Implementation of Quadruple Helix Models Due to Increase Stockfarmers Household Welfare: Case Study in Palem Madu Village, Imogiri-Bantul, Yogyakarta

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Abstract

Animal faeces waste is a serious problem experienced by many farmers today. Animal faeces waste that is not treated properly will have a negative impact on the environment so that it disrupts the health of humans and other livestock, including being able to become a vector of diseases. The purpose of this study was to apply the Quadruple helix concept model to improve the quality of life among livestock farmers' household in Palem Madu Village, Imogiri-Bantul Regency, Yogyakarta.

This research used qualitative method. Indepth interview, Focus Group Discussion, and On Site Training are applied regarding to obtain the data. The stages have been conducted in this research are (1) Planning and Preparation; (2) Indepth interview and Focus Group Discussion; (3) Dissemination and Training; and (4) Implementation, Monitoring, dan Evaluation the Program.

Main results of this research are (1) The programs are successfully implemented accordance with the plan; (2) Increasing the welfare can be felt by villagers; and (3) The program are potentially to be sustained in a long period. Implementation of Quadruple Helix Model have very valued prospect in another community with various social problems.

Keywords: Vermi-compost, Quadruple Helix Model, Stock-farmers, Lumbricus rubellus

INTRODUCTION

Animal faeces waste is a serious problem experienced by many farmers today. Animal faeces waste that is not treated properly will have a negative impact on the environment so that it disrupts the health of humans and other livestock, including being able to become a vector of diseases. Increased levels of air pollution caused by cattle faeces in the form of odors and methane (CH4) gas in excessive amounts in the air will cause global warming.

Some efforts to overhaul organic matter using earthworms to produce vermi-compost have been widely carried out, especially abroad such as in Australia (McCredie et al., 1992) and in India (Morarka, 2005). Vermi-compost is compost produced by earthworm activity, which works with help of other soil microbiota so that they contain a lot of plant growth hormones (Manaf et al, 2009). Various microbiota are beneficial for plants, soil enzymes, and nutrients which are slow to release (Sallaku et al, 2009). In processing waste into vermi-compost, there are two products that have very high use values, namely biomass (cultured worms) and vermi-compost (former worms) which are the remaining media for worms (Azarmi et al., 2008; Kaviraj and Sharma, 2003). Earthworms have a high protein content (72% - 84.5%). Earthworm protein contains 20 amino acids. The high protein content of earthworm biomass has the potential to be developed as an animal feed material for protein sources so that livestock growth is faster (Yadav et al., 2010).

The pharmaceutical field requires earthworms as raw materials in the manufacture of certain medicines. People also often use earthworms in the manufacture of typhus and stomach acid drugs. The earthworm commonly used in the community is the Lumbricus rubellus type of earthworm. Lumbricus rubellus worms have advantages over other types of earthworms such as Pheretima and Perionyx (Azarmi et al., 2008). These advantages are in the form of high productivity (weight gain, egg / tillage production, and "vermi-compost" worm production), resistant to ammonia gas in faeces, temperature in faeces, and not moving much.

Palem Madu Village, Imogiri-Bantul, Yogyakarta is a village where the majority of the population lives as farmers & breeders. Villagers are classified as middle to lower-income economies, with the majority of their income dependent on farming, livestock, and some traditional food processing products. Every family head who maintains beef cattle is a group of livestock. The total number of members of the existing cattle group is 15 members. From the livestock products, the waste is faeces. Waste treatment in the village of Palem Madu is only a problem that is only removed at the edge of the cage which has the potential to cause disease in other livestock and the community and cause air pollution.

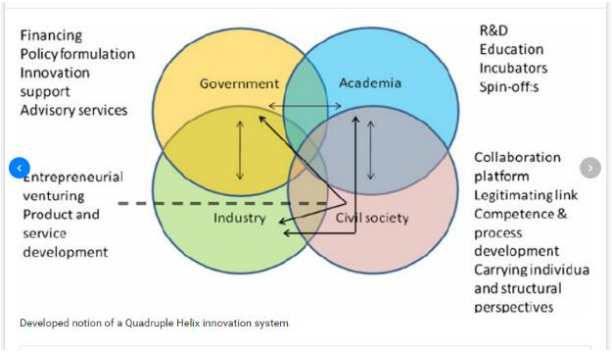
The purpose of this study was to apply the Quadruple helix concept model to improve the quality of life among livestock farmers' household in Palem Madu Village, Imogiri-Bantul Regency, Yogyakarta. The Quadruple Helix Model concept was developed through activities as follows: (1) Utilizing cattle faeces waste to produce fertilizer (2) Creating jobs for Pelem Madu villagers (3) Improving the economy of Pelem Madu villagers (4) Preserving the environment by treating waste faeces so that it has a selling value (5) Increasing the cohesiveness of the people in Pelem Madu Village.

