



Increasing Food Production with Aquaponic Cultivation System to Support Sustainable Economic Independence During the Covid-19 Pandemic Period, Gunungpati District, Semarang

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ABSTRACT

The COVID-19 pandemic occurred when the SARS-CoV2 virus spread throughout the world. It creates a widespread global shock that creates a severe economic slowdown. There has been a slowdown in all sectors of the economy worldwide, and more than a third of the global population has been isolated. It can harm the community and the surrounding environment, especially related to the irregular income many people receive in the village. In overcoming the economic downturn in the community, the service team provided several solutions to help reduce these problems. The solution offered by the service team is Increasing Food Production with Aquaponic Cultivation Systems. The aquaponics cultivation system is easy for rural communities to increase community income and provide benefits to individuals and the surrounding environment. The team chose one village as the place to implement the solution, namely Kalisegoro village. The method used is the active approach, namely the provision of aquaponic cultivation training. The training was carried out using used plastic bottles, tarpaulins, wood, paralon, seeds, water hoses, and planting media.

Pandemi COVID-19 terjadi ketika virus SARS-CoV2 menyebar ke seluruh dunia. Ini menciptakan guncangan global yang meluas yang menciptakan perlambatan ekonomi yang parah. Telah terjadi perlambatan di semua sektor ekonomi di seluruh dunia dan lebih dari sepertiga populasi global telah diisolasi. Hal tersebut dapat memberikan dampak negatif bagi masyarakat dan lingkungan sekitar terutama terkait pendapatan tidak tetap yang diterima oleh banyak masyarakat di desa. Dalam mengatasi penurunan ekonomi masyarakat yang terjadi, tim pengabdian memberikan beberapa solusi untuk membantu mengurangi permasalahan tersebut. Solusi yang ditawarkan tim pengabdian yaitu Peningkatan Produksi Pangan Dengan Sistem Budidaya Aquaponik. Sistem budidaya aquaponik merupakan hal yang mudah bagi masyarakat desa untuk meningkatkan pendapatan masyarakat serta memberikan manfaat bagi individu maupun lingkungan sekitar. Tim memilih satu desa sebagai tempat untuk mengimplementasikan solusi tersebut yaitu desa Kalisegoro. Metode yang digunakan pendekatan aksi yaitu pemberian pelatihan budidaya aquaponik. Pelatihan dilakukan dengan memanfaatkan botol plastik bekas, terpal, kayu, paralon, bibit, selang air dan media tanam.

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INTRODUCTION

The city of Semarang has the slogan "Semarang is Great" and is dubbed the City of Atlas, namely Safe, Orderly, Smooth, Beautiful, and Healthy. The population in the city of Semarang is pretty dense. In the city of Semarang, Gunungpati District has 177 villages, one of which is Kalisegoro Village. The name Kalisegoro comes from the Javanese language, namely Kali, which means river, and Segara, which means sea. It is due to the generosity of Kalisegoro, being surrounded by many rivers and springs or springs. Kalisegoro means "*kali kanthi akal lan iman kang dadi*" while Segara means "*seneng gotong royong minangka kebudayaan*". Based on this, Kalisegoro has the slogan "Kalisegoro in Action". Based on data from BPS, Kalisegoro Village has an area of 281,884 ha with a northern boundary, namely Sekaran Village, Ngijo Village in the south, Patemon Village in the east, and Pongangan Village in the west with views of Mount Ungaran that can spoil the heart. The total population of Kalisegoro village is 4568 people, consisting of 2312 males and 2256 females.

Kalisegoro Village is known as the Super Orchid Thematic Village, which develops the cultivation of superior varieties of orchids and is managed jointly by a group of women farmers. Most of the livelihoods of the Kalisegoro residents work as traders as many as 1030, as many as 663 construction workers, as many as 660 civil servants, as many as 369 industrial workers, as many as 364 farmers, and as many as 21 public transport drivers.

