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DECISION MAKING IN THE UTILIZATION OF LIVESTOCK MANURE WASTE

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***Abstrac*- The purpose of this study was to determine the factors associated with farmer decision making in processing livestock manure into biogas. This research uses quantitative methods with data analysis techniques using the rank spearman. The sample used in this study were 30 farmers, all of whom were members of two farmer groups in Japara Village Kuningan Regency. All the characteristics of innovation relate to decision making. Relative advantage, compability, triability and observability has a low relationship with decision making for biogas production with an average correlation coefficient below 0.2. Among all characteristics of innovation that are most closely related to decision making is complexity with coefficient correlation is 0,59. In fact, people feel that biogas technology is not easy to put into practice and people are worried that there are other dangers from biogas technology such as explosions because the tools used to process livestock waste into biogas are still very simple.**

Keywords- ***Decision Making; Biogas Technology; Determinant Factors***

I. INTRODUCTION

The scarcity of kerosene and LPG that occurred in 2008 was due to energy consumption which continued to increase while production continued to decline in line with the decline in fuel oil and natural gas resources on earth [1]. Oil production in Indonesia from 2000-2018 has decreased while oil consumption has increased. Oil production in 2018 is around 80,000 barrels per day, while oil consumption is around 1.8 million barrels per day [2]. This deficit condition requires a shift in energy consumption from consuming non-renewable energy to consuming renewable energy. Renewable alternative energy sources are those that come from abundant raw materials such as wind, sun, plants, dirt, garbage and so on. One of the benefits that can be obtained from renewable energy sources is that they are efficient and environmentally friendly, and one of the products is biogas.

Biogas technology is a source of energy to replace petroleum. The thing that makes biogas interesting is that the maintenance process for biogas plants is simple and the energy produced is quite large (8900 kcal/m3 of pure methane gas [3]. The use and distribution of biogas in Indonesia is around 1.24%, so that the electricity generated is still small. Even though Indonesia has a great opportunity to be able to produce biogas because the raw material for making biogas is easy to obtain, Japara Village Kuningan Regency is one of the districts in West Java that has the potential and has made biogas technology. In this village, there are cattle and goat farms owned by farmer groups. The raw materials for cow and goat manure are abundant and the amount of organic waste from crop residues makes farmers utilize by making it into fertilizer and alternative biogas energy. Understanding innovation in technology for farmers is very important so that this factor needs to be taken into account in an effort to increase the level of farmer adoption [4]. The high level of farmer adoption will increase the quality and quantity of farmers and ultimately will have an impact on the welfare of farmers [5]. Several previous studies that stated goods perception of the use of livestock manure waste to be used as biogas were research by[6][7][8][9]

The benefits of biogas are not only as a more efficient fuel alternative, but also to reduce pollution around livestock caused by manure. The use of biogas for household needs is of particular interest to the community in Japara Village, because it can save more money on buying gas or kerosene. Applying new technology to rural communities is a challenge due to their low educational background, knowledge, and insights moreover in the application of biogas technology. The purpose of this study was to determine whether the characteristics of innovation were related to farmer decision making to make and use biogas. The process of making innovation decisions starts

from knowledge and then forms an attitude until deciding to reject or accept [10], [11]. The characteristics of innovation are one that determines the speed of an innovation process. There are 5 characteristics of innovation, namely: relative advantage, compatibility, complexity, trialability or triability (can be tested) and observability (can be observed)[12]

II. METHOD

2.1 Object and Place

This research was conducted in Japara Village, Japara District, Kuningan Regency. The location of the research was chosen purposively, considering that the farmer group is a pilot farmer group and has already made biogas for alternative fuels. Research objects are factors related to farmer decision making in making and using biogas technology. This study wanted to see whether the characteristics of innovation, namely relative advantage, compatibility, complexity, trialability and observation, were related to decision making [12].

