Polish Aid Grant
Final Report - Kopernik

1. Organization & Program Information

Project name	Food production through aquaponics: supporting covid-19 affected communities in Bali
Project number	DWR / PPWR 2021/001 / R
Name of the institution	The Embassy of the Republic of Poland in Jakarta
Name of the partner institution/contractor	Yayasan Kopernik
Project implementation period	July - December 2021

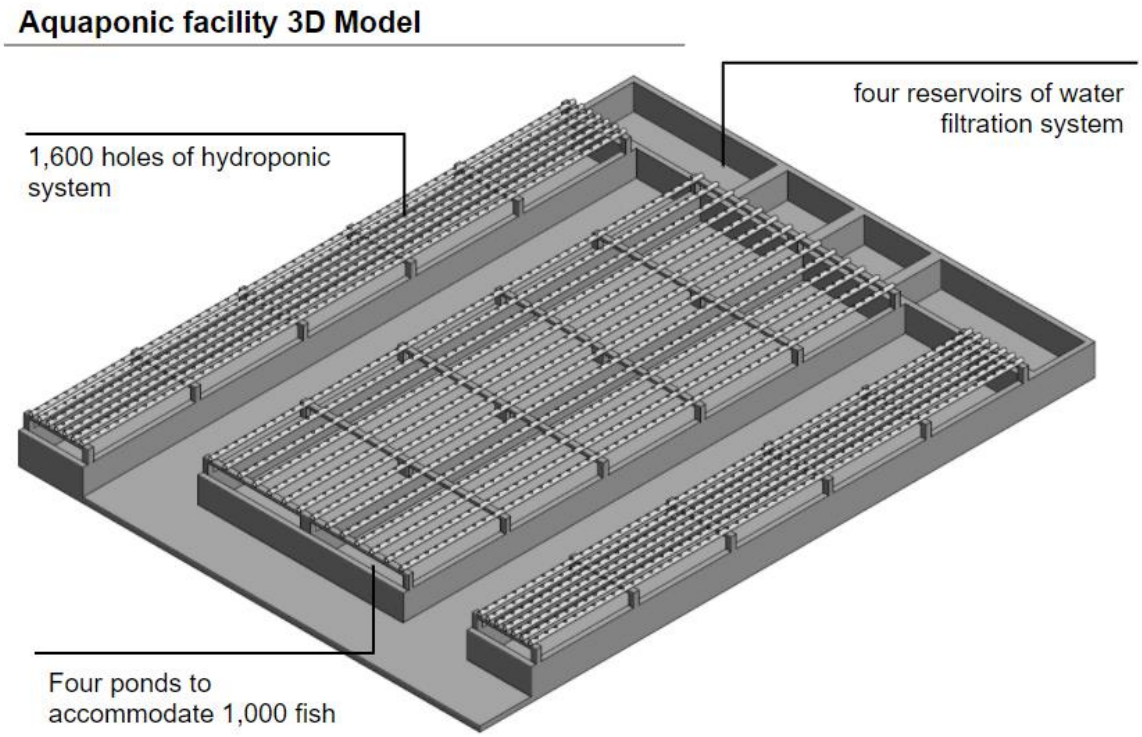
2. Description of the project implementation

2.1 Information on the achieved goal of the project

Supported by the Polish Aid, Kopernik has been able to provide support to communities impacted by Covid-19 in Bali through an aquaponic facility as an alternative source of food supply for the communities. Below are the achievements of the project implementation:

1. Establishment of a fully functioning aquaponic facility

The aquaponics facility is a combination of aquaculture and hydroponic facility, where freshwater fish are raised in a basin, and the wastewater is utilized as a nutrition source for hydroponic plants. Together with the community in Selat village, we built a greenhouse equipped with 1,600 holes on pvc pipes for growing plants, four reservoirs of water filtration system, and four ponds to accommodate approximately 1,000 fishes.



Aquaponic facility 3D model combining hydroponic and fish pond for nutrition circulation

Completed aquaponic facility after the construction process

2. Training on Aquaponic implementation for the community

In partnership with Warmadewa University, we provided training to the participating community on how to build and maintain the aquaponic facility and grow, raise plants and aquatic animals, and manage the facility. The project participants consisted of 11 women and 4 men from Selat village and neighboring villages.

During the project period, the training participants successfully grew and harvested vegetables for two growing cycles. In the first cycle, the participants chose to grow bok choy due to its high demand in the local market. After 40 days, the vegetable was ready to harvest, in which it produced around 50 kg of bok choy. In this first cycle, most of the harvest was taken home by the participants for household consumption.

