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THE ECONOMIC REHABILITATION WITH GREENHOUSE DRYING SYSTEM OF COFFEE BEANS DURING PANDEMIC IN GAMPONG REULEUT TIMUR, MUARA BATU DISTRICT, NORTH ACEH

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ABSTRACT

Malikussaleh University (UNIMAL) as a state university in North Aceh has the potential in the form of human resources to play a role in village development. The idea of a greenhouse system for drying coffee beans in Gampong Reuleut Timu was based on the condition of the Corona Virus Disease (COVID-19) Pandemic which dealt a tremendous blow to the economy of the village community. The majority of the people around the institution have house rentals for UNIMAL students. The best solution that academics offer is to turn into small and medium-sized entrepreneurs who can generate additional income. The community can take advantage of their free time by doing a coffee bean drying business with a greenhouse system which has a great opportunity to be developed considering the high intensity of sunlight in North Aceh Regency. The location of this activity is in Reuleut Timur Village, Muara Batu District, North Aceh Regency. The service activity was carried out in two stages, namely an explanation of how to make a greenhouse installation and an explanation of how to dry with a greenhouse system. The outputs are in the form of a service journal system International Review of Practical Innovation, Technology and Green Energy (IRPITAGE) Volume 1, Number 2, December 2021, online publications in the Merdeka News mass media, and an Agreement Document with Geuchik, Reulet Timu Village, Muara Baru District. North Aceh District.

Keywords: Coffee, greenhouse, drying system

INTRODUCTION

The lowest area of government is rural areas. The level of community welfare in rural areas is still low, which is motivated by the large number of village potentials that have not been utilized optimally, the low quality of human resources in rural areas, the low accessibility of rural communities in obtaining basic services to develop economic enterprises such as sources of financing, information and technology, limited infrastructure that supports village development and the function of community institutions in the village is not yet optimal. In the context of accelerating village development and developing village potential as the main driver of development in various fields, the role of many parties, including universities, is needed. Universities can be involved in community service activities. Therefore, in 2021, the Agribusiness Study Program, Faculty of Agriculture, Malikussaleh University has the desire to organize community service programs around the campus in the form of fostered villages.

Agriculture Faculty Malikussaleh University (UNIMAL) is one of the leading faculty in the field of agriculture and fisheries development in Sumatra which has a vision to become a research-based superior agricultural higher education institution in the development of national standard science and technology by 2020. The missions of the UNIMAL Faculty of Agriculture are: (1) to provide education, research and community service in the field of Agriculture global insight based

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on faith and piety, (2) develop and apply science and technology in the field of agriculture based on superior research.

As one of the idea to realize Agriculture vision and mission, the academics of the Agribusiness Department Agriculture Faculty UNIMAL, through the program to establish fostered villages, have a goal to rehabilitate the economy of the people of the Reulet Timu area, which had been affected during the pandemic. This economic rehabilitation is carried out by holding a village development program. The idea of an economic rehabilitation program through an effort to dry coffee beans with a greenhouse system in the reuleut timu village was based on the condition of the Corona Virus Disease (COVID-19) Pandemic which dealt a tremendous blow to the economy of the village community. The majority of the people around the institution have house rentals for UNIMAL students. The COVID-19 pandemic condition in Aceh forced UNIMAL to change the offline education system to an online system according to the direction of the Ministry of Education and Culture. This is done to prevent the spread of the COVID-19 virus.

In the online system, students carry out the learning process from their home region so they are not in the environment around UNIMAL. This has a direct impact on the people of East Reulet as a provider of rental houses. People who have to experience financial constraints due to the Covid 19 Pandemic. The price of rice commodities, which is the main source of income, has also decreased several times due to problems with transportation delays during the pandemic so that rice commodities have lost their market. At this time, too many people were experiencing financial problems due to the lack of rental housing businesses and the often unstable price of rice commodities.

The best solution that academics offer is to turn into small and medium-sized entrepreneurs who can generate additional income when not in the rice growing season. The community can take advantage of their free time by doing a coffee bean drying business with a greenhouse system which has a great opportunity to be developed considering the high intensity of sunlight in North Aceh Regency. This is also in line with one of the Nawacita programs initiated by the government, namely realizing economic independence by moving domestic strategic sectors.

The principle of drying with a greenhouse is to make a building whose walls and roof are made of transparent material such as glass, which functions as an insulating material so that the incoming heat energy can increase the temperature in the drying room building (Hadi, 2015). In the preliminary test of the greenhouse it was 39°C, while the outdoor temperature was 36°C. In a study conducted by Amanah, et al (2013), drying with a greenhouse was able to speed up the empon-empon drying process when compared to conventional (natural) drying. According to Candra (2016), the higher the temperature of the drying air, the faster the evaporation of material water so that the decrease in water content and mass of the material will be faster as well.