In the Kalisegoro sub-district, several micros, small and medium enterprises are commonly referred to as MSMEs, including convection SMEs, fried onion SMEs, taro chips SMEs, musical guitar instruments, workshops, and other businesses. Kalisegoro Village is dominated by Muslim residents, which can be seen from the many places of worship for Muslims, such as mosques, prayer rooms, and TPQ. In addition, there are also educational places such as PAUD, TQ, and SD, which teach a lot of science, religion, and culture. Kalisegoro Village has many arts, one of which is musical art which the existence of several music studios can prove. Once a year, the residents of Kalisegoro hold the Aptian Kalisegoro tradition through various activities such as cultural carnivals, recitations, village clean-ups, to pilgrimages to ancestral graves. However, no community in Kalisegoro village has vegetable and fish cultivation. Therefore, the aquaponic cultivation system is very well introduced to the people of Kalisegoro village, Gunungpati district.

An aquaponic cultivation system is a form of agriculture that combines fish rearing in tanks (recirculating cultivation) with plant cultivation (hydroponics). Aquaponic cultivation systems have

contributed to economic improvement, agricultural science education, and a form of developing environmentally friendly technology with additional production (organic vegetables) to produce nutrient-rich foods (Surnar, et al., 2015). The existence of aquaponics is a solution to several sustainability problems, such as limited water availability, environmental pollution, increased fertilizer costs, and depletion of fertile soil (Yep, et al., 2019). Over the past few years, aquaponic systems have received increasing attention as they reduce pressure on resources in first and third-world countries (Duarte, et al., 2015). The aquaponic cultivation system can overcome economic problems because aquaponic cultivation systems can produce products that have a selling value.

Aquaponics can be an essential driver for developing an integrated food production system. Dry areas that lack water will benefit from this technology being operated in the environment to create commercial items. The aquaponic cultivation system is an easy thing for rural communities to create these opportunities, especially if the community lacks education and skills. The aquaponic cultivation system can become a village community to open a small business.

Okemwa (2015) explains the reason the aquaponic system is ideal. First, aquaponics is a sustainable resource that combines aquaculture (growing fish and plants in a controlled environment) and hydroponics (growing plants without soil). Second, aquaponics is an integration of two relatively well-established production technologies, a recirculating aquaculture system where fish tank waste is treated and cleaned before being returned to the fish tank and a hydroponic (or soilless) nutrient solution-based horticultural system bringing the two together allowing plants to utilize the waste nutrients produced by fish. Third, with aquaponics, fish, and plants grow well and thrive.

Based on the results of research conducted by Noor et al. (2011) under the title "Evaluation of Productive Labor-Intensive Programs in Gerdu Kempling by the Semarang City Manpower and Transmigration Office in 2011,". Problems in the labor-intensive program sector in the city of Semarang generally lie in human resources, knowledge, income, skills, and mastery of modern technology, causing weak competitiveness. Many labor-intensive programs in the city of Semarang have been running, but the majority lack assistance, so the groups themselves experience difficulties managing them. Moreover, the activity groups felt they were still not skilled enough in managing activities and still needed input and guidance in developing these activities.

According to several agencies or institutions and laws, labor-intensive programs have different definitions

in each literature. Following the Regulation of the Minister of Transportation of the Republic of Indonesia Number PM 73 of 2018 concerning Procedures for the Implementation of the Labor-Intensive Program within the Ministry of Transportation, the Intensive Work is defined as follows:

Padat Karya is an activity to empower marginal/poor communities that are products based on the utilization of natural resources, labor, and local technology to reduce poverty, increase income, and reduce stunting rates.

Based on Surat Edaran: 02/SE/DC/2018 concerning Technical Guidelines for the Implementation of Labor-Intensive Activities of the Directorate General of Human Settlements, the criteria for the location of labor-intensive programs are:

1. Located in a rural area with access to drinking water that has not reached 100% and is categorized as vulnerable to water;
2. There is a need for drinking water services following the Regency/City Drinking Water Supply System Master Plan document (if it has been prepared);
3. Not including district/city PDAM drinking water service areas;
4. Preferably located in Low-Income Community locations who are willing to join the program.

The ILO defines the criteria for target groups for labor-intensive programs as follows:

1. Adult men and women who can carry out the work;
2. The primary breadwinner of the family, other than minors;
3. Workers who have lost their jobs (laid off);
4. Unemployed, underemployed, poor people;
5. People who are victims of natural disasters.