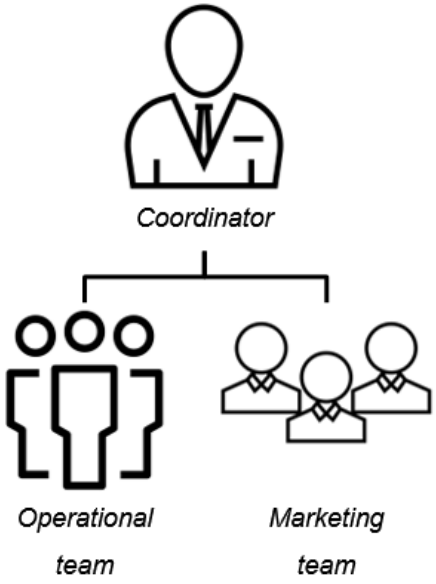
In the second planting cycle, the community participants grew an additional vegetable, lettuce, alongside bok choy. The total amount of bok choy harvested was about 35 kg, while lettuce was harvested the following week with a total production around 10 kg. In contrast with the quality of bok choy grown, the lettuce appeared yellowish as a result of less exposure to sunlight. We learned that the differences in production quantity and quality between the first

and second cycle was mainly due to the change in weather. The second planting cycle was in November during heavy rain that limited the plant growth. Nevertheless, the participants have started to sell bok choy in the local market. As for fish, it is scheduled to be harvested at the end of January 2022.

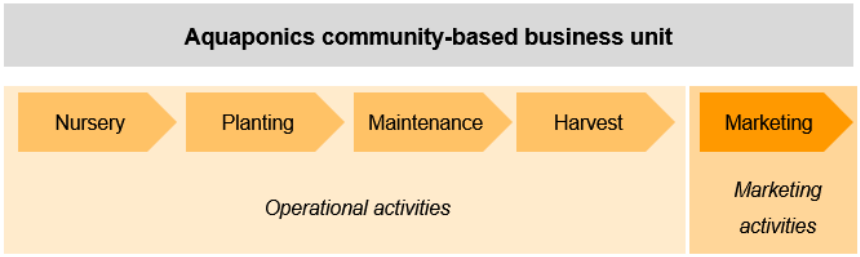
Training participants harvest vegetables from aquaponic facility

The participants have also developed a system for future facility management. They are divided into two groups: an operational group and a marketing group that will be managed by a coordinator. The coordinator was appointed to manage the facility and organize the activities. This includes coordinating with participants to plant, harvest, monitor vegetables and fish at the facility. The participants have agreed that the revenue from the harvest will be managed to cover the operational cost, labor cost, and land lease. Then the profit will be distributed to the participants once in six months during Galungan (a Balinese religious celebration day) when they need money the most.

Organizational structure of the aquaponics Community-based business unit

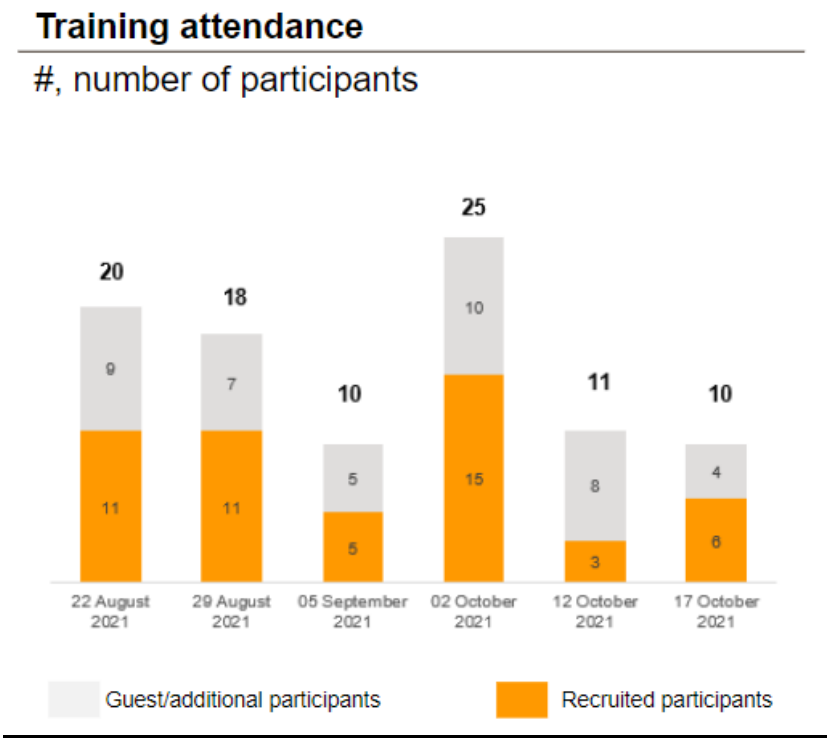


Production activities in community-based business



3. The program has attracted interests of the local government and neighboring villages to potentially adopt and replicate the initiative

