THE USE OF RENEWABLE ENERGY IN HYDROPONIC SYSTEMS: SOCIALIZATION AND APPLICATION OF SOLAR PANELS IN GANG HIJAU SWAKARYA, MERUYA SELATAN

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ABSTRACT

In Gang Hijau Swakarya, Meruya Selatan, there are still lots of open spaces with plenty of sunlight and plots of land surrounding residential buildings that have not been used for greening. Nevertheless, the community has not yet been able to convert sunlight into electricity using it as a renewable energy source. When used, this can save operating expenses and maximize the product's selling price. Therefore, the purpose of this community service project is to improve food security by creating an eco-friendly and effective hydroponic farming system in metropolitan areas, employing renewable energy sources, and developing and putting into practice solar cell technology. Socialization and hydroponics training are used to accomplish this aim. Through the use of renewable energy, the participants were able to comprehend and put hydroponic planting principles into practice. The result, from the questionaire, it is obtained that the average training participants strongly agree at 0.653 and agree at 0.348. The mean value is 3.652 and the standard deviation is 0.029. This indicates that the standard deviation value is smaller than the average value, so the performance can be said to be good.

Keywords: control, farming, hydroponics, solar panels, renewable energy

INTRODUCTION

In the the Gang Hijau Swakarya, Meruya Selatan, there are still parcels of land surrounding residential housing that have not been greened. Additionally, there are open spaces that are abundant in sunlight. Nevertheless, the community has not yet been able to employ sunlight as a renewable energy source for electricity conversion. This has the potential to decrease expenditure costs, thereby maximizing the product's selling price. (Muazib, 2022) Consequently, the objective of this community service activity is to improve food security by introducing and implementing solar cell technology, utilizing renewable energy, and establishing an environmentally benign and efficient hydroponic farming system in urban areas. (Muhammad, 2021) In order to accomplish this objective, socialization and hydroponics training are being implemented. Consequently, the participants were able to comprehend and execute hydroponic sowing methods through the use of renewable energy.

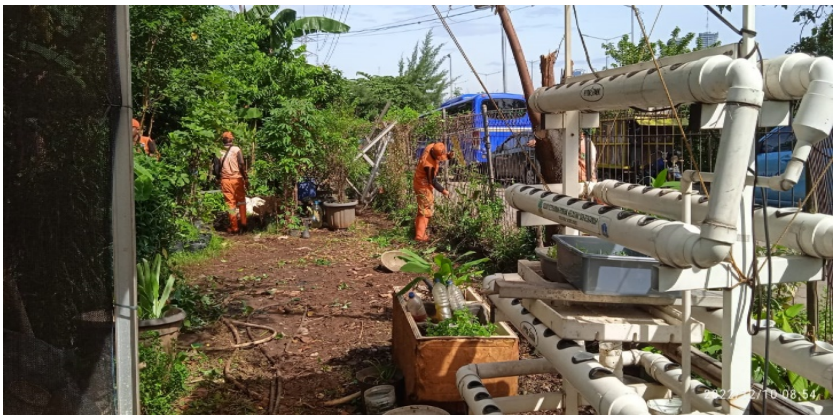

Figure 1. The hydroponic tools and open regions in the area along the outer ring toll road that have not yet been utilized

Currently, the Gang Hijau Swakarya community in Meruya Selatan, which is comprised of Family Empowerment and Welfare Community and is situated approximately 750 meters from Mercu Buana University, has implemented

hydroponic techniques in the densely populated, limited land surrounding the toll road area, alleys, yards, and rooftops of their homes. This initiative is the result of numerous training sessions that they have attended. They plant bok choy and lettuce in square containers and PVC pipelines that are 1-2 meters high. The containers are subsequently drilled and equipped with net pots to accommodate the plant seedlings. Nevertheless, the implementation of the green alley in Swakarya, Meruya Selatan has not been optimal, as the residential areas in the area have not been greened, including alleys, terraces, front yards, and the Meruya toll road. Consequently, its utilization has not been optimal, which could have been capitalized on as a potential solution to the food security crisis in a green economy. However, this objective has not been achieved. The hydroponic equipment that is currently available is not yet appropriate for the space and scale of its intended location.

