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BIOGAS-BASED VILLAGE INNOVATION PROGRAM TO ACHIEVE AN ENERGY SELF-SUFFICIENT VILLAGE

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Abstract

The implementation of village development programs that directly involve the community or community empowerment is an effort of social change aimed to change aspects of community life towards a better target with the focus on community welfare. This study aims to describe the village innovation program through the processing of cattle manure into biogas in Ngampel Village, Papar Sub-district, Kediri District, East Java Province, Indonesia. The research method used is an exploratory approach. The sampling method used is snowball sampling. The respondents are farmers, village government officials, ranchers, and household groups. Data is analyzed using descriptive statistics. The results of this study explain that the village innovation program is carried out by empowering the community in processing cattle manure into biogas material to meet the energy needs of the village. The empowerment activities are carried out by implementing: program socialization, coaching and training programs, supervision and assistance, and program development. The impacts felt by the community include those in terms of economic, social, and environmental aspects. The biogas energy has been used by part of the village community to meet the needs of fuel for cooking and lighting. However, in terms of energy independence, Ngampel Village has not met the Energy self-sufficient village criteria because there are only a few people who use biogas for their daily needs, namely only 6 households (KK) out of a total of 2317 households (0.21%).

Keywords: Community Empowerment, Village Innovation Program, Biogas Energy, Independent Village, Explorative

INTRODUCTION

A village is the smallest area in Indonesia's state structure. The Law Number 6 of 2014, a village is given authority based on origin rights and local authority on a village scale, increasing the village's financial capacity through the Village Fund (DD) and the Village Fund Budget (ADD) so that the village can increase its ability to regulate and take care of community interests effectively to improve its welfare. The implementation of village development programs that involve community empowerment is an effort of social change that aims to change all aspects of community life for the better with the main goal of creating community welfare. The basic principle of village development is to emphasize the changes and developments to all aspects of community life, both physically and non-physically, towards just and equitable development. The success of development in each village will be related to programs that have been successfully carried out by the village. In order to create an equitable village development, creativity and innovation are needed in all parts of the village through village innovation programs that refer to the interests of the village community. According to Boda (2015), there are three aspects that can influence the success of regional development, namely: innovation, reformation, and stable development. These factors have special significance if there is an astute reaction by business and investment actors.

The Village Innovation Program (PID) is one of the government's efforts to improve the welfare of the village community through increasing the village capacity in developing quality village development plans and implementations that involve the empowerment of the village community. This village innovation program is a program from the central government to encourage improvement in the quality of the utilization of village funds. It is also an effort to improve the welfare of the community in developing the potential that exists in the local village. In this program, the village ministry provides village assistants, local villages, to district, provincial, and national level experts to facilitate village governments in implementing the program consistently.

Ngampel Village, Papar Sub-district, is one of the villages that conducts a village innovation program. Papar Sub-district is a sub-district located in the northern part of Kediri District. According to BPS of Kediri District, Papar Sub-district of East Java Province, Indonesia, has an area of 3663.32 km^2 with a population of 48,593 people and has 17 villages, with each village having local potential that can be developed through the Village Innovation Program. Ngampel Village, Papar Subdistrict, is one of the villages that develop its potential through the village innovation program that is processing cattle manure into biogas. The biogas is closely related to the provision of energy independently by the community in meeting their daily needs. Sambodo and Novandra (2019) in their research suggested that the government provide more

support to improve energy access to people who do not have it. In this case, the productivity and efficiency in energy use need to be increased among the poor.

Residents of Ngampel village, Papar Sub-district of Kediri District, who are members of the Sari Pathi breeders group, utilize cow manure as an agricultural fertilizer and a renewable energy source through processing the abundant cow manure into biogas. Before the program ran, the local people thought about and did not know how to process cow manure properly. The cow manure was only discarded or piled around the cage, causing odors and unhealthy environmental conditions. Through the village innovation program run by the local government and also the Ngampel Village community, it is expected to be able to improve the quality of Human Resources related to the village productivity through community empowerment, and it can be seen that the village innovation program in order to realize village independence is urgently needed to achieve an energy self-sufficient village.

