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Optimization of School Yard Utilization to Support Food Security in Adiwiyata Program Implementation at SMKN 1 Gunung Sindur, Bogor, West Java, Indonesia

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A B S T R A C T

Food security is a crucial issue in Indonesia's national development, especially in the face of challenges such as climate change, rapid population growth, and limited land resources. One strategy to address this challenge is to optimize the utilization of available land for sustainable horticultural cultivation. Vocational high schools (SMKs) can play an important role by integrating practical agricultural learning into their curriculum, particularly in line with the Adiwiyata Program, which encourages environmentally friendly school practices. This community service program was implemented at SMKN 1 Gunung Sindur, which has a school yard with untapped potential for productive use. The objective was to improve students' knowledge and skills in land management and the preparation of planting media for horticultural crops. The program was carried out through training and practical demonstrations, focusing on vegetable and fruit cultivation techniques that are efficient and adaptable to limited land conditions. The initiative was supported by PT Agrowing Agrikultura Indonesia, a supplier of high-quality agricultural products, and the Rawa Kalong Village Government. The collaboration aimed to create an educational and productive green space that could serve as both a learning laboratory for students and a contribution to local food security. The results showed increased student engagement, better understanding of sustainable agricultural practices, and the development of an eco-friendly school environment.

Keywords: Food security, Adiwiyata Program, school yard optimization, horticulture, community service

1. Introduction

Food security is a strategic issue in national development, particularly in the face of global challenges such as climate change, population growth, and limited natural resources (Arini & Pratama, 2024; Yudha et al., 2020). As a developing country with a large population, Indonesia must strengthen its agricultural sector, especially in efforts to enhance local food security (Rusdianto et al., 2023; Puryati, Kuntadi, & Basuki, 2018). Vocational high schools (SMKs) hold significant potential to support this effort through practice-based learning that integrates sustainable environmental management (Zulfarosda & Purnamasari, 2024; Khasanah et al., 2024).

This Community Service Program (PkM) represents a domestic collaboration between the PkM Team from Universitas Mercu Buana (UMB), PT Agrowing Agrikultura Indonesia as Partner 1, and the Rawa Kalong Village Government as Partner 2. The program, implemented at SMKN 1 Gunung Sindur, aims to support the school in implementing the flagship Adiwiyata Program while promoting local food security. It is designed to improve the quality of learning, foster a culture of work, and enhance students' skills through character education integrated with sustainable environmental management. The program also instills environmental awareness and maximizes school resources, such as underutilized school yards, for horticultural activities. This approach creates an educational ecosystem that supports environmental sustainability and raises awareness among students, teachers, and school staff about the importance of preserving natural resources.

The PkM program seeks to increase awareness and knowledge among students, teachers, staff, and school employees regarding sustainable environmental education and local food self-sufficiency. It emphasizes the optimization of unused school land to develop productive horticultural areas and fosters students' independence and entrepreneurial skills through hands-on horticultural practices. Through these activities, the school serves as a practical learning platform and a model for implementing sustainable environmental education.

This initiative aligns with the Merdeka Belajar-Kampus Merdeka (MBKM) policy, which provides opportunities for students to gain practical experience outside the classroom. Participating students gain hands-on experience in agricultural technology, environmental management, and agriculture-based

entrepreneurship while collaborating with schools, higher education institutions, and local communities. The program is also supported by several university students who assist in delivering practical training directly, including interactive presentations, videos, and in-field guidance. Participants receive academic credit for their involvement and contribute directly to society, particularly in education and local food security.

Moreover, the program supports several Key Performance Indicators (IKU**)** of Universitas Mercu Buana. Students acquire practical project management experience, skills in urban agriculture system design, resource management, and agribusiness entrepreneurship, enhancing their competitiveness in the workforce. Faculty members expand their networks and engage in applied research collaborations, increasing the relevance and societal impact of academic activities. The program generates replicable urban agriculture models, such as greenhouse designs and simple hydroponic systems, which can serve as references for other schools and industries. Collaborative and participatory learning approaches help students develop teamwork and leadership skills while designing technological and management solutions for efficient food production on limited land.