The open land in Gang Hijau Swakarya, Meruya Selatan is abundant in sunlight. Other advantages include the production of vitamin D, the conversion of energy into electricity, and the support of the photosynthesis process in plants. (Sanubary, 2021) (Wirawan, 2021) Nevertheless, the community has not yet been able to employ sunlight as a renewable energy source for electricity conversion.
This activity endeavors to develop a hydroponic system (Hariadi et al, 2021)(Andika et al, 2022)(Pamuji et al, 2022)(Khairunnisak, 2022)(Budiyanto et al, 2021) and to integrate it with solar panels as a converter of solar energy into electrical energy. (Nurcipto et al, 2022)

METHODS

The steps for implementing this activity are carried out in 3 stages, with each stage involving active participation from the implementing partners. The stages are explained in Table 2 below.

Table 1. Stages of Implementing

No.	Stages of Implementing Solutions	Partner Participation
1.	Socialization Stage	
	• Conducting a survey of partner issues and the location of planned activities, as well as determining the position of the hydroponic equipment to be installed. • Conducting socialization for the community that will receive training regarding the activities that will be carried out.	Partenr conveyed information about the current situation, issues at hand, and the location of the activities.
2.	Training Stage	
	• Conducting training on hydroponic cultivation techniques	Community partners participate in training, applying hydroponic cultivation techniques starting from seedling.
3.	Evaluation Stage	
	• Conducting an evaluation of the implementation results to assess the level of understanding and skills of the community.	Community partners respond to the questions and surveys provided by the implementation team.

RESULTS AND DISCUSSION

The socialization of hydroponics-based sowing techniques was conducted on July 12, 2024, at RPTRA Mahkota in Meruya Selatan. The Meruya Selatan PKK mothers' group was represented by 29 participants at this event. This activity commences with an overview of the fundamental concepts of hydroponics, including the definitions and types of hydroponic systems, including the fiber system, DFT (Deep Flow Technique), and NFT (Nutrient Film Technique). The advantages and benefits of hydroponic cultivation in comparison to traditional methods. It is not possible. The tools and materials required to construct a hydroponic system were introduced to the participants, including a water reservoir, pump, pipelines, net pots, and growing media. (cocopeat, rockwool, etc.). Defining the varieties of nutrients that are employed in hydroponics. (macronutrients and micronutrients). Comprehending the optimal pH of water for hydroponic vegetation. A live demonstration or simulation of the process of establishing a basic hydroponic system. Afterward, a question-and-answer session and discussion were conducted to conclude the event.

In parallel, the hydroponic sowing site is also in the process of assembling system components. The implementation team connected the linking cables from the solar panels to the solar panel controller and installed solar panels on the

lightweight steel canopy roof that had already been installed. This stage entails the inspection of the equipment to ensure that each component is securely connected and functioning properly. This may include the installation of circuit breakers or fuses to prevent damage or short circuits.

