

IMPLEMENTATION OF SOLAR PANEL CHARGING CABINETS AT RPTRA MAHKOTA, WEST JAKARTA: A COMMUNITY ENGAGEMENT PROGRAM IN INDONESIA

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ABSTRACT

The installation of solar panel charging cabinets at Mahkota RPTRA in South Meruya offers several key benefits. Access to Electricity : Provides an independent power source, reducing reliance on PLN. Energy Efficiency : Lowers operational costs by using solar energy, enhancing long-term efficiency. Sustainability : Reduces environmental impacts and reliance on fossil fuels, supporting climate action. IoT Technology Integration : Enables real-time monitoring of solar panels, extending their lifespan and minimizing damage. Community Empowerment : Encourages local engagement and provides training opportunities. Education on Renewable Energy : Includes sessions to boost community understanding of solar energy benefits. Enhanced Public Facilities : Improves perceptions of local infrastructure. The proposal focuses on energy efficiency, sustainability, and community education, achieving a 93.21% satisfaction rate among participants, many of whom expressed interest in similar technologies for their homes. Students involved also gained skills in communication, group management, and problem-solving.

Keywords: Charging Cabinet, Energy-saving Features, Solar Panels, Batteries, and RPTRA (Public Space for Child-Friendly Integrated Area).

1. INTRODUCTION

The implementation of solar panel-based charging cabinet technology at the RPTRA Mahkota office offers several significant benefits. Here are some key observations highlighting the need for this technology. Limited Access to Electricity, Many outdoor areas and parks experience limited access to electricity (Tverijonaite et al., 2019). Solar panels can provide an independent source of power without relying on the PLN (State Electricity Generation) electricity network (Purba & Siregar, 2020). Energy Efficiency, Solar panels harness energy from the sun, resulting in lower operational costs compared to conventional electricity sources (Hayat et al., 2019). Charging cabinets powered by solar energy will be more efficient in the long run (Yap et al., 2022a). Sustainability, Utilizing renewable energy from solar panels helps reduce environmental impacts and dependence on fossil fuels, thereby contributing to the fight against climate change (Ebhotu & Jen, 2020).

The objective of this community service activity is to Enhance energy efficiency through the use of solar panels., Support sustainability and environmental friendliness, Improve public facilities at RPTRA Mahkota, promoting a technology-conscious and environmentally sustainable area, Increase community knowledge about the application of solar panels in daily life.

Based on these observations, a proposal has been prepared for a community service project titled "Implementation of IoT and Solar Panel-Based Charging Cabinets at RPTRA Mahkota Meruya Selatan." This project aims to collaborate and implement both solar panel and IoT technology to enhance public facilities at RPTRA Mahkota.

2. METHOD

The following are the comprehensive methods employed to effectively address the needs of the Mahkota RPTRA, orchestrated by the dedicated community service team from Mercu Buana University's Electrical Engineering program.

Socialization Phase

1. Needs Assessment

Conduct a thorough investigation to determine the specific demand for electricity access within the vibrant Mahkota Meruya Selatan RPTRA (Groh et al., 2016). This phase involves selecting an optimal location for the installation of a solar-powered charging cabinet, ensuring it is both accessible and beneficial for the community.

2. System Planning and Design

Engage in innovative design work to create a charging cabinet that not only incorporates high-efficiency solar panels but is also harmoniously integrated with the surrounding environment (Khan et al., 2024). The design will reflect sustainability and aesthetic appeal, promoting the utilization of renewable energy (I. U. V. Simanjuntak et al., 2024).

3. Resource and Tool Preparation

Diligently compile all essential resources and materials required for the project. This includes sourcing high-quality equipment and securing adequate funding to facilitate a seamless implementation process (Salim et al., 2024).

Education Phase

4. Community Counseling and Training

Launch initiatives to enhance public awareness regarding the myriad benefits of renewable energy (Qudrat-Ullah, 2024). Through informative sessions and hands-on workshops, instill a sense of environmental responsibility and empowerment within the community.

5. System Installation

Implement the technological solutions through the careful installation of solar panels and charging stations (Yap et al., 2022b). This step ensures the infrastructure is laid down with precision, setting the foundation for reliable energy access.

6. Monitoring and Testing

Carry out systematic assessments to verify that the newly installed system operates effectively and aligns with the predetermined goals. Rigorous testing will be conducted to identify any potential issues and ensure optimal performance (Kalay et al., 2022).

Evaluation Phase

7. Evaluation and Reporting

Conduct a comprehensive evaluation of the project's impact on the community. This phase involves measuring success against defined objectives and compiling detailed reports that reflect the outcomes and benefits of the community service effort (Dauenhauer et al., 2020).

8. Maintenance and Sustainability Plan

Formulate a robust plan that guarantees the ongoing maintenance and sustainability of the established system. This ensures that the benefits of the solar-powered charging cabinet endure long into the future (Budiyanto et al., 2024).