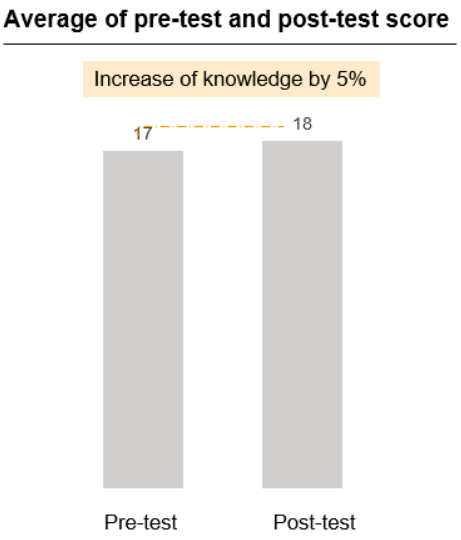
Since the implementation of this project, news about the aquaponic activity in Selat village spread out through word of mouth and has gained interest of the wider community. As a result, there were additional people who participated in the training sessions, mostly people from neighboring villages and local government representatives. On average, seven additional newcomers attended the initial six training sessions. These interests indicate that there is high potential for further adoption and replication of the aquaponic system as an alternative food source and income. They were interested to learn more about the operational side of the aquaponic system.



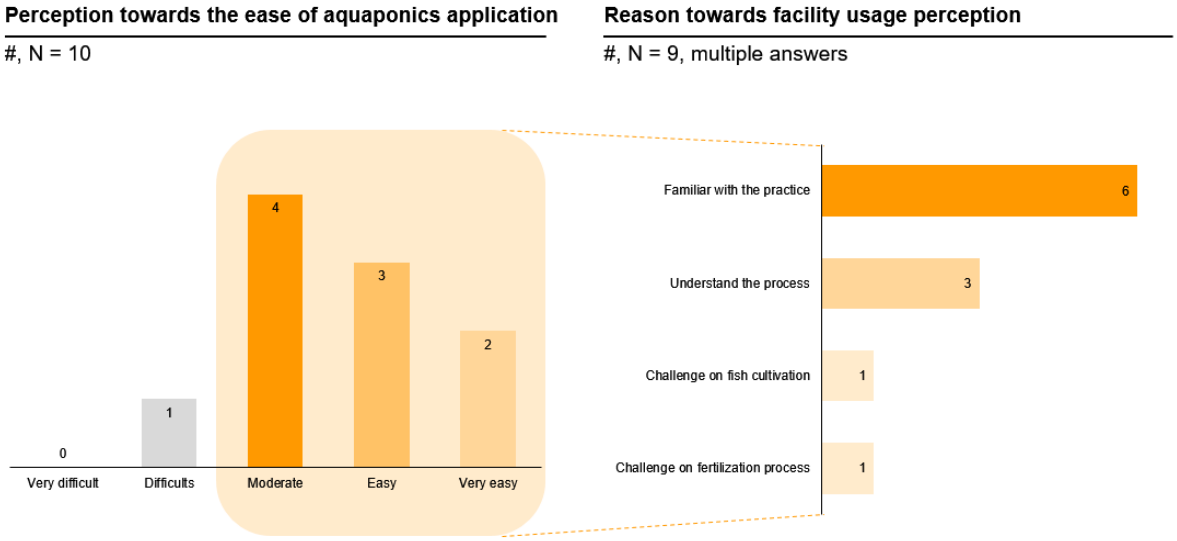
4. Participants' knowledge and skills on modern farming

The community participants are mostly farmers, which means that they have good understanding and skills on farming. Some have previously enrolled in hydroponic training held by the local government. The participants were excited when introduced to the aquaponic system because part of the system they were already familiar with (growing plants) - which means that they do not need to learn from the beginning - yet eager to learn about the integrated system of growing plants and raising fish in one facility. This was shown in our comparison of average pre-test and post-test scores of participants, where there was a slight increase in their knowledge and skills after the training sessions, due to their prior knowledge on farming and the hydroponic system.

The participants stated that the aquaponic training sessions helped them to understand the integrated system by allowing them to practice on site and experiment with different vegetable types.



Upon completion of the training sessions, most of the participants found the aquaponic system an easy process to follow. Nevertheless, there are still some aspects that they still need to get used to, for example, fish care and maintenance as well as measuring the nutrition for plants.