TABLE 1. OPERATIONALIZATION OF VARIABLES

No	Variable	Indicators	Answer
1.	Decision making	Knowledge, affective implementation, confirmation	
2.	Inovation Characteristics Relative Advantage Compatibility Complexity Trialability Observability	More thrifty, easier to be understood More profitable, experience easier to use, easier to get Support of government Agricultural extension People interest Raw material, tools technique of making Need knowledge and skill, Risk Access to be informed, can be made alone Level of succeed, can be used Interest of another people, can be understood by another people, Can be imitated	Likert scale SS = very agree S = agree RR = doubt TS = not agree STS = very not agree

2.2 Research Design and Techniques

The research method used was survey research methods. Survey research aims to collect information about a large population of people by interviewing a small part of the population [13]. Respondents who were sampled were 30 farmers, representing the population of members of farmer groups in Japara Village. Sampling was carried out with the consideration that these farmers were farmers who had made biogas and farmers who had never made and used biogas. The data obtained are then processed, analyzed, and further. processed with the theoretical basics that have been studied. Meanwhile, the analysis is carried out through a quantitative approach using relevant statistical methods to test the hypothesis. The research instrument contains several questions, which have been tested for validity and reliability, and each question is provided with a closed answer. The respondent's answer is measured by a Likert scale consisting of 5 scales. The operational variables of this study are as follows:

The level of decision making to make and use biogas is categorized into 3, namely low, medium, and high using 3 indicators, namely knowledge, attitude, and implementation. Then an interval is made by calculating the maximum score minus the minimum score, then dividing the number of intervals minus 1 and the result is 119. Next is to make an econometric model of innovation characteristics related to decision making in making and using biogas technology.

$$Y = \rho_1 X_1 + \rho_2 X_2 + \rho_3 X_3 + \rho_4 X_4 + \rho_4 X_4$$

note:

Y Y= Decision Making

X_1= Relative Advantage

X_2 = Compatibility

X_3 = Complexity

X_4 X_4 = Trialability

X_5 X_5 = Observability

ε ε = Error of measure

According to [14], Spearman correlation is used to analyze whether there is a relationship between variable Y and variable X. Spearman correlation is used to find the significance of each variable with an ordinal scale. Data processing in this study using SPSS. Based on the Spearman correlation coefficient, it is interpreted as follows:

If r> 0, it means that there is a positive linear relationship, the greater the value of variable X, the greater the value of variable Y

If r <0, it means that there is a negative linear relationship, the greater the value of variable X, the smaller the value of variable Y

If r = 0, there is no relationship at all between variable X and variable Y

If r = 1, or r = -1, it means that there is a perfect linear relationship in the form of straight lines.

III. RESULTS AND DISCUSSION

3.1 History and Profile of Farmer Groups

The farmers who were respondents in the study were members of the Gemah Ripah II and Gemah Ripah III Farmer Groups. Farmer groups were established based on the needs of members who wish to have an organization as a

forum for togetherness in developing their farming. The Gemah Ripah II and Gemah Ripah III Farmer Groups were founded in 1998. After two times leadership, improvements were made in terms of management, management, administration so that in their development these two farmer groups grew. Farmer groups become a means to exchange ideas, find solutions to problems faced such as technology, capital, plant pests and other obstacles. The ownership of agricultural facilities and infrastructure owned by the group continues to increase and can be used by members. Another development of this farmer group is the increase

In group assets, namely agricultural facilities and infrastructure that can be used for farming needs, such as rice milling machines, food barns, straw chopping machines and other agricultural tools.

Along with the development of farmer groups, the programs and activities of their group members also develop. Some of the activities that have been carried out and are still part of the activities of this farmer group to date are: beef cattle and cattle and sheep pens, compost and compost storage, food market barns, biogas production, rice factories

3.2 Decision Making Level

Results of the scoring show that the level of decision making for biogas technology is in the medium category approaching low i.e. 262. Farmers have knowledge of the meaning of biogas, the benefits of biogas are also supported by socialization and assistance from Padjadjaran University so that farmers have passed the knowledge stage. Most of the biogas raw materials used are cow dung, goat manure, organic waste such as grass, twigs, leftover feed, and the remaining feed straw. Farmers make biogas using simple technology, namely.

