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EDUCATIONAL AND TECHNICAL ACCOMPANIMENT OF INDUSTRIAL WASTE PROCESSING MANAGEMENT OF BLACK GRASS JELLY INTO ORGANIC FERTILIZER TO INCREASE PRODUCTION CAPABILITIES UD RSA KEDIRI

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Abstract:
One of the weaknesses of home-scale industrial management is in terms of industrial waste management. The limited knowledge and skills in processing industrial waste is obstacles that have to be immediately found a solution. UD RSA has not been able to manage its industrial waste effectively and efficiently. This industrial waste might be used as raw material for organic fertilizer production. This Community Service Activity aimed to provide assistance to the management of UD RSA in managing black grass jelly industrial waste into organic fertilizer. In addition, this activity also aimed to gain cooperation with stakeholders to support business continuity. The method of mentoring activities was in the form of socialization, training, monitoring, and participatory evaluation. The community service activity partners were 35 people consisting of UD RSA management team, UD Semi Indah organic fertilizer producer team, lecturers and students of Kadiri Islamic University Kediri, village officials, farmer groups, and local villagers. Monitoring and evaluation of mentoring activities was carried out in a participatory manner. The results achieved were an increase in participants' knowledge, skills, and business motivation to process black grass jelly industrial waste into quality organic fertilizer.

Keywords: Accompaniment; Production management; Organic fertilizer; Industrial waste; Entrepreneurship.

1.INTRODUCTION

In recent years, waste problems have been increasingly encountered and pose a problem to the surrounding environment. These various waste problems might come from any side, especially the industrial sector. The waste generated from the industrial sector is increasing due to the increasing market and consumer demand for various products, so that the increase in product volume certainly produces greater waste from the production process. The majority of waste disposal is in trash cans or other places far from community settlements. This certainly causes the accumulation of garbage, and potentially pollutes the environment massively (Gaidajis, *et.al.*, 2010).

Until now, industrial waste has been an unresolved problem for years; and this has become one of the main concerns of the government in an effort to preserve the environment and indirectly protect public health. In some cases, waste disposal needs to pay attention to the technical waste treatment process until it reaches a certain standard related to the safety of waste for the environment. However, most cases of waste disposal that have occurred do not meet these safety standards, resulting in environmental pollution and causing serious health hazards (Echiegu and Liberty, 2013).

Waste from industry is released in various forms of phases, which are basically solid, liquid, and gaseous wastes. One of the focuses of serious environmental problems today is solid and liquid waste from industry, because it has the potential to directly pollute the environment and disrupt the health of living things. The waste might contain inert, organic or toxic materials, including pathogenic bacteria that are harmful and have the potential to interfere with health. Almost all types of manufacturing industries contribute to environmental pollution through the waste that is disposed of, including by the food industry (Mavrov and Beleires, 2000).

The waste might be disposed of directly as long as it does not cause harm to the environment. It would be pleasant if the waste was treated first before being disposed of in order to minimize the potential for pollution to the environment. Basically, waste processing implements several priority stages such as *Reduce* (reducing the amount of waste generated), *Reuse* (reusing waste as raw material for similar or other process products), and *Recycle* (transformation of waste into alternative raw materials or other products through recycling process) (Wang and Howard, 2004). The food industry also needs to treat this waste so as not to pollute the environment, considering that waste from the food industry might potentially increase the value of BOD5 (Biological Oxygen Demand) in waters. The BOD5 value in these waters is the amount of oxygen needed by microorganisms for the anaerobic and biochemical decomposition of organic and biochemical materials in water. The high BOD value indicates the presence of oxygen which is still very low than that required by microorganisms for survival and decomposition of biological materials. In addition, waste from the food industry gives off an unpleasant odor, thus disturbing the comfort of the environment (Ipeaiyeda and Onianwa, 2011). Therefore, there is requiring for serious handling related to the waste generated from the food industry.

