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Fish Farming in Buckets (Budikdamber) as an Effort to Provide Self-Sufficient Food and Alternative Income

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Abstract: This program was proposed to overcome food problems, limited land for farming and additional income for the society in urban areas. The aquaponics in the bucket technique is a relevant solution to be implemented nowadays for urban communities faced with the increase in food prices issue on the market, as reported by target partners. Implementing aquaponics also has the potential to be an alternative income as this produces commodities with selling value. The implementation of this program involves PKK RW members in Bangunharjo as potential partners due to their background as housewives with a high need for a variety of food ingredients and a source of additional income for the family. This program was implemented for six months, from April until September 2023, covering the preparation, practice, evaluation, and assessment stages using the Participatory Learning and Action method. The results showed quite satisfactory results, with an average of 2 harvests of plants being carried out by each partner group and a mortality rate of farmed fish of 16% or 45 of 280 catfish fingerlings.
Keywords: aquaponics in the buckets; food; income

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INTRODUCTION

This community service program was conducted in RW 1, Bangunharjo Village, Semarang. Bangunharjo Village is one of the densely populated areas in the centre of Semarang, with a population of more than 2,900 people and an area of about 25 hectares, as accessed from the official website of Semarang Central Subdistrict government in 2023. Most residents work in the micro-business sector, which is the main source of family income. Observations indicate that many residents complain about uncertain incomes and frequently experience shortages to meet their family needs. Additionally, various limitations hinder them from seeking alternative additional income, such as limited capital and knowledge to create supporting businesses, as they believe that starting a new business requires significant capital. In terms of time flexibility, many residents, especially women in this area, have opportunities to be productive, but the lack of guidance results in the underutilization of available time. Therefore, this community service program is implemented to empower women in the Bangunharjo Village area,

given their significant role in improving the community's overall welfare and, specifically, for families.

The role of women in families is increasingly important in the era of modernization (Mafriana et al., 2023; Yuniningsih & Suhartini, 2018). Women must manage families and assist the head of the family in supporting the economy, especially for middle and lower-economic families. Regarding family needs, women are crucial in providing healthy food with various self-prepared menus, reducing excessive spending on daily consumption. However, rising food prices demand that women be more creative in saving while still providing the best for their families.

The following is the atmosphere of Bangunharjo Village as shown in Figure 1.

Figure 1 Bangunharjo Village

In terms of supporting the economy and saving on family consumption, women are also required to generate additional income (Yuniningsih & Suhartini, 2018), as some families farm, and the income of one head of the family is still insufficient. Therefore, fish and vegetables in buckets, proposed in this community service program, is considered as one solution that can be applied by the community, including housewives, to address the issues of providing self-sufficient food and generating income, even with limited capital and land (Baganz et al., 2022; Ifada & Setyawan, 2022).

Fish and vegetable farming in buckets (Budikdamber) is a modification of the aquaponics method. Both technologies combine fish breeding and, especially, vegetable farming efforts simultaneously. However, the difference lies in the main medium used. Aquaponics requires pumps and filters, necessitating electricity, extensive land, and expensive costs for its functionality. This method is considered quite complex for amateur communities to practice. In contrast, Budikdamber only requires buckets and other environmentally friendly supporting materials. Budikdamber requires easy maintenance and does not utilize chemicals. The bucket serves as a container for fish and a place to store or place hydroponic vegetable pots that are watered using the aquaculture medium because the wastewater from Budikdamber can become good organic fertilizer for the vegetables. In terms of harvest results, both methods are promising as long as they are managed correctly and consistently.

The implementation of Budikdamber has various benefits for practitioners. Some of these benefits include providing an alternative food solution, utilizing minimal land, and generating additional income. Budikdamber can be applied to various types of fish tolerant of low oxygen, such as catfish, catfish, snakehead fish, and gourami. Furthermore, this method can also be applied to farming various types of vegetables, such as water spinach, spinach, lettuce, mustard greens, and bok choy. Thus, alternative food sources from fish and vegetables can be met with this method. Additionally, as Budikdamber only uses buckets with a size of 15-20 litres and water as the main medium, it only requires a little land but only minimal space, as commonly found in urban areas for bucket storage. If

consistently implemented with proper maintenance, Budikdamber also has the potential for a profitable business product as the harvest can be sold to neighbours, relatives, or in the market.