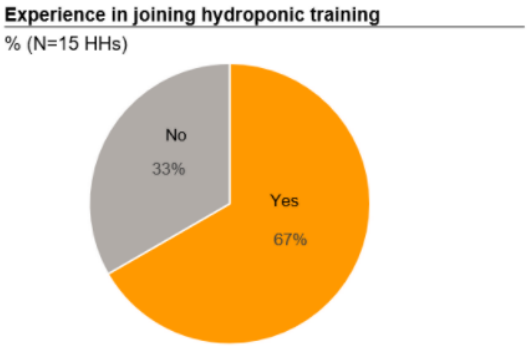
2.2 Information on the implemented activities

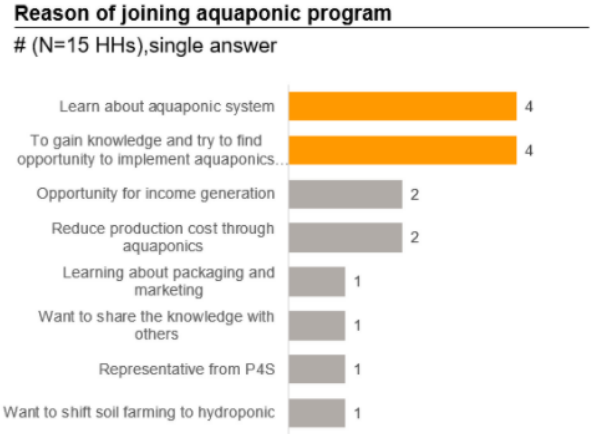
The project activities that we have successfully implemented are detailed below:

1. Baseline survey

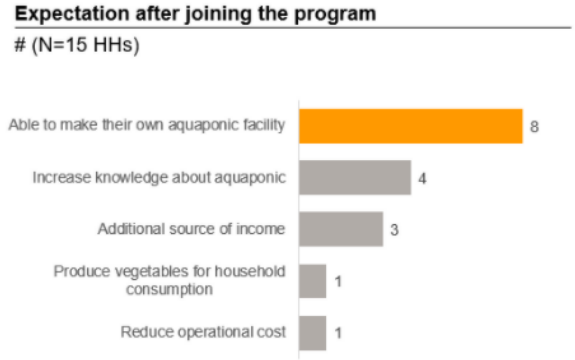
Prior to implementing the project, we conducted a baseline survey of 15 participants to understand their current household situation and motivation to join the program.

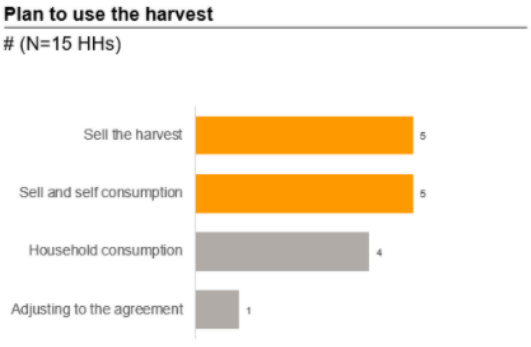
The survey result showed that most of the participants have prior experience in joining hydroponic training, however, they were still interested in joining the aquaponic training because they want to learn about the integrated system.





After the training, most of the participants aspired to own an aquaponic facility at the household level for household consumption and additional income.





2. Construction of the aquaponic facility

Together with Warmadewa University and the participating community in Selat village, we constructed the aquaponic facility that took two weeks to complete. The facility consisted of a greenhouse, with a size of 12 x 9 meters, that was equipped with 1,600 holes for planting vegetables, four reservoirs of water filtration system, and four ponds to accommodate 1,000 fish. All construction materials were locally available.

The initial construction process of aquaponic facility by creating a structure of fish pond and water reservoir filtration system

3. Participant training

Over the course of the project, we have successfully delivered nine training sessions, attended by community participants as well as other people (additional participants) who were interested in learning more about the aquaponic system. The prepared training material covered essential information from constructing the facility to marketing the product. The table below shows the detail of training agenda and the number of participants attending each session.

Session	Date	Agenda	Number of participants
1	22 August	• Pre-test • Introduction to the program • Module 1: aquaponic facility construction	20
2	29 August	• Module 2: Media and seedling, nutrition for vegetable and fish	18
3	5 September	• Module 3: Planting vegetables and system maintenance	10
4	2 October	• Module 4: Organic pesticide and packing	25

5	12 October	• Activity - Harvest of first planting cycle	11
6	17 October	• Module 6: Introduction to Product, Price, Place, Promotion (P4) marketing • Seedling for second planting cycle	10
7	5 November	• Module 6: Introduction to pricing and business analysis	18
8	11 December	• Activity - Harvest of second planting cycle • Polish embassy visit	21
9	22 December	• Module 7: Fish care and system maintenance • Post-test	23

Participants conduct group discussion during marketing training session

4. Monitoring and evaluation of the project implementation

Together with Warmadewa University, we conducted regular biweekly monitoring for each vegetable and fish cultivation process. A local community coordinator responsible for ensuring the usage of the aquaponics facility was conducting daily monitoring of the progress. To ease

the communication, the local coordinator reported to the Warmadewa University representative of any updates in the field.