9. Documentation and Dissemination of Results

Document the outcomes of the project meticulously and disseminate the findings to share valuable insights with other interested stakeholders. Through the production of informative materials, promote the knowledge gained and inspire further initiatives in renewable energy solutions (I. U. V Simanjuntak et al., 2024).

3. RESULTS AND DISCUSSION

The Community Service Program (PkM) took place at RPTRA Mahkota, South Meruya, on Saturday, July 1, 2025. This event involved a group of Electrical Engineering teachers and students from Mercu Buana University, with active participation from local residents.

1. Event Overview

Figure 1 presents the event attended by M. Ghufri F, the Head of Meruya Selatan Village, local community members, RW representatives, and lecturers and students from the Electrical Engineering department of Mercu Buana University.



Figure 1. Opening and Welcome from the Head of Meruya Selatan Village.

Figure 2 presents a speech by the Head of Meruya Selatan Village and Mrs. Fina Supegina, the head of the PKM team, along with a series of activities during the program.



Figure 2. Community service activities include education on solar panels and prizes awarded for Q&A sessions with participants.

Following the opening ceremony and welcome address, a symbolic handover of a school nameplate utilizing solar panels was conducted. Documentation of this event can be seen in Figure 3.



Figure 3. Symbolic inauguration of the Charging Cabinet at Mahkota RPTRA.

2. Discussion of Activities and Program Implementation

The next agenda item was a workshop, which included a discussion and a question-and-answer session led by the lecturer. Documentation of this session is provided in Figure 4. The lecturer presented material related to solar panels and their applications in everyday life.



Figure 4. Materials and workshops provided by lecturers

3. Activity Outputs

The PkM activity resulted in various outputs, including mass media publications, video recordings of activities on YouTube, posters on figure 5., and conference publications.



Figure 5. An example of the outcomes produced by community service activities.

4. Evaluation of Activity Results

Before and after the community service activity, a questionnaire was distributed to 15 training participants, comprising local community members who have significant potential to use the charging cabinets at the Mahkota Meruya Selatan RPTRA. This questionnaire was crucial for assessing the impact of the PkM activity. As shown in Figure 6, the

analysis indicated a satisfaction level of 93.21%, with a minimum score of 61.82, a maximum of 100, a standard deviation of 10.74, and a variance of 115.45. The results of the questionnaire can be visually represented in the graph in Figure 6.

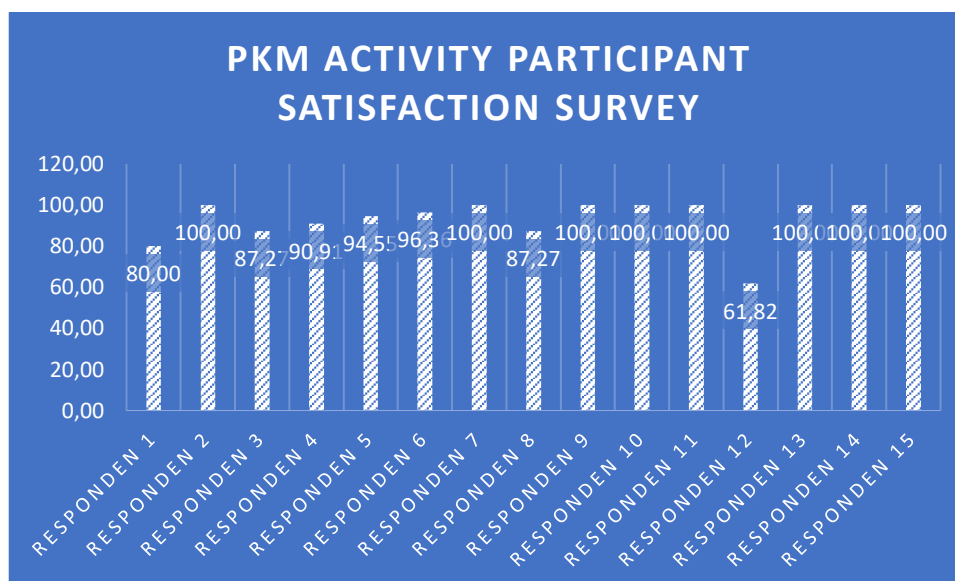


Figure 6. Participant Questionnaire Graph

Participants provided feedback expressing the hope that similar community service programs would continue to be held periodically, as they provide significant benefits to the local community. Additionally, they can apply the skills acquired during the training, with some participants already implementing these skills in their daily lives. Various challenges, such as limited time and resources, were addressed through collaborative efforts.

4. CONCLUSION

The implementation of the Community Service Cooperation (PkM) initiative contributes directly to the university's learning process, particularly in courses that emphasize field practice and the enhancement of soft skills. The evaluation results showed a high satisfaction level among participants at 93.21%, indicating their interest in adopting similar technologies in their homes for energy savings. Student participants gained invaluable real-world experience, enhancing their communication skills, group management abilities, and problem-solving capabilities within the community.

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