Stool processing innovation into vermi-compost fertilizer and Lumbricus rubellus cultivation media are expected to empower Pelem Madu villagers in terms of 3 main aspects, namely economic, environmental and social. The economic aspect of society has a new source of income that can improve the economy of the community from sales. The environmental aspect of the community becomes cleaner than the pollution of soil, water and air so that people are infected with zoonotic diseases and diseases caused by bacterial contamination. The social aspect of the

community becomes more collaborative in building the village and is more active in the group of worm livestock so as to create a more relaxed and peaceful society.

METHOD

This research used qualitative method. Indepth interview, Focus Group Discussion, and On Site Training are applied regarding to obtain the data. Conceptually, Quadruple Helix Models can be explained by using the figure as seen on Figure 1.



Source: Lindberg et al, 2014

Due to realize internalizing the entrepreneurial mind set to stockfarmers, it must run simultaneously by all stakeholders, i.e. Government, Academia, Civil Society, and Industry. Government have to take a role on Financing Policy Formulation, Innovation Support, and Advisory services. Academia take a role on Research and Development, Education, Incubators, and Spin Off. Civil Society take place on Collaboative action, and Capacity Building. And finally, role of industry is on product and service development, investation, and absorb the product.

The stages have been conducted in this research are as follow:

1. Planning and Preparation

This stage begins with coordination among stakeholders (livestock farmers, local officials, academia, and industry) to prepare for the implementation of the program. Coordination is carried out through discussions and meetings that are conducted by establishing the ad-hock team. In this stage, it is ascertained who does what and how to achieve common goals. The preparation needed in this earthworm cultivation is to gather the growing media, provide superior seeds, prepare worm cages and protective cages. The use of faecal waste as a breeding medium for earthworms is based on various aspects, such as humidity conditions and temperature and the location of the cage. In addition, the preparation of work plans and the formation of a board for one year. The activity is carried out jointly with the team and village officials in a related manner.

2. Indepth interview and Focus Group Discussion

This stage is intended to explore valid and accurate information about the existing conditions in the target group. Indepth interviews were conducted to key persons i.e. village heads, heads of livestock farmer groups, women groups, related industry owners, and expert form academicians in the field of animal husbandry. The results of the in-depth interview with the key persons were used as the basis for carrying out the FGD, by involving all members of the livestock farmer group, housewives of livestock farmer groups, local officials, academicians, and related industry practitioners.

3. Dissemination and Training

The dissemination was carried out to introduce the community about A to Z of the program, what is Vermi-compost stand for, the background and objectives of the implementation, detailed explanation, creation, and a small scale simulation. Through dissemination activities, the target group will be presented with matters relating to earthworm cultivation techniques that can improve the effectiveness in the utilization of cow faeces waste, use of superior worm seeds and efforts to obtain superior worm seedlings, the benefits of using faecal waste as a worm breeding medium and benefits caused by this utilization. Worm cultivation techniques developed can support the economic development of the people. The training was carried out during the implementation in the field and was attended by 25 participants who were representatives of the livestock group who were also the target group residents. Types of training carried out include: faecal waste management techniques, worm cultivation techniques, utilization of worm management, and marketing management.

4. Implementation, Monitoring, dan Evaluation the Program

Construct worm houses by using cheap and easy-to-obtain materials such as bamboo, Leaves, palm fiber, used boards and clay tiles. The place used in the form of a large box with horizontal insulated made of wood which is multilevel and requires only a little room. Inside are made multilevel shelves as a place or container for maintenance. Worm houses can also be made without walls (open). Worm house models vary, including legged shelves, stacked boxes, multilevel fishing rods or lined fishing rods. Worms planted as much as 0.25% of the weight of cow manure used as media. Earthworms are mixed evenly and carefully. The treatment is carried out for approximately 30 days, a reversal is carried out every 5 days. Watering treatment is done so that media moisture is maintained.