The results of this activity are expected to empower the partner community, especially women, with adequate time flexibility to carry out a self-sustaining farming program. Additionally, it is hoped that residents can obtain alternative additional income by selling the harvest and saving expenses by consuming self-produced items.

The activity's achievements were periodically evaluated during the mentoring period and measured based on the physical progress of the cultivation, i.e., the reproduction of the fish and vegetables being cultivated. Other measures were assessed based on partner statements regarding the benefits derived from aquaculture, whether the fish and vegetables can be consumed, saved as income, or sold, generating additional income for the community.

Previous community service programs presented the advantages of Budikdamber with fish and vegetable yields for communities facing various limitations such as limited space, complex methods, and limited capital (Anifah et al., 2022; Ifada & Setyawan, 2022; Ratna et al., 2022). Furthermore, some other activities also utilized Budikdamber specifically for catfish breeding as a home business (Adriansyah et al., 2020; Nasution & Prayogi, 2018). Fauza et al. (2021) explained the advantages and challenges of applying aquaponics with more complex equipment than Budikdamber. Research on the importance of empowering women has also been discussed previously (Handayani et al., 2019; Kusumawardhani et al., 2020; Sugiyani et al., 2017).

METHOD

The mentoring of Budikdamber for partners in this program was carried out for 6 months, from April to September 2023. The implementation of this activity adopted the Participatory Learning and Action (PLA) method, involving participants in learning and practice from the preparation phase to the final assessment. Until the program concludes, all farming equipment was handed over to representatives of PKK groups for independent management. Figure 2 illustrates the stages of implementing PLA in mentoring Budikdamber.

In the preparation stage, the initiators begin by identifying relevant community issues to be programmed in community empowerment. Problem detection is conducted through visits to observe the potential and challenges in the partner area and informal interviews with randomly encountered residents. Subsequently, an analysis of various alternative programs is developed and proposed to local stakeholders until the Budikdamber program is agreed upon for implementation for partner communities. The stages of implementing Budikdamber assistance are shown in Figure 2.

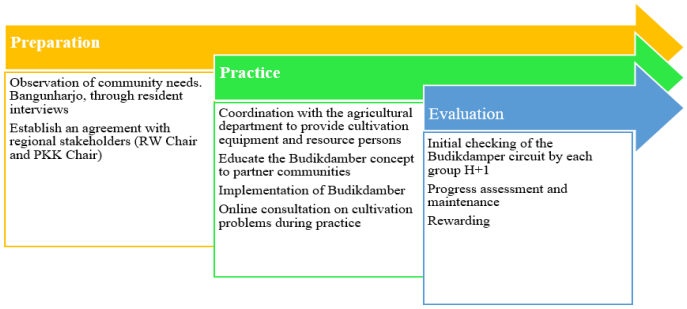

Figure 2 Stages of Budikdamber mentoring implementation

The next stage involves the practical implementation of the Budikdamber program. Based on agreements with local stakeholders and the proposing team, the initiators coordinate with the Semarang City Agriculture Office to provide input for the community's practical implementation of the Budikdamber program.

Two speakers, representing the Semarang City Agriculture Office and the proposing team, conduct education based on their respective fields of expertise. Subsequently, Budikdamber is carried out independently by participant groups that have been designated, with guidance from the proposing team coordinating with representatives of the Semarang City Agriculture Office through online consultations.

Each group's progress in Budikdamber is periodically evaluated. The first evaluation concerns the readiness of the Budikdamber media on the first day of training. Subsequently, direct reviews are conducted once a month until the harvest period. Evaluations also concern plant fertility, the survival rate of cultivated fish, and the utilization of cultivated plants with a faster harvest cycle for family consumption.

