MANUFACTURE OF SOLAR HOME SYSTEM PORTABLE FOR LIGHTING TANCAP CHART WITH A CAPACITY OF 200WP FOR TRADITIONAL FISHING GROUP TUAK SABU LASIANA

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ABSTRACT. The technique of fish fishing by the traditional fishing group Tuak Sabu Lasiana still uses a lift net with lighting still using petromax lamps, where the fuel still uses kerosene at a high price.

The use of electrical energy as a source of lighting on the lift net is crucial in fishing. Lighting on the lift net can also attract fish to look for food sources around the chart. The lighting/light attractor on the chart aims to collect fish because it has positive phototaxis properties. Phototaxis-positive fish will gather in the light area of the lamp, making it easier for fishers to catch fish.

The problem faced by fishers today is the availability of electricity as a substitute for petromax. One alternative solution to the problem is providing a portable solar home system on the lift net to meet electricity needs and store it in a storage battery.

Fishers do not need fuel oil (BBM) using a portable solar home system. Moreover, from an operational point of view, they do not require fuel for lighting; only by using a solar module, solar energy will be accommodated in the battery / Accu and, at night, used for lighting the lift net.

The lamp's light from this portable solar home system can attract fish to gather. The lamp's position height layout can be adjusted flexibly according to the sea level position at high and low tide. The reason is that the light produced can spread well. The interest of fish in the light is due to the occurrence of phototaxis events which is partly because the light stimulates the fish and attracts the fish to gather at the light source, or it is also mentioned because of the light stimulation (stimulus), then the fish gives its response. Catching with a chart using the help of lights is called light fishing.

The function of light in this fishing is to collect fish to a particular catchable area; Then, the fishery is carried out with a net. With this netting tool, it can be said that the net is passive. Instead, the light serves to attract fish to the net spot. The event of the gathering of fish under this light can be divided into two, namely direct events and indirect events. A direct event is that the fish are attracted by the light and then gather. Meanwhile, indirect events, namely with light, are where plankton collect, and then many fish gather to eat the plankton.

The method used in this research activity consists of an implementation plan, tools, and follow-up implementation. The implementation plan contains a schedule and procedure of implementation activities, design, and manufacture of instruments, as well as the stages of preparation for the tool's operation. The tool's implementation will include material selection, tool making, installation of portable solar home systems, tool trials, and analysis. Furthermore, implementation in the field is required to evaluate the tool and the potential for improvement and development.

The external target of this research activity is in the form of lighting lamp products based on a portable solar home system. Other output targets are patents, national-scale journal publications and international seminar proceedings.

The Integration Application that will be made occupies TKT Level 5 because this application is a form of implementation of the concept of information integration between the Electrical Engineering Department and the Academic Section at the Kupang State Polytechnic.

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Keyword: Fishers, Portable Solar Home System, Lift Net.

1 INTRODUCTION

The lift net/planting net is one of the lifting nets operated in coastal waters at night using light to attract fish. A chart or bbed is a fishing gear that looks like the skeleton of a pyramid without a corner of the peak. Above this chart in the middle there is a small house building that serves as a resting place, a lamp protection from the rain and a place to see and watch the fish. On top of this building, there is a *roller* made of bamboo that serves to pull the net. (Bekak, DO, 2015).

The technique of fishing by the traditional fishing group Tuak Sabu Lasiana still uses a tancap chart with lighting still using petromax lamps.

Figure 1. Stamp Chart

The basic principle of the fishing method with a stamp chart is to utilize surface fish that have an interest in light (positive phototaxis) so that the fish gather around the lamp. The use of light as a fishing aid is closely related to the behavior of fish in responding to changes in the surrounding environment. Light is a lure factor for fish to gather and stay temporarily around the light of the lamp. Based on this knowledge, fishermen use lamp light as a fishing aid.

1.1. Comparison of Portable Solar Home System to Petromax Lamps for Lighting Tancap Charts.

Energy Source.
Portable Solar Home System: Relies on renewable solar energy, harnessing sunlight to generate electricity. Environmentally friendly, sustainable, and cost-effective in the long run.
Petromax Lamps: Relies on non-renewable fossil fuels, such as kerosene or petroleum. Limited resource contributes to pollution and involves ongoing fuel costs.

Environmental Impact.
Portable Solar Home System: Produces no emissions, reducing the carbon footprint. Does not contribute to air or water pollution.
Petromax Lamps: Emit greenhouse gases and air pollutants, contributing to environmental degradation and health issues.

