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Sun Power Implementation For Public Parking Area In Perum Villa Mutiara Serpong, Tangerang Selatan, Banten

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ABSTRACT

The existence of street lighting and/or public facilities is very important for the convenience of residents, especially in the car park at night. However, not all of them have installed lighting as in the land area, block B / C, stage 1, Villa Mutiara Serpong, Pondok Jagung, South Tangerang. This area is a land of public facilities whose area is still ground, and most of them have not installed lights to illuminate the entire area, because car parks also need lighting that is important enough to monitor unwanted things, therefore it is necessary to install the lighting of these public facilities and the road inside. this is in the form of solar-powered lamps as an effective alternative for solutions in lighting and reducing the cost of using electricity from PLN. Solar lights are installed at strategic points, namely in areas with little lighting. The lamp used is a 60-90 watt power lamp for better lighting. In addition to street lighting and public facilities, and economic analysis is also carried out in this activity by comparing the total costs required between incandescent lighting and solar power.
Where it is found that the nominal difference in rupiah is Rp.2,607,455, which is more efficient than incandescent PJU, and solar lamps are not affected by TDL (basic electricity cost).

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INTRODUCTION

In today's life, technology is rapidly developing, the need for electricity is also increasing, PLTS has become a common item in society, but goods and their forms are still considered expensive because they are not and there are no sellers in every region, which are still rare and expensive product categories. Therefore, the situation and conditions in the place or area of this service that is carried out are a general area, where the night light is still lacking or dark, can be seen in Figure 1.

Figure 1.
Conditions to be installed PLTS

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From a social perspective, the condition of the parking area is occupied by vehicles from various RTs, but the position in the RT 03 area. Being brighter will allow more comfort to be felt, because if the night will be bright, if there are reptiles or the like it will be more visible, and it will strengthen between fellow users to care for each other from the area and the needs of the area, which is none other than the PLTS. With the addition of a little lighting, it is possible to raise a spirit of togetherness to protect each other in security and a brighter vision will make it easier to be monitored if someone is doing something wrong, or outsiders are suspicious. The parking lot area is from the fact that the land is not clear about its status, but the condition has been like this for dozens of years. The use of vehicle parking is not a problem, but it cannot be used more; such as casting land, installing a roof, but if a flexible PLTS is installed it is very helpful in addition to adding light and feeling safer. With partners, they are very supportive of installing solar cell (PLTS) lighting.

METHOD

The implementation of the solar cell (PLTS) in one session is expected to be attended by 20-30 participants. This activity can be carried out within at least 8 (eight) working days and 1 year.

Step 1: Participants are given examples of the application and implementation of PV mini-grid and basic knowledge of PV mini-grid and the benefits of solar energy.

Step 2: Participants are given an understanding of what solar cell energy (PLTS) is.

Step 3: After the participants are given the theories, participants will then be given examples of how to install PV mini-grid and how to handle it, and how to care for and maintain good use of PV mini-grid.

Step 4: Participants are expected to be able to continue and disseminate knowledge about the basics of PV mini-grid.

The form of the evaluation will be monitored every day which will be carried out by the partners, and a form will be given to fill in the results of the PLTS performance. From the simple daily results will be summarized into weekly, monthly, and finally in the next 1 year whether PLTS is very useful or there are obstacles. As for indicators of success 1) The local community who have been briefed and given knowledge about PLTS, its installation, and users will have a better understanding of the technology of PLTS; 2) From the beginning of the introduction, the introduction with local partners was very enthusiastic and enthusiastic to make the region an area for implementing their service. The ability in its maintenance are 1) the community will be provided with the initial information on what PLTS is, and 2) by implementing or direct piloting, the community will better understand in practice and its performance as well as its maintenance. There is also a partner contact person to communicate with each other whenever there are complaints or obstacles, therefore the system in future observations is

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done manually. Because it still uses a simple PLTS tool. The activity flow diagram can be seen in Figure 2. below.