LITERATURE REVIEW

Empowerment in essence is an effort to encourage the community to participate in activities aimed at improving the quality of their lives, including the quality of their economy, social, environment, mental, and others. The principle of empowerment is a principle that involves access to resources and the ability to use these resources effectively to improve the welfare of the surrounding community (Suharto, 2014). Similar to the people in Ngampel Village, especially members of the Pokternak Sari Pathi Ngampel who have experienced the easy access to economic resources, and they have also used these economic resources appropriately.

In this case, Empowerment is "the process by which people who fall into the category of social stigmatization throughout their lives can be helped to develop and improve their skills in the exercise of interpersonal influence and the performance of valuable social roles (Solomon, 1976: Luke, 1986). Whereas according to Brenyah (2018), the empowerment process includes the following cycle of activities: collaborative planning, adaptation renewal, and institutalization, community capacity and outcome, community change, and community action. The process will be integrated with the condition of the community being the party that carries out the empowerment in their lives.

The provision of various inputs, as well as opening access to opportunities, will make the community empowered. Opening and granting access to economic resources will help the community to become empowered and able to innovate in the future (Mardikanto and Soebiato, 2015). An empowered community is shown by looking at the people who have access to productive resources that enable them to increase their income and obtain the goods or services they need. Empowerment in essence is an effort to encourage the community to

participate in activities aimed at improving the quality of their economy, social, environment, mental, and so on.

The government through the Ministry of Village, Development of Disadvantaged Areas, and Transmigration continues to reduce poverty by increasing the welfare of village communities through the provision of village funds as a manifestation of the Nawa Cita agenda in the 2015-2019 Medium Term Development Plan (RPJMN). The village innovation program is one of the Kemendesa PPDT efforts to increase village capacity in accordance with Law No. 6 of 2014 on villages in developing plans and implementing quality village development programs in order to increase the community's productivity and economic independence and prepare for the competitive development of resources.

In Schumpeter's theory emphasizing the important role of entrepreneurs in realizing economic growth through the process of innovation, the main keys to economic development are innovators and entrepreneurs. The economic progress of a society can only be realized by the entrepreneurs' innovations. In the process of economic development according to Schumpeter, the main factor that causes economic development is the process of innovation and the actors are the innovators or entrepreneurs.

The Village Innovation Program aims to increase the village capacity in the village development planning and implementation sourced from the Village Fund to be more of quality through managing the village innovation, replication, or by adopting innovative development activities, village community empowerment, and the support of P2KTD institutions. The village innovation program is expected to be able to improve the socio-economic welfare of the community and ultimately reduce poverty. In Sen's view (in Mukhlis et al, 2019), development should go through the process of expanding freedom on one side and supervising human capabilities (human development), which is how the community is empowered, on the other hand, promoting freedom as a goal and instrument of development. Through the village innovation program that is run, it can determine the competitive advantage of an area that can be used as a regional base sector that can be developed in order to increase its economic growth.

Based on the Ministry of Energy and Mineral Resources Regulation No. 32 of 2008, it is stated that an "Energy self-sufficient village is a village that can produce energy based on new and renewable energy, including Biofuel as another fuel to meet and provide at least 60% of the village's own energy needs." Energy self-sufficient village is a village that is able to innovate to create renewable energy from natural resources or the potential they have to fulfill providing a minimum of 60% of their energy needs including electricity and fuel for the village. The Ministry of Energy and Mineral Resources stated in 2009 that the goal of developing an energy self-

sufficient village was to reduce poverty (pro-poor), strengthen the national economy (pro-growth), and improve the environment (pro-planet). There are several purposes by using a village as its starting point, which is to empower and increase the added value of the village so that it can motivate the villagers to reduce the level of urbanization. Realistically, an energy self-sufficient village aims to create job fields, reduce poverty, and create productive economic activities. The concept of energy independence here includes two types, namely: independence in the supply of electricity and independence in the supply of fuel by utilizing environmentally friendly renewable energy

RESEARCH METHOD

This type of research is exploratory research that answers research problems. Creswell (2008) defines it as an approach or search to explore and understand a central phenomenon. According to Raco (2010), exploratory research is to find out more about a case that can provide a hypothesis.