The green house system of drying coffee beans will later have the aim of encouraging, growing, improving and rehabilitating the economic potential of the community by improving the quality of existing human resources. The establishment of a coffee bean drying business with a greenhouse system is expected to be a means of support and empowerment for the community by providing information related to a quality-based coffee drying system. Academics from the Agribusiness Study Program, Faculty of Agriculture, UNIMAL also aim to assist the people of East Reulet in direct practice of drying coffee with a greenhouse system. With this service activity, it is hoped that it will be able to increase sources of income and help overcome environmental problems that exist around the UNIMAL Faculty of Agriculture environment.

The problems that underlie the formation of this service activity are as follows: (1) The regulation of the online learning system due to the Corona Virus Disease (COVID-19) Pandemic which has dealt a tremendous blow to the economy of the community around the UNIMAL Faculty of Agriculture as a provider of rental housing for students/ i, (2) The number of people who have lost their jobs because companies are experiencing financial constraints due to the Covid-19 Pandemic so that many people are experiencing financial constraints, (3) Lack of public knowledge about business prospects that can be run, (4) Potential coffee market that is The large and high intensity of light in North Aceh district is a business opportunity that has not been utilized by the community. Furthermore, the objectives and benefits of this service activity are to: (1) The community can open new business opportunities, namely drying coffee and other agricultural products, (2) To empower the economy of rural communities through the manufacture of greenhouses as an alternative to drying coffee beans.

IMPLEMENTATION METHOD

The location of the community service was taken around the UNIMAL Faculty of Agriculture, namely Gampong Reulet Timur, North Aceh Regency. The determination of this location is because the Faculty of Agriculture, Malikussaleh University is located in North Aceh Regency, so with this service activity it is expected to be able to make a direct contribution to the problems that exist in the environment around the agency.

To explore the problems that exist in the community, the service team held an in-depth discussion with the community. In this phase, the Service Team listens to community problems. The implementation methodology is designed for mentors in the form of a participatory approach and refers to the adult learning process (adult-learning), which consists of: (1) Providing information regarding the construction of greenhouse installations, (2) Providing information regarding the process of drying coffee beans in the greenhouse system.

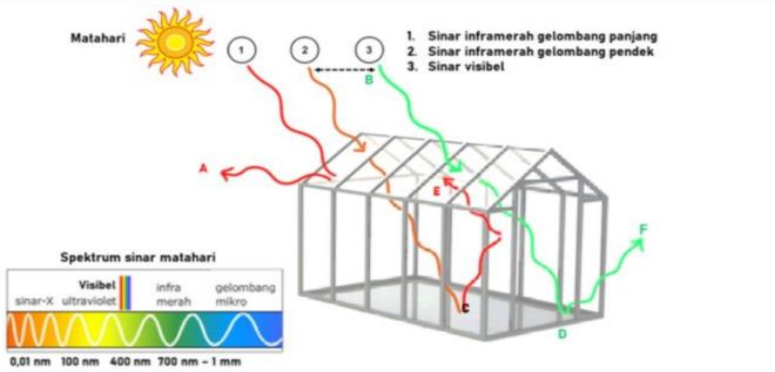

Figure 1. Design and Description of the Greenhouse Effect

This service activity is expected to continue and can make a real contribution to the problems of the community around the campus. The Reulet Timu community can play an active role in participating in this program to increase their capacity.

The instrument for evaluating the results of service activities used was in the form of a questionnaire with open-ended questions regarding the understanding of the training participants

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about the materials and practices presented in this training. The expected impact of service activities are:

1. There is a paradigm shift from "job seekers" to "job creators"
2. The surrounding community is able to understand the knowledge of the coffee drying system

RESULTS, DISCUSSION, AND IMPACT

This activity was arranged starting from June 3, 2021 by forming a service team with 1 Chair, namely Fadli, S.P, M.Si (Lecturer of the Faculty of Agriculture) and 4 members consisting of Dr. Suryadi, SP, MP (Lecturer of the Faculty of Agriculture), Emmia Tambarta SP, M.Si (Lecturer of the Faculty of Agriculture), Rizal, S.Si., M.IT (Lecturer of the Faculty of Engineering) and Bustami, S.Si., M.Si ., M. Kom (Lecturer of the Faculty of Engineering). The five teams were formed on the grounds that there must be collaboration between Lecturers of the Faculty of Agriculture who have an agreement on how to dry coffee beans with Lecturers from the Faculty of Engineering who have an agreement on the construction of greenhouses for drying media. The following is a schedule of services that have been carried out from the beginning of team preparation to the report preparation process.