Cost Efficiency.
Portable Solar Home System: Initial investment for solar panels and batteries; minimal operational costs as sunlight is free. Long-term savings due to reduced energy bills and no fuel expenses.
Petromax Lamps: Ongoing expenses for purchasing fuel, which can accumulate over time, making it comparatively more costly in the long term.

Reliability and Maintenance.
Portable Solar Home System: Low maintenance, with no moving parts. Reliable as long as there is access to sunlight. Batteries may require replacement after several years.
Petromax Lamps: Require regular fuel refills and maintenance. Prone to malfunctions, especially in adverse weather conditions.

Ease of Use and Portability.
Portable Solar Home System: Easy to install and operate. Portable, allowing flexibility in placement. Can be moved and reinstalled if necessary.
Petromax Lamps: Require careful handling of fuel, can be dangerous, and may not be easily portable, especially when lit.

Impact on Catch.
Portable Solar Home System: Provides consistent and stable illumination, attracting fish effectively. No risk of sudden light outages.
Petromax Lamps: Light output may fluctuate as fuel burns out, potentially affecting the catch. Risk of sudden blackout if fuel runs out unexpectedly.
In summary, the Portable Solar Home System offers a more sustainable, cost-effective, and environmentally friendly solution for lighting tancap charts compared to traditional Petromax lamps. It not only enhances the catch due to stable illumination but also reduces environmental harm, operational costs, and maintenance efforts, making it a superior choice for the traditional fishing group Tuak Sabu Lasiana.

Based on the problems described above, it is proposed to make a *Portable Solar Home System* for lighting tancap charts for the traditional fishing group Tuak Sabu Lasiana. Thisecnology can be used on the stamp chart in Lasiana waters which has been using petromax lamps so that the catch is much more.

2 RESULT AND DISCUSSION

2.1 Solar Home System Installation

The installation of the Solar Home System involves the strategic placement of 2 PV (Photovoltaic) modules. These modules operate within a voltage range of 17.8-21.8

volts, indicating their adaptability to varying sunlight conditions. The choice of Polycrystalline PV modules is significant for this installation due to their efficiency and cost-effectiveness in converting sunlight into electricity.

Efficient Energy Harvesting. The use of Polycrystalline PV modules ensures efficient energy harvesting. These modules are made from multiple crystalline structures, allowing them to capture sunlight from different angles throughout the day. This characteristic maximizes energy production, making them suitable for environments like Lasiana waters where sunlight conditions may vary.

Adaptability to Voltage Fluctuations. The voltage range of 17.8-21.8 volts indicates that the PV modules can adapt to fluctuations in sunlight intensity. This adaptability is crucial for maintaining a stable power supply to the chart tancap, even during changing weather conditions or varying sun angles.

Durability and Longevity. Polycrystalline PV modules are known for their durability and longevity. Their robust construction enables them to withstand harsh marine environments, including exposure to saltwater and high humidity. This durability ensures the longevity of the solar panels, providing a sustainable and reliable energy source for the chart tancap over an extended period.

Cost-Effectiveness. Polycrystalline PV modules are generally more cost-effective than other types of solar panels. This cost efficiency makes them a practical choice for installations where budget considerations are essential, allowing for the allocation of resources to other critical components of the Solar Home System.

By incorporating these Polycrystalline PV modules into the installation, the Solar Home System not only harnesses solar energy effectively but also does so in a manner that is resilient, adaptable, and economically viable, making it a sustainable solution for the energy needs of the penmoaning chart tancap in Lasiana waters.

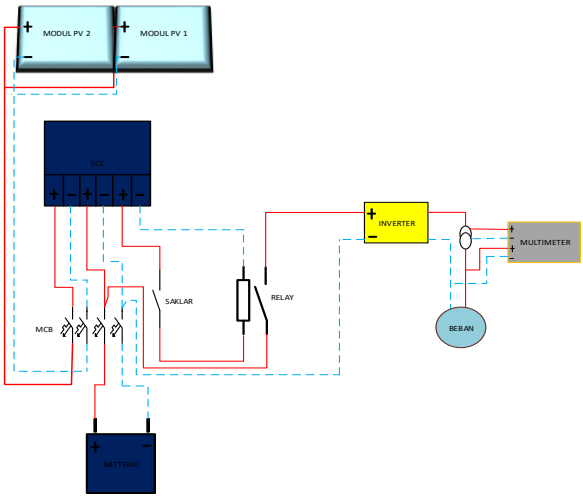

Figure 2. Solar Home System (SHS) Installation.