UD RSA is black grass jelly producer in the Kediri regency which was established in 2000. The industrial scale included as home industry category. The produced black grass jelly has good quality, especially in terms of taste, smell, and texture. This causes the demand for UD RSA black grass jelly products to be routine every day. Product marketing areas are still limited where only included Kediri and Tulungagung Regencies. The capacity in one production process is around 40 cans measuring 23 x 35 cm. In one day more or less might produce as much as 1-2 times. In the month of Ramadan, the demand for black grass jelly always increases. The average production increase is 8-10 times the daily production capacity. From this black grass jelly production activity, UD RSA produces industrial waste in the form of solids and liquids. The amount of production waste generated in one production process was approximately 160 kg in wet conditions. As production activities progress, the accumulation of industrial waste volume has become a problem that has not been resolved by the management of UD RSA. To reduce the amount of existing waste, employees usually burned the waste so that it becomes ashes and might be stored in sacks. Waste treatment by burning this potentially disrupted the work environment and cause air pollution. This is considered as less effective solution and it is required to find a solution to treat waste effectively.

The waste produced by the grass jelly industry is generally solid waste with quite wet or hygroscopic properties. This waste was disposed of after the cooking process to extract grass jelly juice at a relatively high temperature, and the waste immediately becomes a problem for a long time because of its hygroscopic nature. This grass jelly waste treatment is still little studied in research, because it is not found in the majority of the whole countries in the world. However, positively this waste has the potential to be reused, one of which is as organic fertilizer. Based on previous research, it was known that black grass jelly waste could be used as raw material for the production of solid organic fertilizer. From the results of testing the content of solid organic fertilizers, previous researchers concluded that the NPK ratio of solid organic fertilizers produced from processing black grass jelly industrial waste was 0.57:1.19:2.16. This value was still quite low, with the intention that in application to plants it is necessary to add other sources of NPK. Solid organic fertilizer that has been produced could be used as a medium for building soil fertility (Samudi dan Saptaria, 2018). Based on the conclusions of previous research, black grass jelly industrial waste is a product that might still be optimized for its function to be processed into quality organic fertilizer.
Organic fertilizer is a product that is a large amount necessary by the farmer community. The Kediri Regency area still relied on the agricultural and plantation sectors to meet the economic needs of the community, so the demand for organic fertilizer products to support agricultural and plantation products are very important. Based on information quoted from (Masyhari, 2019), the allocation of fertilizer for farmers in Kediri Regency is still lower than the existing needs. This deficiency is known based on the number of the Definitive Plan for Group Needs (DPGN), where the total allocation was still minus the number of proposals. The difference between requests and allocations reaches thousands of tons, with various types of fertilizer brands. For urea the difference was around 11 thousand tons, for SP36 the difference was 16 thousand tons, ZA was 11 thousand tons, Phonska was 22 thousand tons, while the difference for organic fertilizer was about 13 tons. The business opportunity as an organic fertilizer producer is still widely opened, due to unfulfilled public demand. Previous research that had reviewed the feasibility study of the organic fertilizer business illustrates that the organic fertilizer business has a small risk of loss, had a relatively short investment return period, and had large market opportunities (Saptaria, 2018). The use of organic fertilizers for plants was a solution to overcome the high cost of purchasing chemical fertilizers. The Regent of Kediri explained his program on the Organic Farmer Innovation Village Movement (DITO) which was socialized to farmers in Kediri Regency. To maintain a balance between production costs and crop income, farmers should apply a mixed farming pattern (a combination of chemical and organic fertilizers) (Afkar, 2020).

Mentoring is a strategy that can be used to improve the quality of Human Resources (HR), so as to be able to find alternative solutions to problems encountered. The ability of human resources is strongly influenced by their own empowerment; therefore, empowerment activities are very much needed in every mentoring activity. Community empowerment is all non-instructive facilitation efforts, which are useful for increasing the knowledge and abilities of the community so that they are able to identify the problems they face, their potential, plan and solve them by utilizing local potential (Mandasari and Nurmala, 2021). Mentoring that includes empowerment programs should involve the participation of the target community in planning, implementing, and evaluating activities. This can

increase community participation, ensure the sustainability of the program, and ensure that the community be able to enjoy the long-term results of program implementation. Mentoring is an activity carried out together with the community in observing real problems faced in the field and then discussing together to find alternative solutions towards increasing community productivity capacity. Mentoring is an effort to include the community in developing their various potentials so that they are able to achieve a better quality of life (Mandasari and Nurmala, 2021; Hikmat, 2010).