The program is implemented in collaboration with PT Agrowing Agrikultura Indonesia, a supplier of premium-quality agricultural products focusing on Indonesian tropical fruits, and supported by the Rawa Kalong Village Government. PT Agrowing partners with experienced farmers and applies an integrated farm management system to ensure product availability, increase productivity, and maintain quality standards (Albetry et al., 2025; Fatimah, 2020). Overall, the program equips students with the knowledge and practical skills necessary to optimize school yard utilization for local food security while reinforcing SMKN 1 Gunung Sindur's vision as an Adiwiyata model school (Arini & Pratama, 2024; Khasanah et al., 2024).

2. Methodology

This Community Service Program (PkM) was carried out using a participatory approach involving the Adiwiyata Team, which consists of students, teachers, and mentors, as well as external stakeholders, including PT Agrowing Agrikultura Indonesia and the Rawa Kalong Village Government (Arini & Pratama, 2024; Zulfarosda & Purnamasari, 2024; Albetry et al., 2025). The objective was to optimize the use of school land as a medium for horticultural cultivation while supporting the implementation of the flagship Adiwiyata Program at SMKN 1 Gunung Sindur (Khasanah et al., 2024; Rusdianto et al., 2023).

The implementation stages were as follows:

1. **Preliminary Assessment**

A site survey and needs analysis were conducted to evaluate the condition of the school yard, the availability of growing media, and students' knowledge of horticultural practices (Rusdianto et al., 2023; Masdor, Ghaida, & Handari, 2019). Interviews were held with the school management and the Rawa Kalong Village Government to identify potential collaboration and community support (Albetry et al., 2025).

2. **Training Material Design**

Training modules were developed to cover sustainable land management, preparation of growing media, horticultural cultivation techniques, and integrated pest management (Arini & Pratama, 2024; Fajar & Putra, 2021). The materials were tailored to students' educational level and aligned with the objectives of the Adiwiyata Program (Khasanah et al., 2024).

3. **Procurement of Materials and Tools**

Planting media, seedlings, and tools were prepared in collaboration with PT Agrowing Agrikultura Indonesia. Organic fertilizer was produced directly by the Adiwiyata Team using locally sourced materials (Puryati, Kuntadi, & Basuki, 2018). Selected horticultural crops included fast-growing vegetables, tropical fruits, and selected medicinal plants suitable for local climatic conditions (Masdor, Ghaida, & Handari, 2019; Fatimah, 2020).

4. **Training and Practical Implementation**

Training was delivered through interactive presentations, demonstration videos, and hands-on practice directly in the school yard. Students were divided into small groups to ensure active participation and close supervision during the planting process. The PkM team from Universitas Mercu Buana (UMB) directly guided all practical activities, ensuring knowledge transfer and skill development (Zulfarosda & Purnamasari, 2024; Albetry et al., 2025).

5. **Monitoring and Evaluation**

The evaluation of this activity was carried out using a Google Form-based questionnaire to assess the effectiveness of material delivery and students' comprehension. The questionnaire indicators included: (1) whether the material had been received previously, (2) whether the material provided was useful, (3) whether the material was easy to understand and comprehend, (4) whether the delivery of the material was clear and understandable, and (5) whether the time allocated was sufficient. In addition, plant growth was monitored weekly through checklists and direct observation, covering plant health, harvest potential, and students' practical skills. Feedback from participants and stakeholders was also collected to improve future programs (Arini & Pratama, 2024; Fajar & Putra, 2021).

6. **Sustainability Plan**

A maintenance schedule was established to ensure continuous care of the planted crops. The school assigned the Adiwiyata Team to manage the school yard sustainably, with regular assistance and guidance from the PkM Team of Universitas Mercu Buana (UMB) (Khasanah et al., 2024; Albetry et al., 2025).

This systematic methodology ensured that the program not only produced immediate results but also had a long-term impact on students' skills and the school's contribution to local food security (Arini & Pratama, 2024; Masdor, Ghaida, & Handari, 2019; Puryati, Kuntadi, & Basuki, 2018).