Table 1. Activity Schedule

o	Activity	Month					
						0	1
	Preparation of TEAM implementing community service						
	Preparation and submission of service TOR						
	Waiting for information from the service proposal selection process						
	Preparation of Activities (Print Letters, purchase of consumables)						
	In-depth interviews with the community regarding service activities						
	Greenhouse building process						
	Providing information on the drying process with the greenhouse system						
	Preparation and Submit Journal Articles						
	Preparation of Activity Reports						

The greenhouse construction process begins in October. The first process is the purchase of greenhouse materials. Furthermore, the service team is looking for technicians who understand the process of making greenhouses with mild steel materials. The process of making a greenhouse from mild steel. The design of the dryer house with a size of 4 m x 3 m x 3.5 m and a blanket or cover in the form of UV plastic. With transparent walls, the drying house has a greenhouse heat effect from solar radiation. This can provide an energy advantage to dry the material from maximum solar radiation. The drying rate is obtained from the change in the moisture content of the material in one unit of time. The higher the change in water content in the material, the higher the drying rate obtained. To get a large drying rate, there are several factors that can influence, namely air temperature, air pressure, air humidity and air flow speed in the drying house.

Figure 4. Greenhouse Construction Process Using Steel Frame Material.

The drying process is an important part in handling agricultural commodities, one of which is coffee beans (Santoso, 2018). Drying is not only intended to preserve coffee beans, but also to facilitate transportation for processing.

The use of sunlight as a heat source in the drying process still has a weakness because the heat of the sun does not last all day and can only be obtained in the dry season. The drying time depends on the weather. When the rainy season falls, the drying process of coffee beans will take longer so that it will accelerate the damage to coffee beans due to the growth of microorganisms. This causes the quality of coffee beans to be low.

Figure 5. Exposure of the drying method with a greenhouse system by the Research Team

The drying process is an important part in handling agricultural commodities, one of which is coffee beans. Drying is not only intended to preserve coffee beans, but also to facilitate transportation for processing. Therefore, one way that can be done to improve the quality of coffee beans efficiency in the drying process is to design a drying device using the greenhouse method. The

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principle of drying with a greenhouse begins with making a building whose walls and roof are made of transparent material such as glass, which functions as an insulating material so that the incoming heat energy can increase the temperature in the drying room building. Greenhouse drying is able to speed up the coffee drying process when compared to conventional (natural) drying. The air temperature contained in the dryer is higher than the air in the outside environment which has an impact on the decrease in the relative humidity (RH) of the air.

Greenhouse drying of coffee beans is usually faster than conventional drying. Drying in a greenhouse takes 7-8 days to reach a moisture content of 13%. Meanwhile, conventional drying takes 10-15 days to reach a moisture content of 14%. Judging from the drying process, it can be seen that greenhouse drying is more effective than conventional drying in terms of time, cost, and quality of Arabica coffee beans. This is because the greater the temperature difference between the heating medium and the coffee beans, the faster the heat transfer to the coffee beans and the faster the evaporation of water from the coffee beans. In the drying process, the water removed from the coffee beans can be in the form of water vapor. The moisture obtained must be immediately removed from the atmosphere around the dried coffee beans. If it doesn't come out, the air around the coffee beans will become saturated with water vapor thereby slowing the evaporation of water from the coffee beans which slows down the drying process. The principle of drying with a greenhouse is a greenhouse that is built with a function to withstand the heat of the sun in the room. During the day, the sun's heat is able to penetrate the glass, thus helping the assimilation process in a dried material. Because the roof is made of glass, the remaining heat from the sun is released back into the atmosphere. This causes the air temperature in the greenhouse to increase. At the end of the session the service team said that this greenhouse system could not only be used for coffee commodities but also for rice, sunti acid and many other agricultural products.

The last activity is the team will distributed a questionnaire to see the impact of this activity fro the community who took part. The response of the service participants to this activity was that the service participants felt that this activity was very beneficial for them. 10 out of 10 participants answered that they were very interested in the training and assistance during the service period. All people in Gampong Reuleut Timu work as farmers, so the drying system will certainly be a very suitable thing to be implemented in this area. This is because the training of the drying system using the greenhouse method will certainly help the community in dealing with the problem of uncertain climate change when the harvest season arrives.