RESULTS AND DISCUSSION

Due to limited available land, farming or gardening activities are challenging to find in urban residential areas. However, this is not impossible, especially for people who understand that cultivating fish and plants in buckets requires only minimal space. This concept is also known as aquaponics, which combines fish breeding and plant farming in an integrated system (Yep & Zheng, 2019). Essentially, this technique combines aquaculture and plant farming with water as a substitute for soil (hydroponics). There is an application of technology in one system where nutrient-rich water from aquaculture is used as fertilizer for plants cultivated in aquaponics. Aquaponics has been present since the early development of aquaculture in China about 2000 years ago and has been applied in many countries worldwide to utilize limited land (Baganz et al., 2022; Palm et al., 2018). In their study on aquaponic trends, Baganz et al. (2022) stated that aquaponics has become increasingly popular over the last two decades due to the growing public interest in the technology. More and more people are utilizing this technique due to its various advantages, including 1) very affordable capital requirements; 2) easily accessible equipment; 3) only requiring minimal space; 4) being able to cultivate two commodities simultaneously, namely plants and fish; 5) easy maintenance and sustainable harvesting (non-seasonal). Understanding these advantages makes aquaponics an appropriate alternative to be promoted in urban communities, including in the Bangunharjo village area, Semarang.

As explained in the objectives of this program, which is empowering PKK groups in the Bangunharjo village to provide self-sufficient food to reduce family consumption expenditures, this program is organized as part of the proposing team's contribution to the community through community service activities. To achieve the objectives of this program, various agendas have been implemented from the preparation stage to evaluation and assessment. In the preparation stage, the initiators obtained information from community complaints regarding the increase in prices of staple foods, resulting in significant consumption expenses. The community hoped for a program that could be a solution to reduce consumption spending and be easily applied, leading to the agreement to implement the Budikdamber mentoring program for

PKK groups in RW in the Bangunharjo Village.

41 mothers participated in the Budikdamber mentoring program, representing four neighbourhood units (RT) under the management of PKK RW in Bangunharjo Village. The practical stage began with a socialization activity by two speakers to educate participants. The first speaker represented the Semarang City Agriculture Office, which was involved by the proposing team as an expert in the Budikdamber technique. In their presentation, participants received explanations about the advantages, disadvantages, threats, and opportunities of the Budikdamber technique. The following socialization documentation is shown in Figure 3.

Figure 3 Documentation of socialization

Additionally, various types of fish and plants suitable for farming in Budikdamber were explained, including catfish, tilapia, and catfish for fish, lettuce, mustard greens, and water spinach for plants. Participants also gained an understanding of various Budikdamber models, including those without drainage, those with drainage, and those using filters and aerators. The speaker then provided examples of Budikdamber construction practices with drainage and explained its application in a simple manner, as well as the maintenance of Budikdamber by non-agricultural community members. The next speaker explained the potential financial results of Budikdamber from an economic perspective. The procedure for making budikdamber media is shown in Figure 4.

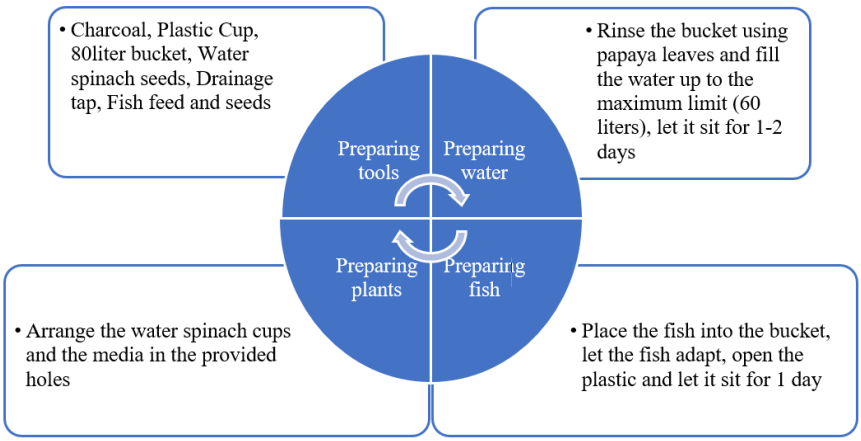

Figure 4 Procedure of making Budikdamber media

This speaker, part of the proposing team and a faculty member in the Faculty of Economics at Sultan Agung University, discussed the benefits of

reducing family expenses from a consumption aspect with various food items such as vegetables and fish. The speaker also explained the analysis of the proportion of family expenses applied to various needs, including education, entertainment, savings, food, and others. In fact, food and education are the largest spending categories at the family expense level. Additionally, participants were informed about the potential additional income that could be obtained from the results of Budik Damber, highlighting that the benefits of Budikdamber reduced expenses and increased income.