Based on the situation analysis, the Kadiri Islamic University (UNISKA) Kediri Community Service (PPM) team carried out mentoring activities to the UD RSA management team and stakeholders involved in processing black grass jelly industrial waste into organic fertilizer. This PPM activity received support from the Ministry of Research and Technology or the National Research and Innovation Agency (RISTEK-BRIN), UD RSA management team, UD Semi Indah Management Team, UNISKA Kediri lecturers and students, Farmers Groups and Villagers of Plosorejo Kunjang Village, Kediri Regency. This mentoring activity is very important to provide knowledge, skills, and strengthen the entrepreneurial spirit of the UD RSA management team and all activity participants related to organic fertilizer business opportunities.

2. METHODOLOGY

Mentoring activities carried out by the UNISKA Kediri PPM team used the methods of socialization, training, monitoring and evaluation. The accompaniment stages included: 1) Situation Analysis Stage, 2) Problem Solution Stage, 3) Socialization Stage, 4) Training Stage, 5) Monitoring and Evaluation Stage, and 6) Conclusion Stage.

In this Situation Analysis Stage, the UNISKA PPM team conducted interviewed with UD RSA partners to obtained information related to the handling of black grass jelly waste so far and plans for handling it in the future. Observation activities were carried out to determine the condition of the location for handling black grass jelly waste. In this activity, a problem study was carried out on several alternative solutions to deal with existing waste.

Furthermore, in the Problem Solution Stage, the UNISKA PPM team offered a solution to the problem of handling black grass jelly industrial waste by processing waste into organic fertilizer. The process of processing activities began with fermentation of black grass jelly waste, mixing of fermented waste with additional materials, packaging, and selling.

In the next stage, that is the Socialization Stage, the UNISKA PPM team conducted FGD (Forum Discussion Group) activities which were attended by parties who were considered to be able to contribute in helping UD RSA to run an organic fertilizer production business. The FGD activities were carried out offline which were attended by the UD RSA team, UD Semi Indah team, UNISKA Agriculture Lecturers, UNISKA Chemistry Lecturers, UNISKA Management Lecturers, Accounting Lecturers, and UNISKA students.

Furthermore, in the Training Stage, the UNISKA PPM team conducted training activities which were carried out offline by implementing strict health protocols, that is washing hands, wearing masks, and maintaining distance. The number of participants in the training activity was 35 people consisting of the UD RSA management team, the UD Semi Indah organic fertilizer producer team, UNISKA Kediri lecturers and students, village officials, farmer groups, and residents of the Plosorejo Kunjang village, Kediri Regency. In this training activity, counseling activities were carried out on materials related to organic fertilizer, such as organic fertilizer business opportunities, organic fertilizer production processes, benefits of organic fertilizer for plants and the environment, organic fertilizer marketing, and organic fertilizer business development. On the sidelines of delivering the material, discussion activities were carried out with participants to improve understanding of the material. At the training stage, the UNISKA PPM team carried out demonstration activities on the processing of black grass jelly waste into organic fertilizer. The participants were able to see the demonstration process directly, and discuss with the resource persons of the activity, namely UD Semi Indah's organic fertilizer business practitioners. The training activity was carried out at the UD Semi Indah Kediri organic fertilizer production site.

In the Monitoring and Evaluation Stage, the UNISKA PPM team was carried out participatory monitoring and evaluation activities with all parties involved in mentoring activities. Monitoring and evaluation for organic fertilizer production activities was carried out using observation techniques and direct participation. The UNISKA PPM team helps process solid and liquid black grass jelly waste into organic fertilizer. To test the quality of organic fertilizers, laboratory tests were carried out on the content of N, P, and K. Tests of the quality of organic fertilizers were also carried out on plants by applying black grass jelly waste fertilizer to plants. Monitoring and evaluation by interview technique was carried out to the owner of UD RSA and the production management team, to ensure the sustainability of the program that has been implemented. The UNISKA PPM team and UD RSA identified the requirements and future steps so that the program's objectives could continue to be improved.