This research took place in Ngampel Village, Papar Sub-district, Kediri District, East Java Province, Indonesia. The reason for the chosen area is because Ngampel Village has been able to innovate through processing cattle manure into biogas. Sources of data used in the study are primary data and secondary data. In the primary data, the researcher conducted observation techniques, interviews with the Ngampel Village community using snowball sampling techniques. Snowball sampling is where research participants recruit other participants for a test or study so that the number of subjects is adding. With this technique, the number of informants who will be the subject will continue to grow according to the needs and fulfillment of information (Idrus, 2009). Another data collection instrument is a documentation technique, which documents various data/information about biogas management. Data analysis in the study was carried out in stages using the interactive model of Miles and Huberman (2007), such as data collection, data reduction, data presentation, and drawing conclusions or data verification. Respondents in this study were residents who manage and process the biogas energy made from cow manure.

RESULT AND DISCUSSIONS

People in Ngampel Village mostly work as farmers, and some others are cattlemen. In 2019, based on the results of interviews with the secretary of Ngampel Village, 80 farmers in Ngampel Village join in four cattle groups with 800 cows and spread in several hamlets in Ngampel Village. The following is the spread data on the number of farmers in Ngampel Village, Papar Sub-district, Kediri District.

Table 1. The number of cattlemen and cattle in Ngampel Village

No	Hamlet	Number of cattlemen	Percentage	Number of cattle	Percentage
1	Pathi	20	25%	250	31.25%
2	Gondang	20	25%	200	25%
3	Karanglo	20	25%	150	18.75%
4	Ngampel	20	25%	200	25%
	Total	80	100%	800	100%

Source: Ngampel Village Government, 2019

The number of cattlemen who use biogas in Ngampel Village is smaller compare to the number of cattlemen. There are only 6 out of 80 farmers who have used biogas for their daily needs. The use of biogas is for cooking fuel and as a source of energy for lighting. Not all people use it because there are constraints, such as lack of installation pipes, the distance between farmers' dwellings, initial costs to make self-contained biodigesters are quite expensive, and there are no soft loan facilities to support the development of biodigesters. So that people are reluctant to use existing cow manure to be used as biogas. The following is a table of the names of biogas breeders in Ngampel Village who are members of the "Sari Pathi" cattlemen Ngampel group.

Table 2. List of Biogas Users in Ngampel Village

No	Name of Biogas User	Needs
1	Eko Hariyanto	Fuel stove and petromax lamp
2	Suparli	Fuel stove and petromax lamp
3	Hartoyo	Fuel stove
4	Ernawati	Fuel stove and petromax lamp
5	Nur Fadilah	Fuel stove
6	Sunarmi	Fuel stove and petromax lamp

Information obtained through this interview is about the community empowerment carried out through the village innovation program of manure processing into biogas towards the realization of the Energy Self-sufficient Village (DME) in Ngampel Village, Papar Sub-district, Kediri District. The interview was conducted with 10 informants, 8 people who were directly involved in processing cattle manure into biogas, and 2 people who were not directly involved with the research object.

In this study, the informants chosen were the people of Ngampel Village, Papar Sub-district, Kediri District. They are residents who can be empowered through the village innovation program for processing cattle manure into biogas, and they are the people who feel the impact of this biogas manure processing program. The following is the interview informant data presented in the study. The information included: village secretaries, heads of cattle groups, village officials, cattlemen, farmers, entrepreneurs, and farm workers.

The village innovation program is one of the government's efforts. The purpose is to improve the welfare of village communities through enhancing village capacity in developing quality village development plans and implementation that involves empowering village communities. The form of community empowerment is that they are directly involved in processing the manure. The cattlemen collect cow dung and then put it in a puddle for the thawing process, after which the liquid cow manure will enter into the existing biogas dome so that it becomes biogas. The results of interviews conducted by the village innovation program in Ngampel Village, Papar Sub-district, this is a sewage treatment program into biogas. This program started the initiative since 2014 and then began to run in 2015. It has been running for about 4 years since the assistance of cattle from the Department of Food and Animal Husbandry of Kediri District, there is also training and assistance.