The socialization activity continued with the practical implementation of Budikdamber construction following the procedure outlined in Figure 6. During the practical session, participants tried their hand at the equipment provided for training under the guidance of the speakers. By the end of the socialization activity, participants were divided into several groups corresponding to their respective neighbourhood units (RT) for ease of coordination.

Each group received a Budikdamber kit to be managed collectively. Throughout the mentoring period, participants engaged in online consultations and coordination through WhatsApp with the proposing team and representatives from the City Agriculture Office who served as speakers.

The evaluation results on Day 1 showed that the initial stages were well-executed by participants, as reported through photos of the assembled Budikdamber systems with water spinach plants standing upright. The plants had initially started wilting during the waiting period at the training. Additionally, 70 catfish for each kit were successfully placed into the buckets alive, and the farming process commenced. The first evaluation after three weeks yielded the following results:

1) Group 1:
- Some water spinach plants were partially cut as they started turning yellow.
- Catfish experienced a mortality rate of 7 individuals.

2) Group 2:
- Water spinach plants were still thriving in cultivation.
- Catfish experienced a mortality rate of 9 individuals.

3) Group 3:
- Water spinach plants were still thriving in cultivation.
- Catfish experienced a mortality rate of 6 individuals.

4) Group 4:
- Water spinach plants were still thriving in cultivation.
- Catfish experienced a mortality rate of 6 individuals.

The Budikdamber practice is shown in Figure 5.

Figure 5 Budikdamber practice

The interview results with the group coordinators indicated several challenges in the initial stages of cultivation. One obstacle was the prolonged dry season, which resulted in high temperatures that raised concerns about the plants' ability to withstand the intense heat. Additionally, information was obtained from Groups 1 and 2 stating that water spinach had been harvested and could be consumed as food for two families represented in the project.

The second evaluation was conducted in the sixth week, showing that the Budikdamber was still functioning well, and all groups had separated the fish into different sizes. However, reports also mentioned an increase in mortality, with an additional three individuals (Group 1), four individuals (Groups 2 and 4), and six individuals (Group 3). Finally, the evaluation was carried out in the twelfth week, reporting that some fish had been harvested in all groups, although not in large quantities, as not all fish had reached a significant size.

Figure 9 Harvesting observation after activity

Harvesting was done gradually, with an average of 8-10 individuals per day. Until the mentoring period ended, participants expressed satisfaction with the Budikdamber results and planned to continue independently. Based on the assessment during the mentoring period, the group from RT 4 emerged as the best-performing group, receiving a reward in the form of a Budikdamber kit and cash. Representatives from RT 1 mentioned that Budikdamber was easy to implement and provided significant benefits for mothers facing shopping limitations. They planned to experiment with other fish and plants in the next phase.

CONCLUSION

Community empowerment requires massive support from various sectors, including the government, academia, and the target community. The strategic potential of each region may vary, necessitating effective approaches to understanding community needs. As demonstrated by the community service team from the Faculty of Economics at Unissula, Budikdamber mentoring is one relevant alternative solution to the needs of the Bangunharjo community. The achievement of results that are in line with expectations motivates the continuation of this program with further development topics, especially related to the management of harvests, to maximize the benefits. Moreover, Budikdamber mentoring is highly feasible for implementation in other urban areas.

REFERENCES

Adriansyah, A. F., Widyasari, N., Utami, A., Santi, P., & Istiqomah, S. (2020). Budidaya lele rumahan sebagai usaha sampingan untuk meningkatkan kesejahteraan rumah tangga di dusun aik rayak timur i. *Seminar Nasional Pengabdian Masyarakat 2020 Universitas Muhammadiyah Jakarta*, 1–12. http://jurnal.umj.ac.id/index.php/semnaskat

Anifah, E. M., Nugrahaeni, K., & Winarni. (2022). Budidaya lele dan kangkung dalam ember dengan pendekatan pemberdayaan masyarakat. *J-Dinamika: Jurnal Pengabdian Masyarakat*, *7*(2), 208–213.

Baganz, G. F. M., Junge, R., Portella, M. C., Goddek, S., Keesman, K. J., Baganz, D., Staaks, G., Shaw, C., Lohrberg, F., & Kloas, W. (2022).