Finally, in the Conclusion Stage, the UNISKA PPM team drawed conclusions from the results of each stage of mentoring activities. Conclusions were formulated based on the achievement of indicators of the objectives of PPM activities.

3. RESULTS AND DISCUSSIONS

The management of UD RSA still has limited knowledge and skills on how to process black grass jelly industrial waste into organic fertilizer. The handling of black grass jelly industrial waste has not been carried out

according to good procedures, industrial waste generated in every production process should be handled immediately, and there is no need to wait for accumulation that has the potential to cause environmental pollution in the workplace. Waste treatment must be carried out early when the production process occurs. This means that waste treatment must be carried out from upstream to downstream because if this is not done then the threat to pollution will be fatal (Nasir, *et.al.*, 2015). Waste management for the black grass jelly industry was a long-term project for the UD RSA management team. Questions that need to be ascertained in this project include: Who will handle waste management into organic fertilizer?, Where is the waste management site?, What is the name of the organic fertilizer product?, How is the packaging design for organic fertilizer?, What is the marketing strategy and promotion of organic fertilizer, and how to develop the business in the future. In carrying out the management of black grass jelly industrial waste management activities effectively, UD RSA needs to involve other parties outside the company who have sufficient competence to assist the project to be carried out. UD RSA requires appropriate assistance, so that project objectives can be achieved and support the application of Good Manufacturing Practice (GMP). Industries that adopt the GMP concept will gain many benefits, including: better quality of food ingredients; safer products; reduction in the incidence of consumer complaints; a better, more fun, cleaner and safer work environment; greater employee motivation and productivity; and better psychological condition (Blanchfield, 2005).

UD Semi Indah is an organic fertilizer producer which has been operating since 2006. The production location is Plosorejo Hamlet, Kunjang Village, Kediri Regency, East Java. UD Semi Indah's organic fertilizer marketing is quite extensive, covering the areas of Kediri, Tulungagung, Blitar, Jombang, Nganjuk, Surabaya, Central Java and many more. UD Semi Indah's fertilizer production capacity per day is an average of 250 units for each type and packaging. The numbers of permanent workers were as many as 10 people who handle the procurement of materials, production, and distribution. Based on the sales of organic fertilizers, UD Semi Indah generates a very satisfactory business profit. The results of sales based on orders also promise big profits for business actors. This is a good opportunity for UD RSA to increase creativity and innovation in taking advantage of business opportunities as an organic fertilizer producer. With an entrepreneurial spirit to explore business opportunities, UD RSA can generate greater profits than before. In theory, before an entrepreneur starts running In business, it is necessary to have a good business plan so that business goals can be achieved effectively and efficiently. The steps that can be taken by UD RSA in starting a business include: 1) Conducting an analysis of the strengths, weaknesses, opportunities, and threats of the business to be carried out (SWOT Analysis), 2) Exploring business ideas as an organic fertilizer producer, 3) Conducting research market, 4) Prepare business plans, 5) Prepare business budgets, 6) Prepare product and service designs, 7) Manage business legality, 8) Produce quality organic fertilizers, 9) Determine organizational structure and build a solid business team, 10) Determine the right production location, 11) Determine the location of the sale of organic fertilizer products, 12) Develop an organic fertilizer business network.

Utilization of black grass jelly industrial waste could support the Kediri Regency local government program, for the Organic Farmer Innovation Village Movement (DITO). This activity will familiarize the community with a new culture, that is from the intensive use of chemical fertilizers to the intensive use of organic fertilizers.

Based on the results of the situation analysis, UD RSA already has an adequate location to treat black grass jelly waste. The location of the waste disposal which was initially too close to the place where the production results in the form of black grass jelly were placed, was moved to a location that was a bit far apart so that waste processing activities did not cause pollution. Waste that has accumulated both solid and liquid is immediately fermented and processed into organic fertilizer.