3.3 Factors Related to Biogas Technology Adoption Decision Making

Data analysis used Spearman correlation with SPSS software. The results of the data analysis indicate that the characteristics of innovation are related to decision making. The correlation results can be seen in the table below.

TABLE 2. RESULT OF ANALYSIS SPEARMAN CORRELATION

No	Variable	Correlation Coefficient	Information
1	Relative advantage	0,257	Related
2	Compatibility	0,116	Related
3	Complexity	-0,591	Negative Relation
4	Trialibility	0,269	Related
5	Observability	0,039	Related

All innovation characteristics are weakly related to decision making and positive or unidirectional. This means that the more the technology has a high relative advantage, the more appropriate it is, and the more it can be tested, the more likely it will be adopted. The first variable of characteristic innovation is relative advantage which has a low correlation coefficient of 0,257. The relative advantages of biogas have a positive relationship with decision making. Some of the benefits that users of biogas technology will receive include that people can save money used to purchase fuel so that it can be allocated to purchase other needs. Biogas technology can help them to process cow manure becomes more useful which often results discomfort in their environment. Biogas can be used as liquid organic fertilizer which is environmentally friendly and contains lots. There are many benefits to be gained when using biogas, especially economic and environmental benefits, and this is in accordance with research conducted by [15][16].

The second variable is compatibility. Compatibility is the degree to which an innovation is perceived to be consistent with existing values, past experiences, and recipient needs. The compatibility that has a low correlation coefficient value is 0.116. Biogas is an alternative energy that is very suitable for what farmers need in Japara Village. The farmer's cowshed is in residential areas. This causes neighbors who do not have livestock to feel disturbed by the smell and dirty environment. Making biogas requires a lot of cow dung so it will reduce cow dung around residential areas. This is in accordance with research results by [17] which state that biogas production is very suitable to the needs of breeders and the surrounding community.

The complexity factor or complexity has a moderate negative relationship with the correlation coefficient -0.591. This means that the more complex or more complicated the production of biogas technology is, the lower the farmers' decision making to adopt this technology. The results of this study are in accordance with research [18] that complexity has a strong and negative relationship with decision making. The equipment used in making biogas in Japara village is still simple, so there is an explosion. High hydrogen sulfide mixed with oxygen causes an explosion. Pajajaran University is one of the livestock partnership universities that collaborates with the government to provide training in techniques for making biogas.

The next variable is the possibility of trying. Likelihood of trying had a low association with utilization decisions with correlation coefficient 0,269. Farmers who try to make biogas do not make them adopt the technology. Farmers have many obstacles to doing this, including the fear of explosions because the tools and infrastructure used

are still simple. This is in accordance with research results by [19] which state that farmers do not want to try making biogas even though the enthusiasm for making biogas already exists.

The last variable related to decision making for biogas production is observability. Observability has a correlation coefficient value of 0.039. Observability has a low relationship with decision making. Biogas production is difficult for farmers in Japara village to observe. Making biogas is not easy and requires large costs according to [19]. Of all variables are thought to be related to decision making. variables that are moderately and negatively related are the complexity of other variables such as relative advantage, compatibility, possibility to try and possibility to observe which have a low relationship with decision making for biogas production.

IV. CONCLUSIONS

The level of decision-making for biogas technology is at a moderate stage. Most farmers already understand the benefits of biogas, and are interested in making and using it only at the implementation stage. It is necessary that the farmers are motivated and being supported for obtaining adequate facilities and infrastructure. All the characteristics of innovation relate to decision making. Among all the characteristics of innovation that are most closely related to decision making is complexity. Complexity has a strong relationship with decision making and is negative in nature. This means that the more difficult the technology, the lower the adoption of the technology by farmers.

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