

USE OF SOLAR ENERGY TO SAVE FISHING BOAT OPERATIONS FOR FISHERMAN IN PULO AMPEL VILLAGE, SERANG DISTRICT

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Abstract In an effort to help improve the welfare of fishing communities, universities implement community service programs, this is an alternative in empowering the economy of fishing communities. There is a fishing village in Pulo Ampel Village, Serang Regency, Banten Province. Fishing activities by fishermen around the offshore Pangkalan Ikan in the village. Puloampel has a population of 11,758 people, namely 5,943 men and 5,815 women. Most of the people in Puloampel are fishermen, trading businesses, and farmers. The size of the existing fishing boats are generally relatively small, between 3 GT and 5 GT. The number of fishermen is 126 people, and there are 38 operating fishing boats. The fishermen use fishing boats generally leaving at night until the morning \pm 8 hours. Currently, electricity needs for lights and other tools use batteries/batteries with electric shocks charging every 2 days. Complaints about charging the charger, the battery will be damaged quickly. To overcome and save electricity, it can be used as an electric charger with solar panels. Therefore, the community service team can provide counseling and training on the installation of solar panel electrical components (solar energy) for fishing boats owned by fishermen. The problem faced by partners (fishermen) who have been complaining about this is that the batteries used are damaged quickly, because the batteries are removed too often for charging electric shocks, this hampers the economic welfare of the fishermen's families because of additional costs. The purpose of implementing this community service program is to increase applied knowledge for small-size fishing boat electricity, and by utilizing solar/solar energy components applied to ships, it can reduce costs and extend the technical life of batteries/batteries.

Keywords: *Boats/ships; fishermen; solar panels; education-training; prosperous.*

1. Introduction

1.1. Situation Analysis

The community service program is one of the main activities of higher education institutions so that it becomes an obligation for lecturers to carry it out and involve students, this is in addition to fulfilling the lecturer's credit load in each semester as well as increasing the status of academic positions in the higher education environment. In order to help improve the welfare of fishing communities, universities implement community service programs, this will be an alternative way to raise the economic level of fishing communities (Maradong, 2016). There is a fishing village in Pulo Ampel Village, Serang Regency, Banten Province. Fishing activities by fishermen around the offshore Pulokali Fish Base, precisely at the Puloampel Fisherman Harbor. Puloampel Village is located on the northwestern coast of Java, namely in the Puloampel area, Serang Regency,

Banten Region. The Puloampel area is geographically located in the north east and extends for approximately 3 km. Administratively, Pulo Ampel is part of the Serang Regency area. The main livelihoods of the people in this village consist of fishers/fishermen, farming and trading businesses, and labourers. Because the Puloampel Region is located on the coast, most of the population becomes fishermen. The population of Pulo Ampel Village is 11,756 people, namely 5,942 men and 5,814 women. The people in Pulo Ampel Village are fishermen, traders, and farmers. The sizes of existing fishing vessels are generally relatively small, ranging from 3 GT to 5 GT. The number of fishermen is 126 people, and there are 38 operating fishing boats. The area of Pulo Ampel Village is directly adjacent to the coast of Java waters so that there are relatively high marine/captive fish resources. Puloampel Village has adequate facilities and infrastructure because there is a Pulokali fish base for landing fishermen/fish seekers, the Love Maritime Nelayan Association, the “Samudera Mina” Rural Cooperative, a wharf, and a business base for refueling. From the Puloampel area, it is approximately 20 kilometers to the regional government office of the Regent of Serang.

The Puloampel area, which is part of the Bojanegara industrial economic zone, will be earmarked for the development of the maritime industry, seaports, fishery and aquaculture, as well as marine and natural tourism.