3. Results

The Community Service Program (PkM) conducted at SMKN 1 Gunung Sindur from March to April 2025 involved the Adiwiyata Team (students, teachers, and mentors), the Universitas Mercu Buana (UMB) PkM Team, and the Rawa Kalong Village Government. The program was implemented using a participatory workshop approach, beginning with interactive presentations and demonstration videos delivered directly by the UMB PkM team, followed by hands-on practice in the school yard. Students were divided into small groups to ensure active participation and optimal supervision throughout the planting process. Several documentations of the implementation of PkM activities are presented in Figure 1.

a. Opening the PkM activities

b. Adiwiyata team & PkM team

c. Interactive presentation

d. hands-on practice in the school yard

Fig. 1 - The implementation of PkM activities

The horticultural cultivation practices included land preparation, seedling arrangement, preparation of planting media, and the use of recycled containers such as bottles and gallon jugs as plant pots. Selected crops included fast-growing vegetables such as spinach, water spinach, and lettuce, as well as medicinal plants like ginger and turmeric. The planting media consisted of a mixture of soil, compost, and liquid organic fertilizer produced directly by the Adiwiyata Team from local organic waste, following the 5R principles (Reduce, Reuse, Recycle, Replace, Restore).

After the workshop, participants were given evaluation questionnaires via Google Form, with indicators assessing the effectiveness of the material delivery and students' understanding. Student perception was overwhelmingly positive, with 99% stating that the project-based workshop was beneficial. Observations also indicated an increase in knowledge and understanding of sustainable environmental education. Progress reports and documentation of the program were regularly prepared by the Adiwiyata Team, and some of the activity documentation is presented in the figures below. Plant growth was monitored weekly, including plant health, harvest potential, and students' practical skills, with intensive guidance provided by the UMB PkM team. The workshop evaluation results using a questionnaire are presented in Figure 2.

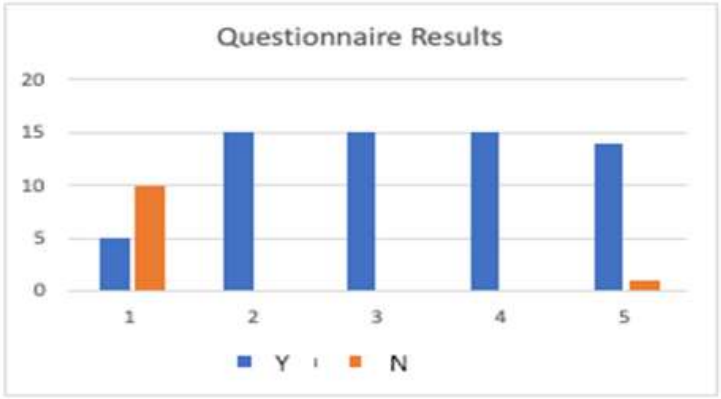

Fig. 2 - The workshop evaluation results.

The results demonstrated increased enthusiasm and active participation from both students and teachers. The establishment of a mini horticultural garden served as a hands-on learning resource, reflecting the practical implementation of sustainable environmental education and local food security. The outputs of the PkM included media coverage, accessible at https://www.metrobogor.com/sosial/107115098769/gelar-pkm-universitas-mercu-buana-dan-mitra-dukung-sekolah-adiwiyata-unggulan-di-smkn-1-gunungsindur, a video of the program implementation available on YouTube at https://youtu.be/EdNv0St2Gjk, publications detailing the program activities, and official reports prepared by the Adiwiyata Team. Overall, the program not only enhanced students' practical skills but also fostered environmental awareness and strengthened the role of the school as an Adiwiyata model, while supporting local food security. The outputs of the PkM and The Adiwiyata Team's work program report is shown in the Figure 3 and 4.

Fig. 3 - The outputs of the PkM

Fig. 4 - The Adiwiyata Team's work program report

4. Conclusion

The implementation of the Community Service Program (PkM) conducted by the lecturers and students of Universitas Mercu Buana at SMKN 1 Gunungsindur was successfully carried out and achieved its intended objectives. This program supported the implementation of the Adiwiyata School initiative through a sustainable environmental workshop project, with evaluation results indicating that 99% of students perceived the activity as beneficial. Furthermore, observations showed an increase in students' knowledge and understanding of sustainable environmental concepts.

The outputs of the program included media publication, a documentation video uploaded on YouTube, an article publication, and the Adiwiyata Team's work program report. These outcomes demonstrate the tangible achievements of the PkM activities. Thus, this program not only contributed to the university's Key Performance Indicators (IKU) and the Independent Learning–Independent Campus (MBKM) program but also generated a broader outcome in raising students' awareness and concern for sustainable environmental stewardship.

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