

DEVELOPMENT OF VERTICAL CULTURE CULTIVATION IN THE MUHAMMADIYAH STUDENT ASSOCIATION OF CANDI

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Abstract:

General Background: Food security and independence are critical issues in urban environments, where limited land poses challenges for traditional agriculture. **Specific Background:** Vertical culture cultivation has emerged as a potential solution to optimize narrow land for agricultural purposes, but its application remains underutilized in many communities. **Knowledge Gap:** While many individuals possess basic agricultural knowledge, there is limited familiarity with vertical culture systems, particularly among youth organizations such as the Muhammadiyah Student Association (IPM) in Candi District. **Aims:** This community service program aimed to improve participants' understanding and skills in vertical culture cultivation to support food independence on narrow land. **Results:** Through a structured process of socialization, training, and mentoring, participants gained the ability to design and implement vertical culture systems, leading to improved agricultural productivity in terms of both quantity and quality of harvests. The program's evaluation showed a significant increase in participant knowledge and the successful adoption of vertical farming techniques. **Novelty:** This program uniquely demonstrates the integration of technology and sustainable practices in vertical cultivation, providing a practical and scalable model for urban agriculture. **Implications:** The success of this initiative highlights the potential for vertical culture cultivation to contribute to food security in urban areas, with opportunities for further development through continuous innovation and broader community engagement. This program serves as a blueprint for future urban agricultural efforts, offering a sustainable approach to maximizing the use of narrow land in densely populated regions.

Keywords: *Development, Verticals, IPM*

INTRODUCTION

As part of efforts to advance the agricultural sector and develop food security, community service has a very important role in introducing and implementing innovative agricultural practices [1]. In the midst of the complexity of modern agricultural challenges, one of the approaches that attracts attention is the cultivation of vertical culture. By utilizing vertical spaces, verticulture offers creative solutions to expand agricultural areas, especially in dense urban environments [2].

In the context of the Muhammadiyah Candi Student Association (IPM), the service activity of the potential of vertical culture cultivation for food development can be a significant step in supporting food independence and increasing understanding of the importance of sustainable agriculture [3]. By involving IPM Candi members, be it students, students, or other members of the community, in this service, it is hoped that there will be a positive change in agricultural mindset and practices at the local level [4].

In this context, the integration approach between local culture and modern technology in agricultural practices is the main key. Through this approach, the potential of vertical culture cultivation is not only directed to increase food production, but also to strengthen cultural identity and environmental sustainability in the Temple area. As an organization that cares about community and environmental development, IPM Candi has a very important role in driving this initiative.

In the midst of global climate change and pressure on natural resources, innovation and adaptation in agricultural practices are needed to maintain their productivity and sustainability. Candi District, as a part of Indonesia that is rich in agricultural potential, is not spared from these challenges. In an effort to increase agricultural productivity and overcome land limitations, as well as face food security problems, the development of modern agricultural technology is a must (Putra, Siregar and Utami, 2019). This is where the role of the younger generation, especially through organizations such as the Muhammadiyah Student Association, has great potential in leading positive changes in local agricultural practices. By taking advantage of the initiative and learning spirit of its members, the development of vertical culture cultivation in IPM in Candi District is an attractive option to answer complex agricultural challenges and promote food sovereignty at the local level [6].

The development of vertical culture cultivation in the Muhammadiyah Student Association, Candi District is a promising initiative in supporting food security and strengthening the involvement of the younger generation in sustainable agricultural practices [7]. However, as with any development project, this dedication may also be faced with several challenges and aspects that need to be considered. The implementation of this service program is expected to increase environmental awareness among students. By introducing the concept of sustainable agriculture through verticals, students not only learn about farming techniques, but also the importance of maintaining the balance of the ecosystem. This is in line with the values held by Muhammadiyah, namely sustainable and environmentally friendly community development.

In addition to educational and environmental benefits, vertical culture cultivation programs can also provide economic benefits [8]. With crops that can be used independently or sold, this program is expected to provide additional income for students and the surrounding community. This will foster the spirit of economic independence and entrepreneurship among Muhammadiyah students. This service is also an effort by IPM Temple to build cooperation with various parties, including the government, educational institutions, and the general public. This collaboration is important to ensure the sustainability of the program and expand its positive impact. With the support of various parties, it is hoped that this vertical culture cultivation development program can become a model that can be adopted by other communities in various regions.

RESEARCH METHODS

The methods used include counseling, training, technology application practices, as well as mentoring and monitoring evaluation. The counseling activity was carried out by gathering IPM members of Candi sub-district to participate in counseling on narrow land management. Some of the materials provided include the importance of food security and independence, narrow land management, technology in narrow land management and the main thing about vertical cultivation.