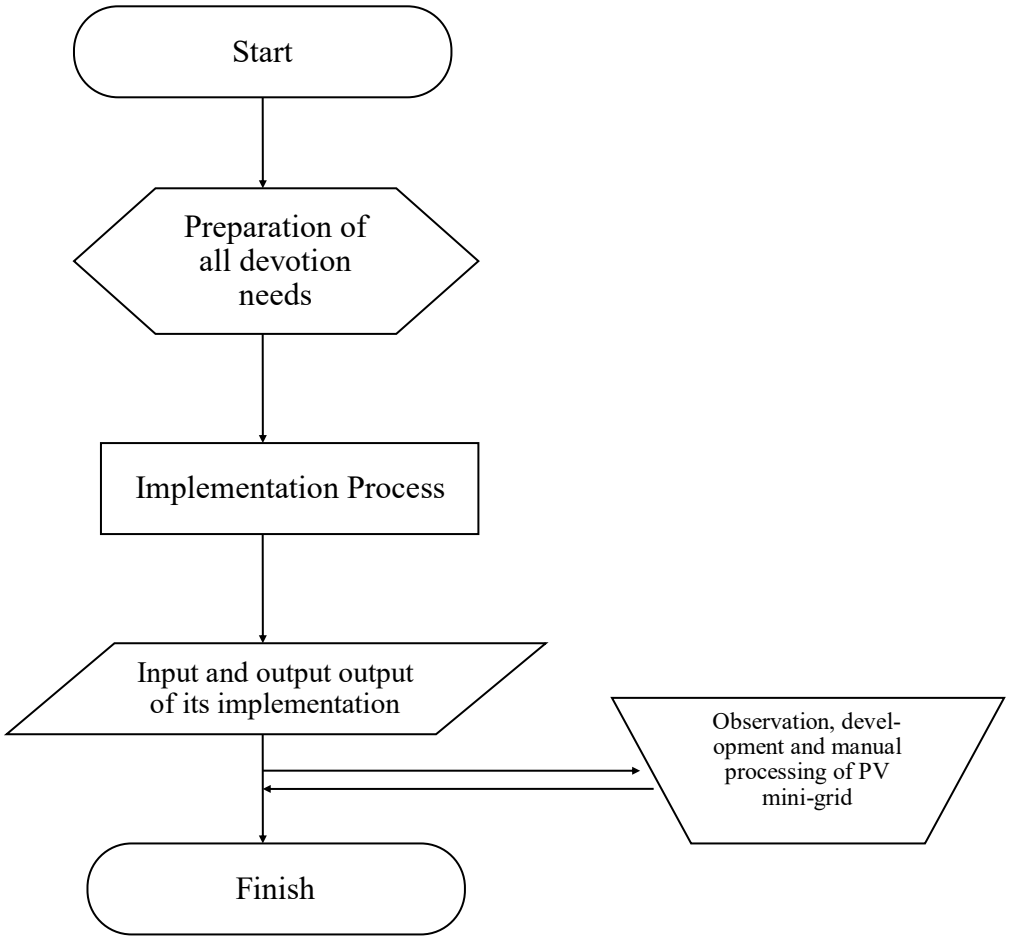

Figure 2.
Flowchart of Community Service Activities

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RESULTS AND DISCUSSION

In this community service activity before the implementation of socialization and training, first, a location survey was carried out which was used as a place for community service, then we gathered together with community leaders in the local environment to discuss the topic of the program to be implemented and to obtain permission and support in the form of providing facilities for socialization and training on this PV mini-grid. Where the implementation of this community service will be carried out in a land area, a public facility area, a car park, Perum Villa Mutiara Serpong Phase 1, Pondok Jagung, Serpong Utara, Tangerang Selatan where the application of this PLTS is in the form of lighting around the parking area.

In socialization, people are quite enthusiastic about exploring and curious about the technology where many of them do not know and understand why sunlight can produce electrical energy. So that is where our big role as lecturers and intermediaries in the world of technology is very much needed and helps the surrounding community. For more details components and parts of PV mini-grid, seen Figure 3. below. Documentation explanation of PV mini-grid can be seen in Figure 4.

Figure 3.
Components and Parts of PV Mini-Grid

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Figure 4.
Explanation of PV Mini-Grid

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For this explanation, any discussion of what we convey may be asked directly what is the question and the public is curious about it. Because it is to go faster and explore the system. In the concept of presentation and socialization, we use a relaxed and unpretentious approach (not formal in the room/ hall) but directly in the area where the PLTS implementation is installed.

After the installation of the foundation is not immediately installed in one day the PLTS support poles are installed, but at least wait a few days so that they are strong and sturdy completely dry for cement and the under foundation. Installation of foundations for PV mini-grid light poles can be seen in Figure 5.

Figure 5.
Installation of Foundations for PV Mini-Grid Light Poles

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These results provide clear evidence that solar energy can be used to generate electricity which will be used for lighting, lighting the parking area which is still dark. Until now, the results are still being monitored, it turns out to be very effective. It is proven that it can light up from 18.00 to 05.00 WIB, it is proven every day by residents who pass and see the results of the PLTS installation. And the surrounding community is very happy and understands how great our solar energy has been. In this analysis, it is adjusted to the results of "Journal of Community Service on the Light of the Country" Vol. 1, No. 2, July 2019 (DOI: https://doi.org/10.33322/terang.v1i2.369) An economic analysis of the installed solar lamps was carried out to see the economic benefits compared to the use of incandescent lamps for PJU. The lamp that is installed is an incandescent lamp because according to the residents' incandescent lamps are cheaper than LED or TL lamps. At this point, the comparison will be analyzed from the economic side of PJU solar lights with incandescent PJU for 1 light point over 5 years. For more details the results of installing PLTS, seen Figure 6. below.