Based on the results of interviews with the head of farmer group members, cattlemen also participated in the empowerment process carried out by the Regional Government, like training, the availability of cattle assistance, and biogas domes provided. The purpose of the village innovation program for processing cattle manure into biogas is to reduce household expenditure (economics), simple, and cow manure that has been processed into biogas that results in solid organic fertilizer made to more quickly absorb into the plant, and it is good. In addition, it is to develop the local wealth of Ngampel village, the processed mature, and the value.

The village innovation program is an effort to build a village using community empowerment focused on 3 program objectives. The first focus of the village innovation program is the development of the local economy and entrepreneurship. The reason is because of the local economy and entrepreneurship of the Ngampel village community is still low and needs to be improved. The second objective of the program is improving the quality of Human Resources (SDM) issues related to the education level of the Ngampel village community. Aforementioned that the education level of the Ngampel village community is still relatively low so that it is expected that through community empowerment carried out through the innovation program of the village, processing cattle manure into these biogas able to improve the skills and creativity of the Ngampel village community. The third is the fulfillment

of rural infrastructure. Improvement of rural infrastructure is still the focus of the Ngampel village government, where limited access to roads and public facilities affects various sectors of education, health, and strengthen the economic sector. Through community empowerment, it is expected to be able to increase the strength of the economic sector through processing cattle manure into biogas that can be valuable in order to reduce expenditure in the household sector and reduce the environmental pollution.

The implementation of the Village Innovation Program in processing cattle manure into biogas has an impact on the community in Ngampel Village, Papar Sub-district, Kediri District directly or indirectly. Especially the effects of the use of renewable energy based on biogas such as for the daily needs of stove fuel, lighting, and supply of organic fertilizer. The impacts are the results of community participation in implementing this biogas-based village innovation program.

Regarding the results of observations on 6 informants in Ngampel Village, especially in the Pathi hamlet, they have got the ease of accessing economic resources. Not only access, but they have also been able to use these economic resources appropriately. The most prominent advantage that is owned by the community in the form of facilities obtained by the community in terms of the opportunity to acquire skills or expertise to process economic resources or potential, in this case, the potential possessed is cow dung which was previously of no use-value which is a problem because of the smell of cow dung which has accumulated. Now it is a biogas that can help the family economy and be used as an alternative fuel for cooking.

Decree of the Ministry of Villages, Development of Disadvantaged Regions, and Transmigration of the Republic of Indonesia Number 4 the Year 2019 state that the Ministry's priority programs in increasing village productivity, are as follows:

Table 3. PDTT Ministry of Village Priority Programs in accelerating village development

No	PDTT Ministry of Village Priority Programs
1	Develop PRUDES (Village Superior Products)
2	Build EMBUNG DESA (Village Retention Basin)
3	Develop BUMDes (Village-Owned Enterprises)
4	Build RAGA DESA (Village Sports Facility)

Source: Ministry of Village, Development of Disadvantaged Regions and Transmigration of Republic of Indonesia, 2019

According to the Ministry of Village Decree, Development of Disadvantaged Regions and Transmigration of the Republic of Indonesia Number 4 of 2019 concerning four priority

programs to accelerate village development. Thus, the implementation of development in the Ngampel Village based on the priority programs include:

1) Development of local economic potential and entrepreneurship. Both in the realm of community business development and businesses initiated by villages through the Village-Owned Enterprises (BUMDes) in the form of developing village innovation programs to raise the potential of local villages that are useful and can be developed sustainably. The Village Superior Products (Prudes) and Rural Area Superior Products (Prukades) are in the form of biogas products from cow manure that is very useful and has been awarded at the District level as a product of the village innovation program.
2) Increase the quality of human resources (SDM) through the skills of members of the Pokternak Sari Pathi Ngampel, especially investments in the area of expertise/skills in supporting village innovation programs. Thus, rural productivity not only involves aspects or strategies for increasing income but also reducing the weight of costs and the risk of loss of potential quality human resources in the future to accelerate the development of the Ngampel Village.