CONCLUSION

The greenhouse construction process begins in October. The first process is the purchase of greenhouse materials. Furthermore, the service team is looking for technicians who understand the process of making greenhouses with mild steel materials. The process of making a greenhouse from mild steel. The design of the dryer house with a size of 4 m x 3 m x 3.5 m and a blanket or cover in the form of UV plastic. With transparent walls, the drying house has a greenhouse heat effect from solar radiation. The use of sunlight as a heat source in the drying process still has a weakness because the heat of the sun does not last all day and can only be obtained in the dry season. The drying time depends on the weather. When the rainy season falls, the drying process of coffee beans will take longer so that it will accelerate the damage to coffee beans due to the growth of microorganisms. This causes the quality of coffee beans to be low. Greenhouse drying of coffee beans is usually faster than conventional drying. Drying in a greenhouse takes 7-8 days to reach a moisture content of 13%.

Meanwhile, conventional drying takes 10-15 days to reach a moisture content of 14%. Judging from the drying process, it can be seen that greenhouse drying is more effective than conventional drying in terms of time, cost, and quality of Arabica coffee beans.

This service activity is expected to continue and can make a real contribution to the problems of the community around the campus. The people of Reulet Timu work as farmers. Some of them expressed the economic problems that declined during the pandemic. Through this service activity, the team provided assistance in establishing greenhouse installations that are not only used for coffee products, but can also be used for other agricultural products such as rice, corn, and sunti acid. The community as service participants can play an active role in participating in this program to increase their capacity. The response of the service participants to the activities based on the questionnaire distributed during the training was that the service participants felt that this activity was very beneficial for them. 10 out of 10 participants answered that they were very interested in the training and assistance during the service period. All people in Gampong Reuleut Timu work as farmers, so the drying system will certainly be a very suitable thing to be implemented in this area. This is because the training of the drying system using the greenhouse method will certainly help the community in dealing with the problem of uncertain climate change when the harvest season arrives.

OUTCOMES

The output produced is in journal *International Review of Practical Innovation, Technology and Green Energy (IRPITAGE)* Volume 1, Number 2, December 2021 with title "The Economic Rehabilitation With Greenhouse Drying System Of Coffee Beans During Pandemic In Gampong Reuleut Timu, Muara Batu District, North Aceh", online publication in Berita Merdeka online newspaper with title "Unimal Agribusiness Lecturer socializes coffee drying in the greenhouse system", and a Letter of Cooperation Agreement with Geuchik, Reulet Timu Village, Muara Batu District, North Aceh Regency.

GRATITUDE

Team would like to say thank you to Malikussaleh University and LPPM Community for giving the team the opportunity to provide knowledge and assistance to the community. It is hoped that the service team will continue to be able to carry out community service activities like this to channel innovation and new knowledge that can be utilized by the UNIMAL campus community.

REFERENCES

Amanah, H.Z., Sri, R. and Silvia, I. M. Modification of Empon-Empon Drying by Utilizing the Greenhouse Effect. Journal of Research and Development of DIY Regional Government. Vol 5 No 7. 2013

Aryani, R., & Khaddafi, M. (2021). The Effect Of Financial Knowledge And Personal Net Income On The Financial Behavior Of Malikussaleh University Employees With Locus Of Control As Moderating Variables. International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration (IJEBAS), 1(1), 1-13.

Candra, R. Integrated Greenhouse Effect Tunnel Drying with Biomass to Dry Cassava Crackers. Essay. Padang Institute of Technology. 2016

Hadi, S. Drying Rate of Cardamom Using a Greenhouse Effect Dryer with the Help of a Biomass Furnace. Journal of Mechanical Engineering Vol. 5, No. 1. 2015.

DOI: https://doi.org/10.54443/irpitage.v2i1.120

Karim, Abubakar. 2012. Local Economy Through the Revitalization of People's Coffee Gardens in the Gayo Highlands. J Economics of Development Vol (3).

Santoso, D. Djunaedi, M. and Mursalim. Mathematical Model Drying Thin Layers of Arabica Coffee Beans (Coffee Arabica) and Robusta Coffee Beans (Coffeae cannephora). Andalas Agricultural Technology Journal Vol. 22, No.1. 2018.

Saragih, M. M. S., Sinaga, S., Faisal, F., Ilham, R. N., & Nurhaida, T. (2021). The impact of the COVID-19 Pandemic on Stock Investment in the Indonesian Capital Market. Management Research and Behavior Journal, 1(1), 1-6.