Figure 2. Participants engage in hydroponic planting practice together

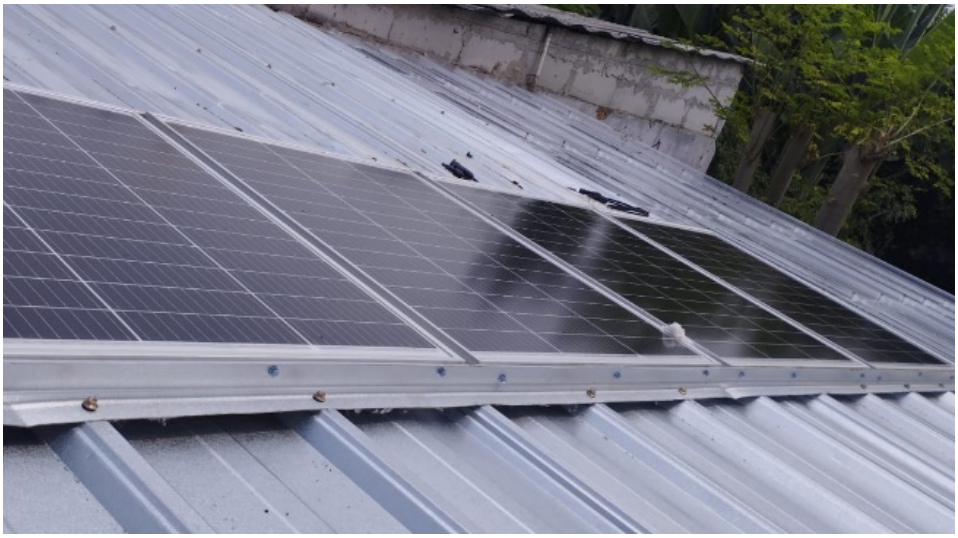

Figure 3. The solar panel is located on top of the greenhouse canopy

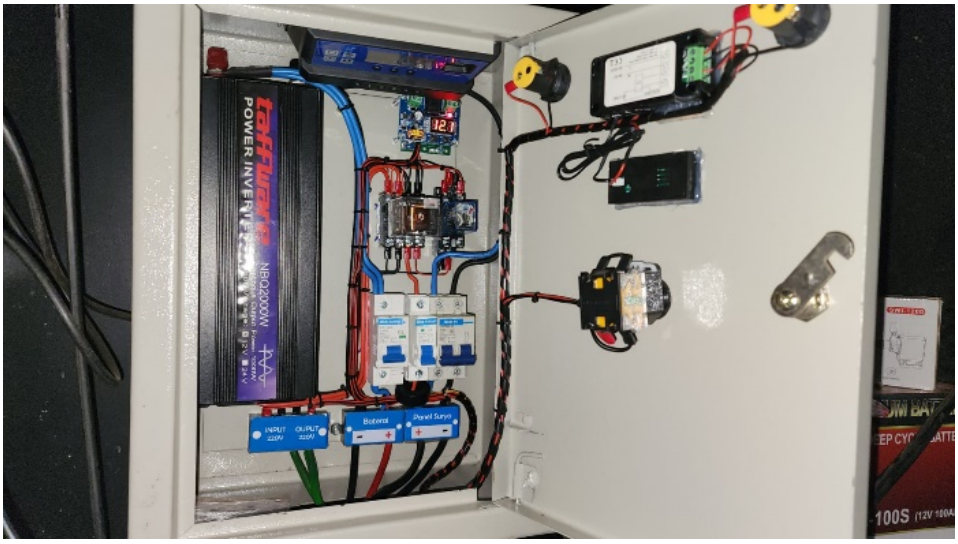

Figure 4. solar charge controller to regulate voltage and current to the battery

Figure 5. Harvest of lettuce plants

Table 2. The results of the participants' questionnaire evaluation of the training outcomes

No	Description	Strongly Agree	Agree	Disagree	Strongly Disagree	Min	Max	Mean	SD
1	The UMB Community Service Team's proficiency can resolve numerous community concerns.	0,621	0,379	0	0	3	4	3,621	0,022
2	The UMB Community Service Team's is employing a more efficient and straightforward methodology.	0,655	0,345	0	0	3	4	3,655	0,029
3	Training is highly beneficial in the	0,724	0,276	0	0	3	4	3,724	0,042

	advancement of community knowledge.								
4	The materials offered are highly advantageous as educational resources for the community.	0,793	0,207	0	0	3	4	3,793	0,054
5	The training provided has the potential to augment the community's income.	0,724	0,276	0	0	3	4	3,724	0,042
6	The training offered has the potential to improve the community's understanding.	0,724	0,276	0	0	3	4	3,724	0,042
7	The training provided has the potential to enhance the quality of the products produced by the community.	0,483	0,517	0	0	3	4	3,483	0,003
8	The training offered motivates the community to continue engaging in these activities in the future.	0,552	0,448	0	0	3	4	3,552	0,010
9	The training provided has the potential to improve the caliber of the community.	0,690	0,310	0	0	3	4	3,690	0,035
10	The community benefits from the collaboration with the UMB Community Service Team's.	0,724	0,276	0	0	3	4	3,724	0,042
11	The cooperation objectives are achieved through the collaboration with the UMB Community Service Team's.	0,483	0,517	0	0	3	4	3,483	0,003
	Average	**0, 653**	**0,348**	**0**	**0**	**3**	**4**	**3,652**	**0,029**

From table 2, it is obtained that the average training participants strongly agree at 0.653 and agree at 0.348. The mean value is 3.652 and the standard deviation is 0.029. This indicates that the standard deviation value is smaller than the average value, so the performance can be said to be good.

CONCLUSION

The community service project in Gang Hijau Swakarya, Meruya Selatan, aimed to improve food security through eco-friendly hydroponic farming powered by renewable energy, specifically solar cells. Despite the availability of open spaces and sunlight, the community had not yet utilized solar energy. The project included socialization and hydroponics training to help participants implement renewable energy in their farming practices. According to a questionnaire, participants' feedback showed strong agreement (0.653) and agreement (0.348) with the training's effectiveness. With a mean value of 3.652 and a standard deviation of 0.029, the results indicate good performance.

The project promotes the use of solar energy, helping the community reduce reliance on non-renewable energy sources, thus supporting sustainability and lowering operational costs. In the other hand, Solar cell technology requires regular maintenance, and community members may face difficulties in sustaining the system over time without proper

technical support. For the development, establishing a more structured follow-up support system, including continuous training and technical assistance, would ensure long-term success and adoption of the technology.

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