Aside from the regular monitoring, we also held a short debriefing session at the end of each training session to evaluate what went well and needed improvement. These feedbacks were incorporated in the next session. For example, we added more group activities to improve active participation especially of female participants, and conducted ice-breaking games prior to training to get everyone excited and more engaged in the training activities.

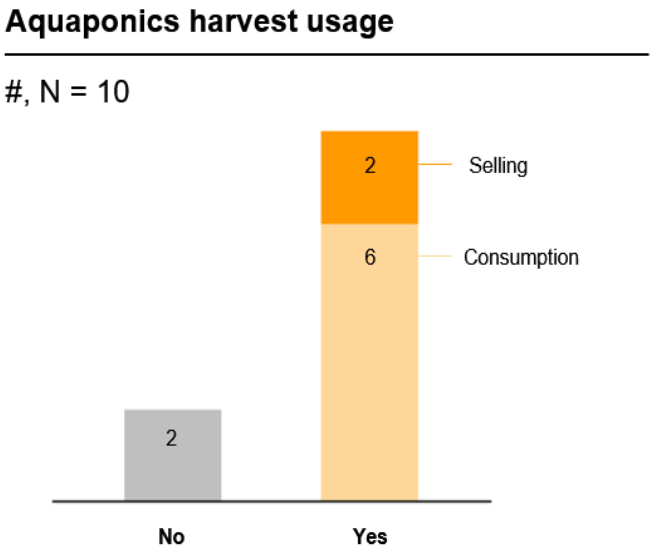
Further, we were visited by the Polish Ambassador to monitor the activities in the facility. The participants and village representatives were honored to be visited, and they expressed their gratitude for the support provided to the village. They acknowledged that the program was one of the appropriate solutions to provide healthy food and additional income to the local community, especially during the pandemic crisis. The visit was also in concurrence with the second harvesting, therefore everyone who attended the event participated in the harvesting process.

Monitoring the growth of fish cultivated in the aquaponic facility

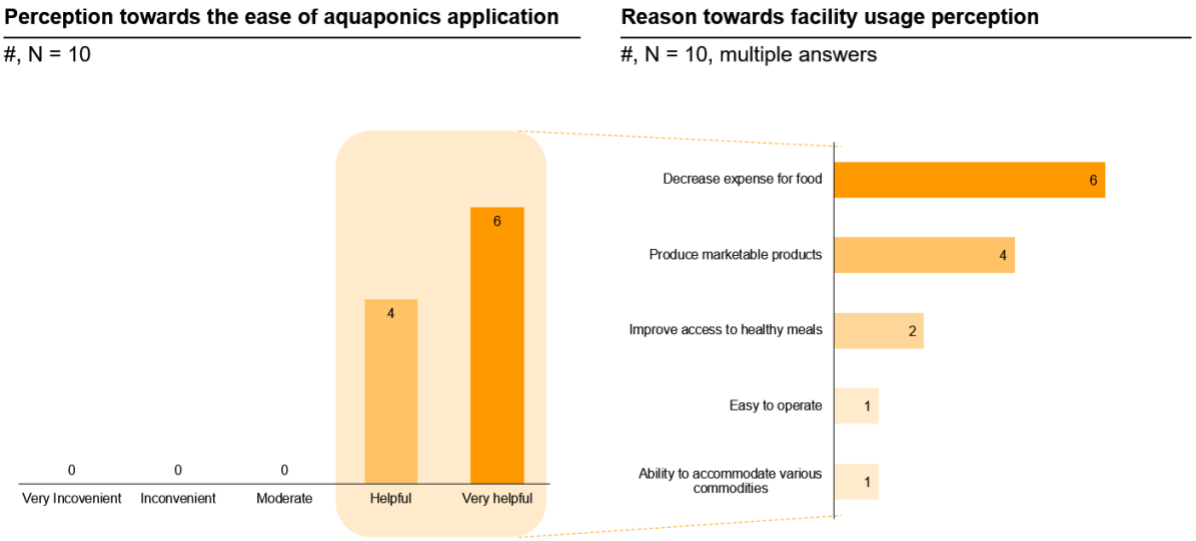
Monitoring visit from Polish Ambassador coincided with the second harvest schedule

5. Endline survey

Upon completion of the project activities, we conducted an end-line survey to understand the impact of the project on the participants. We learned that **80%** of the interviewed participants had utilized the vegetable harvest. Most used it for household consumption, while few already have a market connection selling the harvest for the group income.