Faeces produced by livestock are processed into vermin-compost which can be sold or used by farmers to fertilize feed crops in pasture fields so that pastura production increases. Pastura is an animal feed material in the form of green plants. Increased past production can reduce farm production costs. The results of the sale of vermi-compost and Lumbricus rubellus worms can also be used by farmers to purchase equipment and equipment to support the farm. The vermi-compost products will be tested by the laboratory of the nutrient content of UGM to ensure the quality of vermi-compost produced. Tests were carried out to determine the content of Nitrogen, Phosphorus and Potassium in vermi-compost. *Kascing* (used worms) is clinically tested by experts so that it is reliable and of good quality

Products produced from worm cultivation are *kascing* fertilizer and Lumbricus rubellus worms. Product packaging is carried out in various types of packaging, there are sizes of kilograms and 50 kilograms of vermi-compost fertilizer. Lumbricus rubellus worms will be packaged in plastic and distributed in fishing stations and worm collectors which will be processed to be used as typhoid drugs. Marketing is carried out with social media as well as official web sites for vermi-compost and worm products, as well as through bird and fish feed shops around the village.

After dissemination, training and demonstration, as well as direct field practice, further monitoring and evaluation will be carried out continuously in the field. This sustainable program is expected to improve the welfare of the villagers by selling vermi-compost products and biomass.

RESULTS AND DISCUSSION

The results of the meeting between stakeholders for coordination and monitoring community interest in utilizing cow faeces waste for worm cultivation media as well as for composting shows that residents enthusiastically welcome the program offered because it is

considered very useful in handling waste and to improve the economy of the people. Some residents were appointed as community driving figures for developing worm cultivation and making vermi-compost. Village youth and residents, especially members of the livestock group, expressed interest in the worm cultivation program and the making of vermi-compost.

Figure 1. The Process of FGD

The further result of this program is the implementation of dissemination and gtraining activities for all villagers. The dissemination was done by presenters wich is explaining about awareness of livestock waste processing and analysis. The results of this dissemination activity were establishment the form of a management structure for livestock groups. Livestock group meetings are held every night of the last month of the month at the house of members of the livestock group. The structure of the livestock group is as follows:

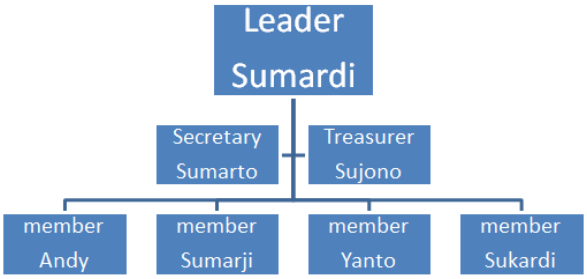


Figure 2. Institutional Boards

To support the operationalization of the program implementation, a module was developed related to the use of cow faeces by making vermi-compost. The module makes it easy for citizens who are interested in developing worm livestock and the use of faecal waste. Modules are distributed to livestock farmer groups.

Figure 3. Constructing the Worms Cage

From the results of worm cultivation that has been carried out for 2 months, harvesting of worms weighing 10 kg was obtained. Worm yields are sold to cosmetic factories and animal feed factories at a price of Rp. 50,000.00 / kg to get a total of Rp. 300,000.00 gross profit which will be entered into the cash of the livestock group. The rest of the mother worms are reused as a nursery business for the next 2 months.

Figure 4. Harvesting the Products

Compost harvesting is done when harvesting worms by taking the media to grow worms that have been treated with worms into vermicompos. Vermi-compost is put into a sack and is only packed in plastic to be marketed in the agricultural shop. Vermi-compost has been tested for content in a basic farm waste management technology laboratory, the faculty of animal husbandry at Gadjah Mada University.

Cattle faeces waste processing can be a great potential in a farm that has not been widely known and utilized properly due to limited facilities and knowledge. Changes in paradigm in the community also occur, from the use of inorganic fertilizers to organic fertilizer which can have an impact on improving the health of soil, nutrients in the soil, and all biotic elements in the soil.

Figure 5. Composting

The next activity carried out was the marketing and packaging of fertilizer and worm packaging to be marketed independently by the residents. The packaging is done with plastic that has been labeled with screen printing and then pressed using a sealer so that it is tightly closed. Worms are marketed independently to supply cosmetics or animal feed companies. Fertilizers are marketed to plant markets and agricultural and online shops by residents independently. All subsequent cultivation and marketing activities will be fully handed over to the worm group.

CONCLUSION

1. The programs are successfully implemented accordance with the plan
2. Increasing the welfare can be felt by villagers
3. The program are potentially to be sustained in a long period.

RECOMMENDATION

Implementation of Quadruple Helix Model have very valued prospect in another community with various social problems.

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