The process of fermenting black grass jelly waste was carried out by the UD RSA production management team, UNISKA PPM team and UNISKA students. The fermentation activity stage consists of the preparation of materials, equipment, and the fermentation process. The materials needed include: solid and liquid black grass jelly waste, goat manure, cow manure, roasted husks, EM4, and brown sugar. Equipment needed included Tarpaulin, rake, hoe, scales, dipper, strainer, and squeegee. The fermentation process started from mixing all the ingredients and then covering the mixed ingredients with a tarpaulin. Checking and mixing of materials were done once a week. The fermentation process took approximately 1 month (four weeks). Fermented black grass jelly solid waste was used as raw material for training activities at the UD Semi Indah location. The next step for mentoring activities was conducting FGD (Forum Discussion Group) activities which aimed to discuss planning and technical training programs for processing black grass jelly waste into organic fertilizer.

Figure 1. Solid and Liquid Waste of Black grass jelly in UD RSA. The figure was taken in 2021.

Figure 2. Solid and Liquid waste of black grass jelly which has been fermented as organic fertilizers.

This activity was held at UD RSA which was attended by the owners and employees of the production division of UD RSA, the owners of UD Semi Indah, UNISKA Agricultural Lecturers, UNISKA Chemistry Lecturers, UNISKA Management Lecturers, Accounting Lecturers, and UNISKA students. The training activity was carried out for 2 days. The number of training participants was 35 people. The arrangement of the training activities includes: participant registration, opening, remarks, prayers, delivery of materials, demonstrations, discussions, filling out questionnaires by activity participants, giving door prizes and short interviews with training participants, prayer, closing.

Monitoring and evaluation activities were carried out in a participatory manner between the UNISKA PPM team, the UD RSA management team, and the UD Semi Indah management team by applying the concept of Participatory Impact Monitoring (PIM) which aimed to observe and evaluated the results and progress of PPM activities. This participatory monitoring activity functions to assess the social and cultural impact of UD RSA's management after participating in a series of PPM programs that have been implemented. In addition, PIM also functions to strengthen the organization, group learning for the UD RSA management team, and efforts to understand stakeholder perspectives.

Based on the response data from the training participants, it was known that the training activities that have been carried out could increase knowledge (for 34 respondences or 97.1 %), skills (for 32 respondences or 91.4 %), and motivation (for 25 respondences or 71.4%) in the organic fertilizer business. Presentation of interesting material (for 31 respondences or 88.6%), quality content (for 31 respondences or 88.6%), and clear presentation of material (for 32 respondences or 91.4%), interactive discussion activities (for 35 respondences or 100%), and coherent presentation (for 34 respondences or 97.1%) could create a pleasant learning atmosphere. The resource person for the demonstration activity of processing black grass jelly waste into organic fertilizer was a business practitioner; this could motivate (for 25 respondences or 71.4%) participants to follow the direction of the resource person. Participants could freely ask questions about the production process and marketing of organic fertilizers. This activity could provide a clear picture of how the production process, packaging techniques, marketing, and sales analysis of organic fertilizers (for 14 respondences or 40.0 %). This activity can increase participants' confidence to start learning more about the organic fertilizer business (for 18 respondences or 51.4 %).

Based on the results of the monitoring and evaluation activities carried out in a participatory manner by the Assessment Team of 3 people, it could be concluded that the objective of the mentoring activity in the form of community empowerment has been achieved. As mentioned, the scope of community empowerment consists of 4 (four) areas, specifically: (1) politics; (2) economy; (3) socio-cultural; and (4) environment (Soetomo, 2006).

4. CONCLUSIONS

Management assistance activities for processing black grass jelly industrial waste into organic fertilizer could run well. The FGD activity resulted in a technical plan in the form of a 1-day training activity and further assistance for the UD RSA management team. The training activities achieved satisfactory resulted with the attendance of 100% of the invitees. The response of the participants to the training activities was very positive. All participants were very enthusiastic in participating in the series of training activities. Participatory monitoring and evaluation activities resulted in a positive impact in supporting the cooperation and cohesiveness of the UNISKA PPM team with the UD RSA partner team.

The follow-up action that needs to be taken from this mentoring activity was to form joint personnel between the UNISKA PPM team, the UD RSA Kediri team, the UNISKA student team to support the planning, implementation, and evaluation of program sustainability. The focus of activities is improving the quality of organic fertilizer production, both solid and liquid fertilizers, expanding the marketing and distribution network of organic fertilizers, assisting business financial management, and developing business for the short, medium and long term business.

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