Conceptually, independence is a condition where there is no "dependence" on anyone and no one party can "dictate" food, and then independence means "self-ability" to meet food needs. Furthermore, independence ultimately means "glory," which is the ability to compete globally.

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METHOD

As a follow-up to the recommendation of the study stated above, action activities to strengthen the local community's economy are carried out to improve the community's welfare. It implies the principle of sustainability, which is economically beneficial and can be accounted for ecologically (environmentally friendly). Meanwhile, the principle of participation is realized by involving the local community as the subject of the action. In this case, the establishment of a business through the provision of training, mentoring, and monitoring can be carried out by the community / labor-intensive program actors to assist the community in starting a business. This program provides training on aquaponic cultivation systems to support food self-sufficiency. Efforts are to provide training, education, and assistance in making aquaponic cultivation in the village.

1. The implementation of cultivation training activities has the following stages:
 - a) Committee Preparation
 - b) Location survey
 - c) Location setting
 - d) Requests for participants from the Department
 - e) Registration of participants
 - f) Debriefing
 - g) Delivery to location

- h) Monitoring evaluation
- i) Withdrawal of students from the location
- 2. The materials that will be provided to the training participants include:
 - a) The role of the State University of Semarang in developing human resources in the Semarang area.
 - b) The role of local government in the management of village institutions as strengthening community empowerment in Kalisegoro Village, Gunung Pati District, Semarang.
 - c) Potential and challenges faced during cultivation training.
 - d) Fostering a spirit of independence for the community.
 - e) Community empowerment.
 - f) Management education in economics.
 - g) Procedures for managing village institutions.

In implementing the activities, first, mentoring for learning relevant scientific concepts on aquaponics management training will be formed, which will be attended by Village Apparatus (Village Head, Secretary, and other Village officials) as well as business community leaders. Second, mentoring scientific concepts for the aspect of resources (SME groups, PKK groups & Karang Taruna in the Village). Third, there is assistance in capital strengthening training through product sales. Fourth, jointly form infrastructure supporting activities in the utilization of local human resources and natural resources, which will be used as education and training centers. The volume of work is determined in the form of student semester credit units.

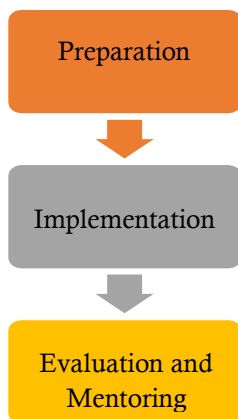


Figure 1.
Devotion Method Scheme

RESULTS AND DISCUSSIONS

Community service activity will be carried out in Kalisegoro village in 2021 and according to the timeframe as shown in table 1.

Table 1.
Service Implementation Schedule

Activity	Month						
	1	2	3	4	5	6	7
Preparation (permission)	█						
Team coordination meeting	█						
Stage 1; - Secondary data		█					
- Coordination with village officials		█	█				
- Guidance				█	█	█	
Stage 2; - Coordination with village					█	█	
- Practice					█	█	
Stage 3; - Coordination with village					█	█	
- Activity evaluation						█	
Writing draft final report						█	
Results seminar						█	
Writing the final service report						█	

Community service activities that have been carried out have succeeded in meeting several indicators such as:

1. The aquaponic cultivation training program has been implemented.
2. Assistance activities have been carried out.
3. The community can do aquaponics cultivation.

The following is an illustration of the service activities that have been carried out in the village of Kalisegoro.



Figure 2.
Community Counseling



Figure 3.
Devotion Program Explanation



Figure 4.
Community Service Team with Participants



Figure 5.
Giving Practice for Making Planting Media

CONCLUSION

Based on the implementation of the service that has been carried out, it can be concluded that this community service activity has been running smoothly, and the people in Kalisegoro village have also gained new knowledge about how to cultivate aquaponics.

This community service activity is expected to be able to implement food self-sufficiency in villages during the COVID-19 pandemic. It can increase community

income and benefit individuals and the surrounding environment.

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