a significance level of 5 % and df value of n - k - 1 (9-2 -1 = 6) obtained t - table value of 2.44691 .

Testing results of the effect of each independent variable (financial resources, stockholder's involvement and new technology / innovation) to dependent variable (renewable energy development) of Ministry of Energy and Mineral Resources. is as follows:

a) The effect of financial resources on Renewable energy development

Based on the known output value amounted to 0.360 t-test. When compared to the t-table value of 2.44691 then obtained t count is much smaller than t - table. So Ho accepted. It can be concluded that the variable of financial resources significantly affect renewable energy development. It means that the renewable energy development is affected by the variable of financial resources.

b) The effect of stockholder's involvement on Renewable energy development Based on the known output value amounted to 2.505 t-test. When compared to the t-table value of 2.44691 then the t-count acquired much larger than t - table. So Ho rejected. It can be concluded that the stockholder's involvement variables significantly influence renewable energy development.

c) The effect of new technology / innovation on Renewable energy development Based on the known output value amounted to 0.300 t-test. When compared to the t-table

value of 2.44691 then obtained t count is much smaller than t - table. So Ho accepted. It can be concluded that the new technology / innovation variable significantly affect renewable energy development. It means that the renewable energy development is affected by the variables of new technology / innovation.

Furthermore the coefficient of determination was essentially measure how far the ability of the model to explain variations in the variable. The coefficient of determination is used mainly because it can explain the merits of the regression model in the dependent variable. The higher the value of the coefficient of determination it will be better the ability of independent variables in explaining the dependent variable. The coefficient of determination is between zero and one. R2 value is small means leading independent variables in explaining the variation of the dependent variable is very limited. Values close to one means of independent variables provide almost all the information needed to predict the variation of the dependent variable.

By using SPSS 17.0 was obtained coefficient of determination as follows:

Table 3 Coefficient of Determination
Model Summary[b]

Mode 1	R	R Square	Adjusted	Std. Error of the Estimate	Durbin-Watson
1	.283[a]	.80	.052	1.557	2.111

a. Predictors: (Constant), FR, SI, TI
b. Dependent Variable: K

From SPSS output of the results can be seen that the coefficient of determination, or R Square of 0.080 or 8.0 %. This shows that the variables studied give effect to the renewable energy development of 80.0 %, while the rest influenced variables studied (confounding variables) .

IV. DISCUSSION OF RESULTS

In the model analysis measurements in this study showed that all variables have met the criteria of validity and reliability, while at the structural model analysis showed that all hypotheses supports the hypothesis proposed. The test results from the structural model for each hypothesis is as follows:

1.   Test Results the effect of financial resources on renewable energy development Financing terms are particularly important to RETs because renewable are often capital intensive, and therefore require a greater degree of up-front debt and equity than power plants with lower capital costs. A number of additional factors make it more difficult for renewable to obtain financing at reasonable costs than for more mainstream generation technologies: many RETs are perceived by the financial community to have high resource and technology risks (Wiser, 1997). Most financial institutions do not have significant experience evaluating renewable energy resource risks (Wohlgemuth, 2000). Results of the analysis showed that the financial resources have a significant effect in

improving the environmental renewable energy development of Ministry of Energy and Mineral Resources.

Based on the data that form the basis of this research can be seen that the relationship between the financial resources with the renewable energy development fluctuates. This means that there are times when financial resources go up so the renewable energy development enhancement. It can be concluded that the financial resources effect on renewable energy development.

2.   The effect of stockholder's involvement on renewable energy development Stakeholder concept suggests that the purpose of a business is to create as much value as possible for stakeholders. In order to succeed and be sustainable over time, executives must keep the interests of customers, suppliers, employees, communities and shareholders aligned and going in the same direction. In the traditional view of the firm, the shareholder view, the shareholders or stockholders are the owners of the company, and the firm has a binding fiduciary duty to put their needs first, to increase value for them (Phillips, 2007). However, stakeholder theory argues that there are other parties involved, including governmental bodies, political groups, trade associations, trade unions, communities, financiers, suppliers, employees, and customers. Sometimes even competitors are counted as stakeholders - their status being derived from their capacity to affect the firm and its other morally legitimate stakeholders. The nature of what is a stakeholder is highly contested (Miles, 2012), with hundreds of definitions existing in the academic literature (Miles, 2011).

Based on the analysis conducted stockholder's involvement is one of the factors that affect renewable energy development. Increased stockholder's involvement will be followed by a renewable energy development enhancement. Even based on the analysis, stockholder's involvement affects renewable energy development significantly.

3 . The effect of new technology / innovation on renewable energy development The combination of other emerging renewable energy sources as well as complementarity of national energy policy and technological infrastructure could perplex the landscape (Johnson and Suskewicz, 2009). As studied by Holburn et al., (2010), investors of REVs when making their investment decisions would evaluate the risks and returns associated with the supporting policy as there could be uncertainty caused by any changes of such policy by the government.

Results of the analysis showed that the new technology / innovation have a significant effect in improving the environmental renewable energy development of Ministry of Energy and Mineral Resources.

Based on the data that form the basis of this research can be seen that the relationship between new technology / innovation and renewable energy development fluctuates. This means that there are times when new technology / innovation rises but the renewable energy development enhancement. It concluded that new technology / innovation effect on renewable energy development.

While the value of R-Square (0982), shows that of the three independent variables / free which consists of technological development, stockholder's involvement and new technology / innovation, stockholder's involvement has an influence that makes renewable energy development increases or decreases. That is the independent variable / free (stockholder's involvement) contributing / effect of 8.0% on the renewable energy development. The rest is the influence of other factors beyond the two independent variables studied. So great little renewable energy development is not only influenced by these variables, but can also be influenced by other variables, such as research Ihtisham Abdul Malik et.al. (2014), Umi Chasanah (2003) and Caroline Kinya Kiara (2013), which not only examines the development of technology, stockholder's involvement and new technology / innovation, but also examined other variables such as organizational strategy, regulation/legislation, etc.

V. CONCLUSION

This study aims to determine the effect of Information Technology Development, Leadership and Stockholder's involvement toward Renewable energy. The conclusion of this study:

1.   There is the effect of financial resources on renewable energy development. Based on the known output value amounted to 2.460 t-test. When compared to the t-table value of 2.44691 then obtained t count is much larger than t-table. It can be concluded that the variable of financial resources significantly affect renewable energy development.

2.   There is the effect of stockholder's involvement on renewable energy development. Based on the known output value amounted to 2.505 t-test. When compared to the t-table value of 2.44691 then the t-count acquired much larger than t-table. It can be concluded that the stockholder's involvement variables significantly influence renewable energy development.

3.   There is the effect of new technology / innovation on renewable energy development. Based on the known output value amounted to 2.573 t-test. When compared to the t-table value of 2.44691 then obtained t count is much larger than t-table. It can be concluded that   the new technology / innovation variable significantly affect the renewable energy development.

This study provides some implications regarding Influence financial resources, Stockholder's involvement and new technology / innovation against Renewable energy development. This research can be a reference benchmark for the interest of practitioners in assessing the Influence of financial resources, Stockholder's involvement and new technology / innovation against Renewable energy development.

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