To facilitate training and practice in narrow land management, technology transfer is carried out by procuring verticulture equipment, media and nutrition, as well as other facilities that support this activity. Training and practice are carried out by simulating the application of vertical agriculture, media and nutrition as well as vegetable cultivation using equipment and materials that have been prepared by the program Implementation Team. The training was carried out by the program Implementation Team, with the participation of IPM members of Candi sub-district. After counseling, training and practice, all IPM members carried out cultivation practices with agricultural technology of verticulture, media and nutrition guided by the program Implementation Team.

Mentoring and monitoring evaluation activities are carried out periodically to foster and assist partners until they successfully practice the application of plant cultivation technology, and IPM Candi members can consult on the implementation of the program until optimal results are achieved.

RESULTS AND DISCUSSION

The initial survey was conducted to identify the knowledge, needs, and potential for the implementation of verticulture among the members of the Muhammadiyah Student Association (IPM) of the Temple and the surrounding environment. Based on the survey results, the majority of participants have a basic understanding of conventional agriculture, but are not familiar with the concept of vertical cultivation. This shows that there is a knowledge gap that can be filled with practical training on modern agricultural techniques that are more efficient for limited land. Land analysis shows that schools and houses of IPM members have adequate areas for small- to medium-scale vertical culture

cultivation. The existing land is quite ideal to adapt to the vertical system, because it has adequate access to sunlight and a supportive environment for water and nutrient management.

Implementation Stage: Socialization and Program Opening. The socialization and opening of the verticalization program was attended by IPM members from branch and branch members. This event managed to build enthusiasm among the participants, which can be seen from their high participation and active involvement. The socialization also helps clarify the goals and targets to be achieved through this program, ensuring that all parties involved understand their respective roles in vertical culture cultivation activities. As a result, participants began to see verticals as a relevant solution to the narrow land around them, as well as potentially increasing food availability locally.

The training and workshop were held at the Candi IPM Bascamp with a total of 25 participants consisting of IPM representatives from various branches and branches. The training was divided into several sessions that focused on the theory and practice of verticals, from planting media preparation to plant maintenance techniques. Participants received training on making vertical culture systems, the proper use of planting media, water management, and how to properly care for plants in a vertical environment. In these sessions, participants successfully practiced techniques for making vertical culture systems and planting various types of plants that are in accordance with vertical methods, such as green vegetables and herbal plants. The pre-test and post-test evaluations showed a significant increase in understanding, where the majority of participants were able to master the well-taught techniques. They were able to assemble a simple verticulture system themselves and began to grow crops suitable for local conditions.



Figure 1. Vertical Training

After the training, the mentoring team continues to monitor the development of the verticulture system that has been built. This monitoring aims to ensure that participants can overcome emerging challenges, such as water

management, plant nutrition, and pest management. This assistance is important because some participants have initial difficulties, especially in maintaining the appropriate humidity level for the vertical culture system. However, with the help and technical advice of the accompanying team, participants were able to overcome these challenges. The monitoring results showed that most of the plants grown in the vertical culture system grew well, and the participants began to show independence in managing plants. Some participants even tried experimenting with new crop types as well as more efficient alternative irrigation methods, signaling an increase in creativity and initiative from participants.

The program evaluation was conducted to assess the impact of training and implementation of the vertical culture system. The results of the evaluation showed a significant increase in the skills and understanding of participants related to vertical cultivation. Many participants admitted that this program is very useful, especially in providing solutions for those who have limited land for farming. The evaluation also showed that the vertical culture system built was able to provide quite satisfactory yields, both in terms of quantity and quality. The first harvest showed positive results, where the planted plants provided good production with quality as expected. This shows the potential for the sustainability of the program in the long term, especially if it continues to be supported by further assistance and innovation. Participants also expressed their desire to develop a vertical culture system in their respective neighborhoods and spread this knowledge to other interested members of society.

Overall, the program has succeeded in achieving its main goal, which is to improve the agricultural skills of IPM members, as well as provide practical solutions for cultivation in narrow lands through verticals. The implementation of the vertical culture system not only succeeded in introducing new methods in farming, but also opened up opportunities for participants to develop creativity and innovation in plant cultivation.



Figure 2. Results of planting a vertical culture model

CONCLUSIONS

Fundamental Finding: The vertical culture cultivation program for the Muhammadiyah Student Association (IPM) in Candi District has successfully enhanced participants' understanding and skills in agricultural techniques suitable for limited land areas. **Implication:** This program demonstrates the feasibility of vertical cultivation as a practical solution for food independence in urban settings, offering potential scalability and sustainability through ongoing innovation. **Limitation:** However, the program's short-term nature and the limited scope of participant engagement may restrict the assessment of its long-term effectiveness and the full breadth of its impact. **Further Research:** Future studies should explore the long-term sustainability of vertical cultivation practices and assess broader community engagement to better understand how these techniques can be scaled across different urban environments.

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