Based on the results of interviews conducted by researchers, the community participation of Ngampel Village is categorized low for the processing of cattle manure into biogas. However, the level of encouragement of the members in the activities of processing cattle manure into biogas and biogas waste processing is higher. It can be seen from the enthusiasm of the group to participate in socialization or training held by the local government of Kediri District, East Java Province, Indonesia. This empowerment received good participation from the Sari Pati Ngampel cattle group. Participation by cattle groups would not instantly exist, as well as the condition of rural communities in general who do not directly accept the innovation programs offered by the government. It is because the community assumed that if something needs to be done, it has benefits that are directly felt by the community. Similar to the benefits that Ngampel villagers feel who have used biogas.

The use of biogas contributes an economic advantage because they will no longer buy LPG, and there is also a reason for the low risk of using biogas because the reactor or the gas cylinder is outside the house and set in the ground so that according to the community it is safer than Liquid Petroleum Gas. The last reason also why people want to use biogas innovation is because it is good for the environment, especially the barn. It is cleaner and well-organized that makes a healthy environment using biogas.

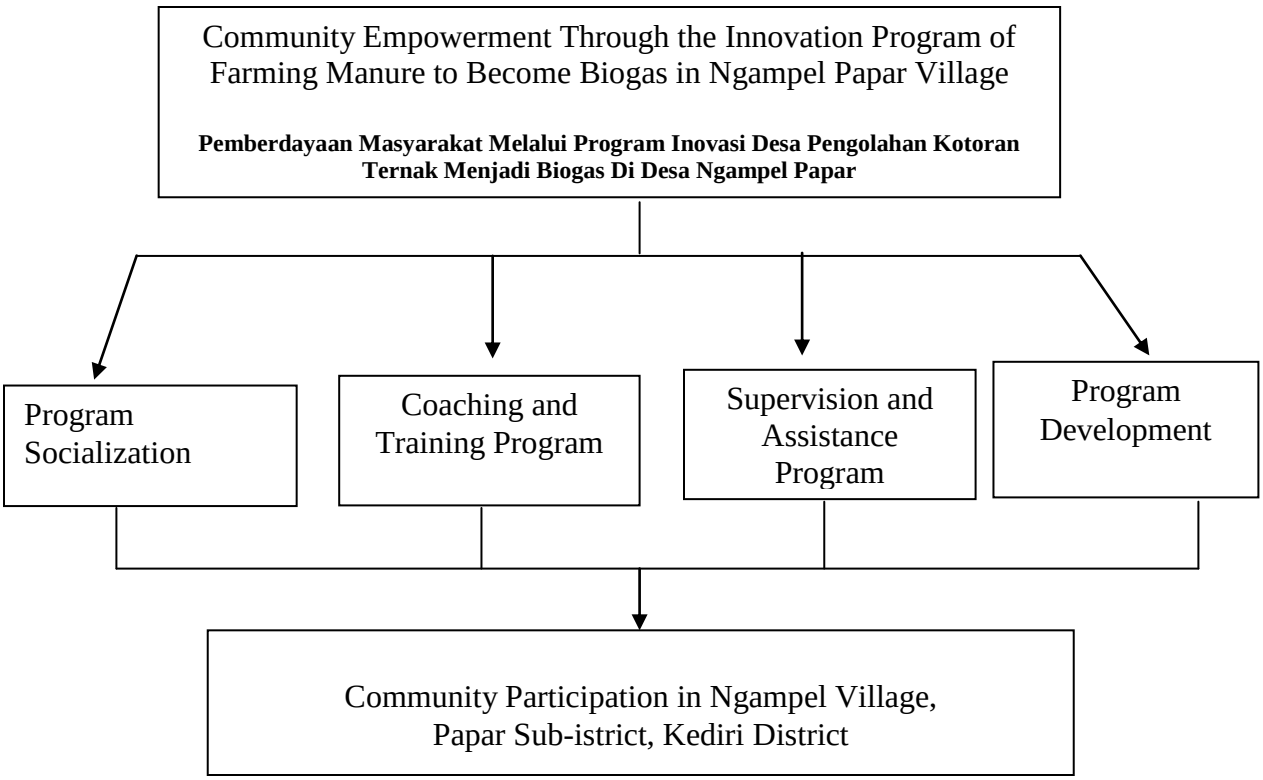

Figure 1. Community Empowerment Framework of Ngampel Village

This village innovation program processing cattle manure into biogas has benefited community in Ngampel Village, Papar Sub-district, Kediri District. The changes experienced by people can be seen from in-depth interviews on 6 respondents that have used biogas and experienced the economic impact that is to save some money from buying LPG (gas) and kerosene. It is because the energy provided by biogas has been able to fulfill daily cooking, and there is no more need to buy LPG. Another benefit felt by Ngampel villagers especially in Pathi hamlet is that the solid output of biogas can be used as organic fertilizer as the substitute for chemical fertilizer which eventually decreases farmers' dependence on chemical fertilizer and saves them some money from buying chemical fertilizer.

This study's result is in accordance with Harahap's (2018) study, which is the benefit gained by people was more or less 90% of profit, or they could save money to buy LPG for daily necessities more than usual. The principle of empowerment is to involve access to resources and skills to utilize the sources effectively. According to Inderawati et al. (2016), the benefit gained by people in the biogas development program is people save money for kerosene as much as 15 liters and 60 bundles of firewood each month. Hariyati (2006) concluded that biogas as renewable energy can be used as substitute energy for fossil-sourced energy that has been

used dominantly like kerosene and gas. Biogas technology is the perfect choice to turn cattle organic waste into energy and fertilizer to obtain socioeconomic and environmental benefits.