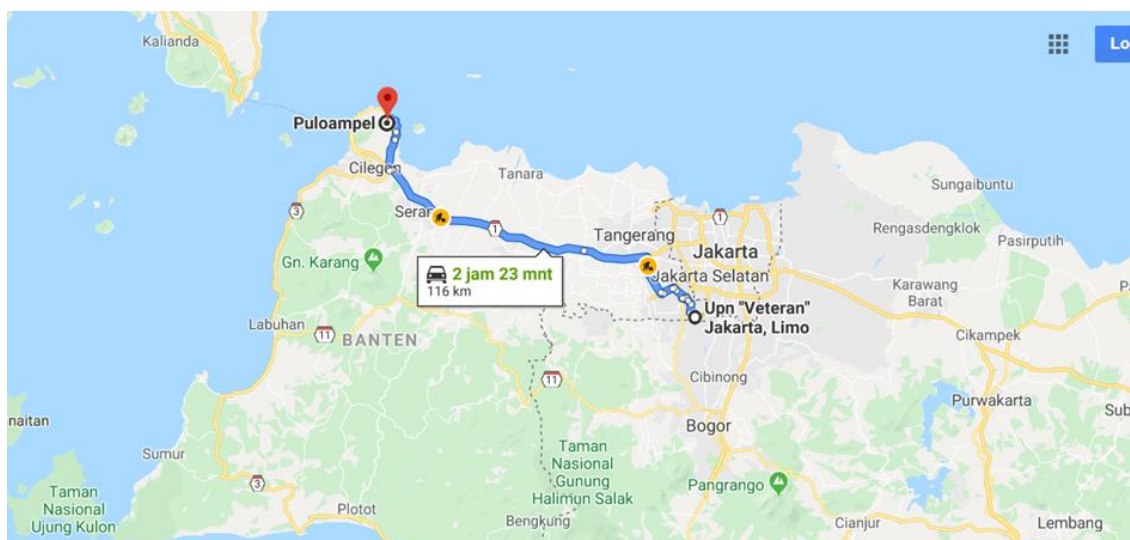


Figure 1. Location Map of Pulo Ampel Village, Serang Regency

The fishermen usually go to sea to catch fish on average at 02.00 am to 08.00 am for \pm 8 hours. The current need for electricity for lamps/bulbs and communication devices uses batteries/accumulators by charging them before they go to sea. The basic disadvantage of filling the strum/charge is that it causes the battery/battery damage to not last, because the battery is often removed, or engine resources require more fuel (Dewanta, 2020). Solving the problem in

saving energy and reducing battery damage with a power generation solution with solar panels. The community service team can provide counseling and training in installing solar panels for community fishermen who have boats/boats.

1.2. Partner Problems

Complaints from fish seekers (fishermen) about charging the charger, the battery will be damaged quickly (not long). To overcome and save electricity, electric chargers with solar panels can be utilized. This problem is a result of the frequent lifting of the battery in charging the power supply, this can cause efforts to increase people's welfare to be hampered, because it costs more. Utilization of solar panels for electricity needs that are installed on fishing boats for fishermen in the Puloampel Region, Serang District, Banten Province, is certain to be able to overcome problems or as a solution to electricity needs on fishing boats. Through the PKM (Community Partnership Program) scheme in carrying out community service, fish seekers (fishermen) will receive counseling and training to install a series of solar/solar panel systems and their equipment components followed by maintenance. Installing solar/solar power panels and the components above by adjusting the electricity needs of boats/ships owned by fishers (fishermen). The installation of solar panels will extend the life of the batteries and will further reduce costs for purchasing batteries and in turn it is hoped that this will increase the economic welfare of the fishermen in Puloampel Village.

1.3. Solution

The cost of buying a battery is IDR 700,000, - on average every 3 months, every year 4 batteries are IDR 2,800,000. To fill the strum Rp. 40,000, - every 2 days, every year 183 strum Rp. 7,320,000, -. So that the annual cost of electricity is IDR 10,120,000. To meet the electricity needs of fishing boats, fishermen spend more to stun and buy batteries. To save costs, a solution by installing solar panels on ships can be offered. With solar panels installed on the ship so there is no more battery stun costs and no longer have to buy batteries often. To buy a battery of IDR 700,000. Installing solar panels IDR 350,000.-. So the cost with the solar panel is IDR 1,050,000. This means that every year you can save + IDR 9,070,000

1.4. Purpose of the PKM Scheme

The audience as the target (partners) is the community of fishers/fishermen who are productive population groups from an economic point of view, so that the community partnership program is the chosen scheme. Expertise in the field of shipping and expertise in the field of panel systems/solar energy are the fields needed in this program. The Community Partnership Program (PKM) scheme in carrying out community service by using a solar panel electric generator installed on a fishing boat ensures that it is economical to buy batteries and also saves costs/battery

strum costs. The aim is to use solar panels properly and regularly, it is believed that a prosperous family society can be increased by increasing economic capacity.

2. METHOD / TECHNICAL IMPLEMENTATION OF PKM

2. Activity Stages

2.1 Preparation phase

- a) Conduct initial surveys or field studies in order to identify the main problems related to the plan to implement counseling and training for fishermen to install solar/solar panels on fishing boats/boats.
- b) Carry out a communication approach to community groups looking for fish/fishermen to convey the goals and objectives of the program/plan of community service
- c) Consultation and permits for the Kades of Pulo Ampel, Serang Regency, Banten Province so that they can carry out community service activities.

2.2. Implementation Stage

- a) Create and provide Guide Sheets regarding the procedures and stages of installing and maintaining solar/solar panel components.
- b) Conduct counseling and training on exchanging the stun battery system with the solar panel system on fishing vessels.
- c) Check how to install and maintain the solar panel system that has been installed on the fishing boat so that it can fully function optimally.
- d) Compile a report after the implementation of the community service program.