Through the endline survey, we also learned that all of the participants perceived the aquaponic facility could help them in providing food for households. Most of them believe that it could decrease the expense for food as they can utilize, and produce vegetables to sell in the local market which can contribute to their income in the long run.



2.3 Changes made to the project during its implementation

There were several activities that had to be adjusted during the project implementation, these are detailed below:

1. Fish harvest

Based on discussions with experts from the university, we decided to raise Tilapia fish, as it is a type of fish that is commonly consumed in the area, high in demand and easy to raise (approximately five months until harvest time). The fish were expected to be harvested by the end of December, to then be distributed to participants (for own consumption or sale in the local market). However, the size of the fish were not yet big enough for harvest. The water flow and aeration was modified to boost fish's growth. The harvest is expected to be done in February 2022.

2. Dissemination event canceled due to the time constraint

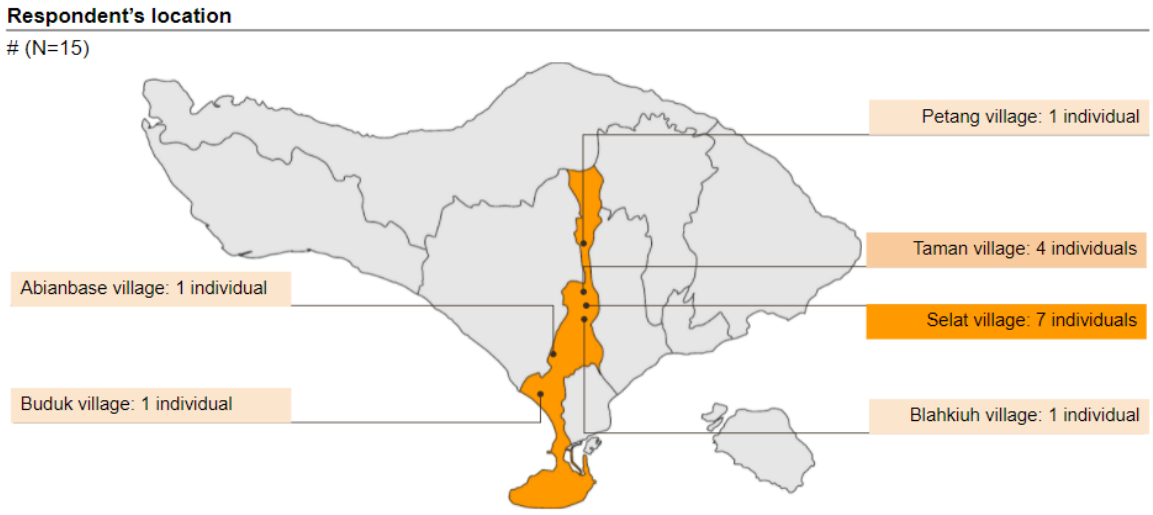
The final activity of the project was the dissemination event which was planned to be conducted in the final week of December, where we can share results and learnings of the project to relevant stakeholders. Unfortunately, we had to cancel this event to accommodate the deadline of final project reports (which was due before the dissemination event). Nevertheless, we had the opportunity to disseminate results and learnings with local government representatives, sub-district and village level officials and related stakeholders during the Polish ambassador's visit to the project site.

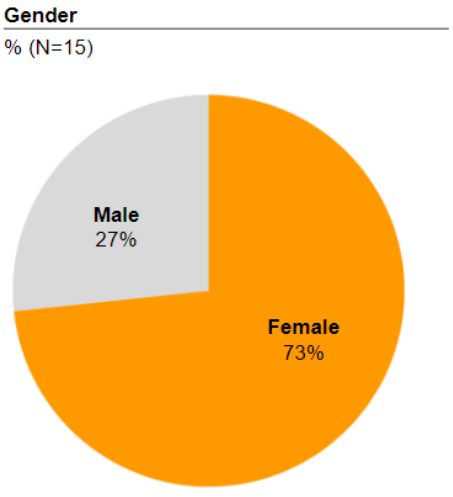
2.4 Information on the beneficiaries of the project