On social aspects, this Village Innovation Program by processing cattle manure into biogas can educate people especially owners of cattle Sari Pathi Ngampel to be able to process the cattle manure to be the renewable energy source (biogas) by applying technology with the training conducted. Behavior changes of cattlemen where they initially threw away the cow waste or even piled it up which contributed to an unhealthy environment have now changed into repurposing the waste into biogas source that has economic value and creates a healthy and clean environment. It is in line with Oktavia and Firmansyah's (2016) research that concluded biogas as a substitute for LPG, which had been used by people, which was seen as waste could give economic and environmental benefits.

However, the village has not been able to reach energy independently, in terms of electricity. It is because there are only several people that can utilize biogas, and that number has not reached 60% fulfilled energy in Ngampel village. There are only 6 households that have already used biogas in a total of 2317 households (0.25%). It is because there have been obstacles such as limited installation, long distance between the house and the farm, the high initial cost to create independent bio-digester, and no availability of soft loan facility to build bio-digester. Palupi (2015) concluded that there is a relation between the effectivity of biogas utilization in Pendoworejo Village with energy security. The number of households having bio-digester was only 9.38%, and the biogas energy source has not reached 60%. People's hope in Pendoworejo Village, Girimulyo Sub-district, Kulon Progo District, Yogyakarta cannot be realized yet. It is due to some obstacles such as a limited number of group barns, limited funds, distance to domicile, no availability of biogas manager team, and nobody creating bio-digester independently.

Conclusion

The model of community empowerment in Ngampel Village, Papar Sub-district, is in a form of innovation of processing cattle manure into biogas, which is delivered and socialized in every regular meeting. Moreover, there are also education, program training, supervision, and assistance, as well as innovation program development that are conducted to increase people's participation in Ngampel Village. The process of this village innovation program is fully conducted by people, meaning people process the manure by themselves by liquefying it and putting it into the biogas dome so the gas can come out of the pipe connection installed, which eventually will be used by Pokternak member in the form of biogas. One economic impact experienced by people is that they can save money from buying LPG and kerosene. The social effect experienced by people is that it gives knowledge to them especially members of cattle

breeders of Sari Pathi Ngampel to process cattle manure available into renewable energy (biogas). In addition, this innovation has created a healthier environment. This condition can benefit people in Pathi Village to use cattle dung as a source of renewable alternative energy. This study has a limited number of respondents, so the use of biogas has not been able to provide comprehensive information to the public.

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