2.3 Training and Extension Materials

- 1) Preparation and determining and selecting fishing vessels :
 - a. The berthing of the boat/fishing boat that will be installed with solar panels
 - b. Selection and inspection of fishing vessels to install solar panel components and batteries.
- 2) Parts/components of solar/solar panels (Endro, 2014):
 - a. Battery (accu), 1 piece;
 - b. Solar panel, 1 piece;
 - c. Inverter (12V to 220V variable), 1 piece;
 - d. Controllers, 1 piece;
 - e. Male-female connector heads, 1 set;
 - f. Cable 2 plays, 4 m;

- g. lamp fittings, 1 set;
 - h. Nuts and bolts, 6 sets.
- 3) Equipment for installing solar panel components (Bachtiar, 2006):
- a. Cutting pliers, 1 piece;
 - b. Cable stripper, 1 piece;
 - c. Flower screwdriver, 1 piece;
 - d. Electric screwdriver for battery, 1 piece;
 - e. Chainsaw, 1 piece;
 - f. Hammer, 1 piece;
 - g. Knife, 1 blade.
- 4) Technically how to install solar panel components (Dzulfikar, 2016):
 Checking the part of the ship where we will install the panel system and stuff. Installing equipment-components:
- a. Installing solar/solar panel sheets and battery/accumulator storage,
 - b. Parts/places for installing lights and connections with cables,
 - c. Install the controller, inverter, and connectors.
- 5) Check components/parts and connections.
- 6) Trial, re-examination, and maintenance / maintenance.

2.4 Time and place

Community service activities with the PKM scheme were held in Puloampel Village, Serang Regency, Banten. Counseling took place in the Puloampel Village Head Office area. Furthermore, the training activities took place in front of the Puloampel Fishery Landing Fish Base which is \pm 500 km from the main road. The schedule for holding the abdimas starts on 27-04-2022 and ends on 31-08-2022. Face-to-face and question and answer counseling will be held on 13-08-2022 and field evaluation will be held on 31-08-2022.

3. ABDIMAS PROGRAM RESULTS

3.1. Public education

Counseling activities carried out by conveying a discussion regarding the system and components of the sun / solar panels as a source of electrical energy in fishing boats / boats. A number of fisherman participating in the service as the owner of the boat and twenty fish seekers/fishermen. Followers are men and women, they have primary and secondary school education.

Resource materials:

1. Preliminary start and determination of boats/fishing vessels as objects for installing solar/solar panels:

- a. The leaning of a boat/fishing boat that will be installed with solar panels, is meant for maximum installation.
- b. Selection and inspection of fishing vessels to install solar panel components and batteries.

2. Solar panel system parts:

- a. Battery/accumulator, 1 piece; b. Solar panel, 1 piece; c. Inverter (12V to 220V variable), 1 piece; d. Controllers, 1 piece; e. Male-female connector heads, 1 set; f. Cable 2 plays, 4 m; g. lamp fittings, 1 set; h. Nuts and bolts, 6 sets.

3. Tools:

- a. Cutting pliers, 1 piece; b. Cable stripper, 1 pc; c. Flower screwdriver, 1 pc;
- d. Electrical screwdriver for connecting the battery;
- e. Batter saw, 1 pc; hammer, 1 fruit, and knife 1 blade.

3.2. The choice of length of electricity usage

16 hours = 48 watts per hour = (4.0 Ah x 12 Volts) per hour

12 hours = 65 watts per hour = (5.4 Ah x 12 Volts) per hour

10 hours = 78 watts per hour = (6.5 Ah x 12 Volts) per hour.

Taking into account that it can accommodate 16 hours of use with a maximum of 48 watts per hour, the battery / battery chosen is 65 Ah. The battery (accu) can accommodate/receive and emit energy at a maximum of 10% of that capacity, so it is chosen = 65 Ah x 10% = 6.5 Ah.

3.3. Required electric power

Calculation of power requirements (calculation of the electric power of the device can be seen on the label on the back of the device, or read from the manual) :

Table 1. Electrical Power Requirements

No.	Equipment	Average Power (Watts)	Quantity	Amount (Watts)
1	Lamp	12	4	48
2	Radio	6	1	6
3	Mobile	3	2	6
4	Etc	5	1	5
Amount				65

Table 2. Specifications for the main components of a suitable/required solar panel system

1 Solar Panels		2 Battery	
Type	100 watt peak	Voltage	65 Ah
Voltage	18 Volt	Long	300 mm
Ampere	5.55 A	Wide	200 mm
Long	1090 mm	Tinggi	250 mm
Wide	680 mm		



Figure 2. Counseling Implementation

3.4 Train to install solar panel components

3.5 Stages of installing

1. Installing solar panels; 2. Installing/placing the battery; 3. Installing lights; 4. Install the controller and inverter; 5. Installing/connecting the controller-panel with cables; 6. Installing/connecting the battery controller with cable; 7. Install/connect the controller-lamp with cable; 8. Installing/connecting controllers-other equipment (radio, cell phones) with cables; 9. check the lighting.



Figure 3. Training to Install Solar Panel Components

4. CONCLUSIONS AND RECOMMENDATIONS

Submission of materials/materials in face-to-face/counseling and training on installing solar/solar panel components is very good, easy to understand, that's why the fishermen/fish finder participants quickly understand and master how to install the solar/solar panel components. In the next activity of installing solar panel components they will be able to install them themselves. Therefore, with the installation of solar panel components, the electricity needs in fishing boat operations can be met so that the battery life is relatively more durable. Ship operational costs are more efficient and battery life can last longer. Calculation of annual cost savings for a ship of IDR 9,070,000.

In order to make a module for how to install parts/components of solar panels on fishing boats that are easier, more practical, and shorter. It is hoped that the regional government can help provide funds to fishermen so that they can get solar panels on fishing boats so that they are more evenly distributed.

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