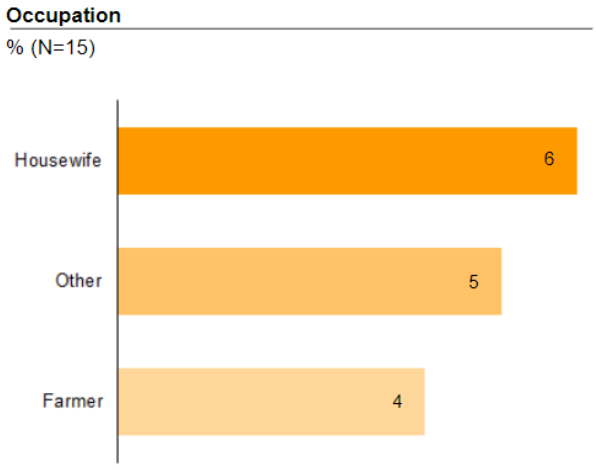
Abiansemal regency consists of 18 villages, including Selat village, that mainly depend on the agricultural sector for their livelihood. The majority of households in Selat village work as farmers who grow rice, vegetables and flowers for their own consumption and sales. The decrease of demand in the market due to the pandemic has negatively affected their income. A total of fifteen people participated in the project, mostly from Selat village and others from neighboring villages. More than half of the participants were female.

The participants and their families experienced an income reduction of 60% due to the pandemic, where they had to adjust daily food consumption by limiting protein variety, consumption frequency and reducing meal portions.

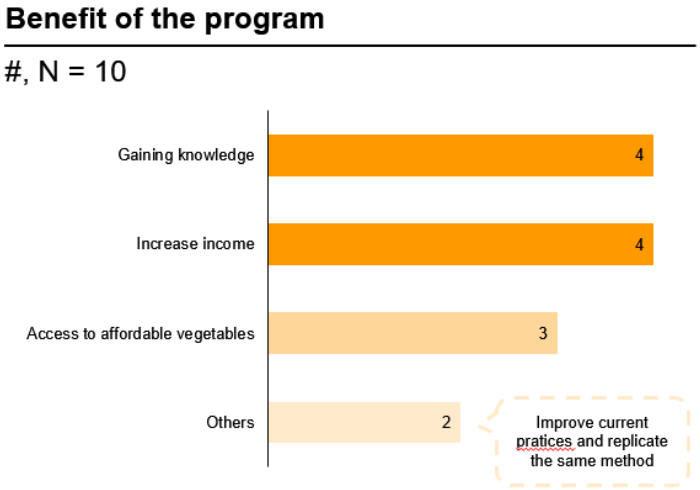
Most of the participants are quite familiar with the hydroponic system due to prior training conducted by the local government. They were excited to participate in the aquaponics training to learn about the integrated system. Upon the program completion, the participants are willing to continue the activity at the facility to generate additional income.







We have also collected participants' feedback regarding their experience being part of the program. We learned that all of the interviewed participants perceived the program to be beneficial because it could improve their knowledge, increase income, and give them access to affordable vegetables. The positive experience in joining the program motivates them to continue the usage of the facility through the established management group.



One of our female participants, Komang Ita Anggreni, said she was happy with the learning experience gained from attending the training sessions. Komang was one of many who had to switch to farming activities to survive the pandemic even though her farming skills were limited. Komang commented that she became more confident in farming as a result of participating in the training sessions. She believes aquaponic farming is a promising opportunity and hopes that through this community-based aquaponic facility, fresh vegetables and fish can be marketed widely to the other buyers. Another participant commented that the program has motivated him to replicate the system at a smaller scale to fulfill their daily household consumption and to generate additional income.

Overall, we learned that the program has brought positive learning experiences for the participants, in which it motivated them to practice modern farming techniques that are intended to support their daily needs especially during this difficult time.

2.5 Information on difficulties in the implementation of the project

1. Difficulties in determining the training schedule

The training schedule often clashes with Balinese traditional ceremonies, and women who are the main participants are heavily involved in the ceremony preparations. Further, ceremony dates often vary from one village to another. Consequently, the training schedules were often adjusted last-minute, which required us to combine some of the activities in one training session.

2. Communication with local partners

As this project involved many stakeholders, the communication flow and information source often varied, which was sometimes challenging to determine which source to rely on. To align understanding and minimize misinformation amongst partners, we conducted regular meetings and evaluation after each training session.