The aquaponic principle—It is all about coupling. *Reviews in Aquaculture*, *14*(1), 252–264. https://doi.org/10.1111/raq.12596

Fauza, N., Wardana, A. A., Pratiwi, A., Winalda, B., Putri, D. M., Tihanum, D., Dwinda, D. A., Anika, H. J., Bramuli, J., Hafiz, M. F., & Fernando, M. R. (2021). Akuaponik sebagai sarana pemberdayaan masyarakat Labuhbaru Barat dalam konsep urban farming. *Transformasi: Jurnal Pengabdian Masyarakat*, *17*(2), 269–278. https://doi.org/10.20414/transformasi.v17i2.3778

Handayani, W., Irbayuni, S., & Susilowati, L. (2019). Pendampingan komunitas produsen kecap skala rumah tangga di kelurahan putat jaya kecamatan sawahan kota surabaya. *Engagement: Jurnal Pengabdian Kepada Masyarakat*, *3*(1), 106-112. https://doi.org/10.29062/engagement.v3i1.54

Ifada, L. M., & Setyawan, H. (2022). Pelatihan budikdamber untuk meningkatkan ketahanan ekonomi di masa pandemi. *Jurnal Penamas*, *6*(2), 115–118. https://www.unisbank.ac.id/ojs/index.php/penamas/article/view/8929

Kusumawardhani, R., Kurniawan, I. S., Maulida, A., & Cahya, A. D. (2020). Pelatihan ukm rumahan industri pangan sebagai upaya meminimalkan kendala berwirausaha. *Jurnal Pengabdian Kepada Masyarakat (Indonesian Journal of Community Engagement)*, *6*(1), 23-28. https://doi.org/10.22146/jpkm.46438

Mafriana, S. B., Muzdalifah, S., Purboningsih, D., Utami, J. P., Saputra, M. R. B., & Arini, N. P. (2023). Program pemberdayaan masyarakat berbasis eco-green kepada kelompok pengajian perempuan di kelurahan landasan ulin tengah kota banjarbaru. *Bubungan Tinggi: Jurnal Pengabdian Masyarakat*, *5*(1), 88-94. https://doi.org/10.20527/btjpm.v5i1.6463

Nasution, M. I., & Prayogi, M. A. (2018). Pemberdayaan masyarakat dan penerapan teknologi budidaya ikan lele sebagai usaha warga masyarakat kota binjai. *Khadimul Ummah*, *2*(1). https://doi.org/10.21111/ku.v2i1.2655

Palm, H. W., Knaus, U., Appelbaum, S., Goddek, S., Strauch, S. M., Vermeulen, T., Jujakli, H. M., & Kotzen, B. (2018). Aquaculture international towards commercial aquaponics: A review of systems, designs, scales and nomenclature. *Aquaculture International*, 813–842.

Ratna, Radjawane, C., Loupatty, E., Noya, E., & Fahrizal, A. (2022). Pemberdayaan masyarakat melalui budikdamber serta peningkatan konsumsi ikan menghadapi pandemi covid-19 di matalamagi, sorong. *Abdimas: Papua Journal of Community Service*, *4*, 48–52.

Sugiyani, Y., Munandar, T. A., & Harsiti, H. (2017). Pemberdayaan ibu rumah tangga usia produktif melalui pembinaan wirausaha mandiri mini konveksi. *Wikrama Parahita: Jurnal Pengabdian Masyarakat*, *1*(1), 33-40. https://doi.org/10.30656/jpmwp.v1i1.359

Yep, B., & Zheng, Y. (2019). Aquaponic trends and challenges – A review. *Journal of Cleaner Production*, *228*, 1586–1599. https://doi.org/10.1016/j.jclepro.2019.04.290

Yuniningsih, Y., & Suhartini, D. (2018). Pemberdayaan perempuan nelayan melalui pelatihan pengolahan hasil

ikan menjadi krupuk bernilai ekonomis di desa gisikcemandi kecamatan sedati kabupaten sidoarjo. *Engagement: Jurnal Pengabdian Kepada Masyarakat*, *2*(1), 51–61. https://doi.org/10.29062/engagement.v2i1.23