Figure 6.
Results of Installing PLTS with Residents

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In table 1, the total price that must be spent for the use of incandescent lamp PJU is analyzed, with the assumption that incandescent lamps require replacement in year 5 with fixed lamp prices. Because PJU lights get electricity supply from residents' houses, the electricity cost required to adjust the Basic Electricity Tariff for households in 2020 is IDR 1,467, assuming there is no TDL increase for the next 5 years. If the light is on for 12 hours, then the electricity needs per day are:

Incandescent lamp = 90 watts x 12 hours = 1080 Wh = 1,080 KWh (2 lamps) = 2,160 KWh

Meanwhile, for 1 year, the need for electrical energy to turn on 1 PJU lamp is:

Incandescent lamp per year = 2,160 KWh x 365 days = 788,4 KWh

The electricity costs incurred for 1 year are:

Electricity costs a year = 788.4 KWh x Rp. 1467 = Rp. 1,156,582.8 (2 lights)

Table 1.
Analysis of the Costs of Using Incandescent Lighting PJU

Spending	1st year (Rp)	2nd year (Rp)	3rd year (Rp)	4th year (Rp)	5th year (Rp)
90 Watt incandescent lamp	100.000,00	0	0	0	0
Iron pole	1.000.000,00	0	0	0	0
Lampshade	30.000,00	0	0	0	0
AWG22x2 8 meter cable	50.000,00	0	0	0	0
1 year electricity cost	578.291,00	578.291,00	578.291,00	578.291,00	578.291,00
Sum (each year)	**1.758.291,00**	**578.291,00**	**578.291,00**	**578.291,00**	**578.291,00**
Cost (5 year)	**Rp 4.107.455**				

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In the table above, the total price that must be spent for the use of PJU solar lights is analyzed. Based on the lamp datasheet, solar-powered LED PJU lights can be used for 50,000 hours = 5.7 years before the lights will finally break down. Thus, there is no need for the cost of replacing a solar lamp if the analysis is carried out over 5 years. For the PJU to shine optimally, each lamppost has 1 solar-powered lamp installed.

Table 2.
Analysis of Costs for Using PJU Solar Lights

Spending	1st year (Rp)	2nd year (Rp)	3rd year (Rp)	4th year (Rp)	5th year (Rp)
90W PLTS lamp	500.000,00	0	0	0	0
Iron pole	1.000.000,00	0	0	0	0
Total (each year)	**1.500.000,00**	**0**	**0**	**0**	**0**
TOTAL cost (5th year)	**Rp 1.500.000,00**				

Based on the results of the analysis in tables 1 and 2, it is found that a large difference in total costs for the operation of the two PJUs for 5 years. For the operation of an incandescent lamp PJU for 5 years, a fee of IDR 4,107,455 is required. Meanwhile, PJU solar lights only cost Rp. 1,500,000. Although the price of solar-powered PJU lights is more expensive, for long-term use, solar-powered PJU is much more economical than incandescent PJU, with the difference in costs of IDR 2,607,455 for 5 years.

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CONCLUSIONS AND RECOMMENDATIONS

The Community Partnership Program (PKM) activity regarding the Utilization of Solar Energy to Illuminate the parking area of public facilities in the Villa Mutiara Serpong Blok C / B housing estate, land field, Pondok Jagung, South Tangerang has been successfully carried out in July-August 2020. This activity was in the form of installing lights by utilizing solar power. The lamp used is the HILIOS SL-90 W brand lamp (2 pieces). The lamp also has an automatic ignition system by detecting ambient light and an embedded 2000 mAh battery. Before the lamps were installed, the PKM team conducted a field survey to determine the points for installing the lamps. Obtained 2 strategic light installation points, namely in the corner of the land where there is no lighting, in addition to conditions that are still empty land (wild gardens).

Lamp installation has been successfully carried out. The lights can operate well at night. The analysis of the performance of solar lights is also viewed from an economic point of view by comparing the total expenditure required for PJU solar lights and PJUs that use incandescent lamps with a source of electricity from residents' homes. Based on the calculation results, the operation of incandescent lamp PJU for 5 years, requires a cost of Rp. 4,107,455, -. Meanwhile, PJU solar lights only cost Rp. 1,500,000. So that solar-powered lamps are much more economical than incandescent PJU, with a difference in cost of Rp. 2,607,455 for 5 years usage. While the life span of solar-powered PJU lamps can reach 5.7 years so that when analyzed for the economics of solar-powered lighting and compared to the cost of incandescent lamps, the difference will be very visible.

If it is applied in remote areas where there is no electricity, it will be even more useful, because of financial limitations and the distance where the farthest distance from the current relief condition from IT-PLN is likely that the people can already enjoy electricity, the only difference is the source and the technology.

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