3. Promotion of the project

For promotional purposes, we have published several postings about the program on our social media platforms. The program was also covered by well-known local media as detailed below:

1. Kopernik's social media post

- *Instagram*
  - *8 September 2021: Fasilitas akuaponik di Abiensemal, Bali sebagai alternatif sumber pangan sudah resmi dibuka!*
  - *14 December 2021: Fasilitas akuaponik di Abiensemal, Bali - bisnis berbasis komunitas untuk ketahanan pangan*
- *Twitter*
  - *8 September 2021: Aquaponics to support the livelihood of communities affected by Covid-19*
  - *14 December 2021: Aquaponics facility in Abiensemal, Bali - a sustainable community-owned business for food security*
- *Facebook*
  - *8 September 2021: Aquaponics to support the livelihood of communities affected by Covid-19*
  - *14 December 2021: Aquaponics facility in Abiensemal, Bali - a sustainable community-owned business for food security*
- *LinkedIn*
  - *8 September 2021: Aquaponics to support the livelihood of communities affected by Covid-19*
  - *14 December 2021: Aquaponics facility in Abiensemal, Bali - a sustainable community-owned business for food security*

2. Media coverage

- *Kompas: Poland Supports Aquaponic Cultivation System in Bali*
- *Antara Bali: Aquaponic vegetables harvest*
- *Antara News: Polish Ambassador to Indonesia harvests vegetables using aquaponics system in Bali*
- *BaleBengong: Combination of Hydroponics and Aquaculture as an Alternative to Food Gardens*

3.1 Photographic material

Please attach five photos of the project implementation to the report. In order for them to be used in printed publications of the Ministry of Foreign Affairs, they should have a resolution of not less than 300 dpi, with a dimension of 300 mm wide. The size of a single file should not exceed 25 MB. In the next field, please provide the following information about each of the photos you upload:

• Name and surname of the photographer, or the name of the organization for which he works.
• Date and place where the photo was taken.
• Brief information about who and what the picture shows (people, situation).

Picture 1

Made Suparsa, P4S | 3 August 2021, Abiansemal | Construction process of aquaponic facility undertaken by the local labor.

Picture 2

Annisa Nurulhuda, Kopernik | 5 September 2021, Abiansemal | Aquaponic facility constructed in Selat village, Abiansemal, Bali.

Picture 3

Yuta, Kopernik | 11 December 2021, Abiansemal | Application of growing the vegetables and fish in the Aquaponic facility.

Picture 4

Randiano Tamelan, Kopernik | 2 October 2021, Abiansemal | Training session on organic pesticide and packaging.

Picture 5

Randiano Tamelan, Kopernik | 12 October 2021, Abiansemal | A training participant applied organic pesticide onto the vegetables.

Picture 6

Egi, Kopernik | 12 October 2021, Abiansemal | Female participants harvest the vegetables in the first planting cycle.

Picture 7

Yuta, Kopernik | 11 December 2021, Abiansemal | The whole team - training participants, Kopernik, Warmadewa University, and Polish Ambassador for Indonesia.

Picture 8

Egi, Kopernik | 24 December 2021, Abiansemal | A female participant monitoring fish conditions at the facility.

3.2 Results of the project (for promotional purposes)

Please describe only actually conducted actions and achieved results. The description should take around 4 short paragraphs (1000-1500 characters) including:
- Summary of results of the activities and their results (max 500 characters)
- Indication of the actual time of the implementation of the project
- Indication of the possible changes of the project (for instance omitting some of the planned activities or conducting some extra activities)
- Description on how the project has led or may lead to a sustained change for the beneficiaries and how the project can continue to bear fruits after it has been concluded.

Supported by the Polish Aid, Kopernik has been able to provide support to communities impacted by Covid-19 in Bali through an aquaponic facility as an alternative source of food supply for the communities. This project was conducted in Abiansemal from July to December 2021. We provided training to the participating community on how to build and maintain the aquaponic facility and grow, raise plants and fish.

Since its implementation, the program has attracted interests of the local government and neighbouring villages to potentially adopt and replicate the initiative. As a result, there were additional people who participated in the training sessions. These interests indicate that there is high potential for further adoption and replication of the aquaponic system as an alternative food source and income.

Due to time constraint, we had to cancel the dissemination event which was planned to be conducted in the final week of December, where we can share results and learnings of the project to relevant stakeholders.

The community participants have agreed on a management system to operate the facility as well as a profit-sharing mechanism. With these resources, we hope the community will continue to use the facility as an alternative way to support their daily needs.

Overall, we learned that the program has brought positive learning experiences for the participants, in which it motivated them to practice modern farming techniques that are intended to support their daily needs especially during this difficult time.

4. Additional materials from the project

(Please attach any additional materials – documents, publications, films, recordings etc. Two attachments possible, each of max. 25 MB (each of them could be a collection of files packed by Zip or RAR). If more attachments are available, please upload them to an external disc and provide a link.

- *Video summary of the project*
- *Printed media publication*
- *Kompas Dewata TV News coverage*