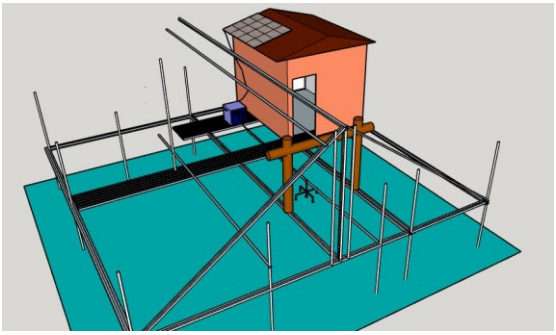

Figure 3. Placement of Surya Module and Light Point on Tancap Chart.

Figure 4. Solar Radiation Intensity Measurement.

2.2 Analysis and initial measurements on land and measurement installed at sea

Measurement Graph on Land

Table 1. Measurement on Land.

Day	Friday 19-08-2022	Saturday 20-08-2022	M21-08-2022
W/m2 radiation	1075.00	1037.94	1060.09

From Table 1.1, ,it is determined that the characteristics of solar radiation average on solar modules on land on Friday -1075.00 W/m ^{2} , Saturday -1037.94 W/m2 and Sunday 1060.09 W/m2.

Table 2. Temperature Characteristics of Pv and V Modules

Day	Module Temperature	V
Friday 19-08-2022	29.20	14.72
Saturday 20-08-2022	29.31	13.21
week 21-08-2022	29.64	14.50

Table 3. Characteristics of Current, Watt Peak and Watt Hour

Day	Friday 19-08-2022	Saturday 20-08-2022	week 21-08-2022
I=Current	6.29	6.99	6.72
Wp=Watt Peak	144.61	123.80	148.09
Wh=Watt Hour	417.28	443.90	427.55

Table 4. Overall Data Characteristics on land.

W/m2 radiation	Module Temperature	V	I	Wp	Wh	ah	W	Box Temperature	V Scc	Vm	Ap
1057.68	29.38	14.15	6.67	138.83	429.58	35.34	96.19	37.30	13.24	12.16	9.75

Measurement Graph at Sea

Table 5. Radiation Characteristics W/m2.

Time/ Day	Radiation w/m2
Saturday 10-09-2022	684.81
Sunday 11-09-2022	683.6
Monday 12-09-2022	610.21
Tuesday 13-09-2022	652.56

Wednesday 14-09-2022	679.66

Table 6. Temperature Charateristic of PV and V modules.

Time/ Day	Pv Module Temperature	v
Saturday 10-09-2022	30.18	15.39
Sunday 11-09-2022	29.9	14.9
Monday 12-09-2022	30.95	15.1
Tuesday 13-09-2022	30.98	15.60
Wednesday 14-09-2022	30.96	15.35

Table 7. Characteristics of Current, Watt and Watt Peak

Time/ Day	I	w	Wp
Saturday 10-09-2022	3.869	62.8	138.3
Sunday 11-09-2022	4.6	75.14	139.0
Monday 12-09-2022	4.48	83.6	134
Tuesday 13-09-2022	4.1	66.58	143.8
Wednesday 14-09-2022	3.82	67.09	164.8

The lamp layout has been meticulously designed and strategically placed at the center of the 100 m² chart to ensure uniform distribution of lighting across the entire area. This thoughtful placement serves a specific purpose: during the process of lifting the net, the fish are naturally drawn towards the concentrated light beneath the lamp. This phenomenon occurs due to the instinctive behavior of fish being attracted to light sources in their environment.

By detouring around the illuminated area, the fish inadvertently find themselves trapped, making the lifting process more efficient. This ingenious setup not only optimizes the fishing process but also minimizes the effort required, ultimately enhancing productivity and yield. The careful consideration of both the layout and the behavior of the fish demonstrates a deep understanding of the aquatic ecosystem, leading to a more effective and sustainable fishing method. If the lamp is placed as

symmetrically on the chart by dividing 4 light points, then the light source will spread outwards, and the fish will not play in the net / waring. So that in the net lifting process carried out by turning the fish tends to come out because of its concentration at 4 points diagonally which have a close distance to the edge of the net / waring.

Certainly, the efficiency of the designed lamp layout is further enhanced by its adaptability to the natural rhythms of the tides. The arrangement of the lights is meticulously adjusted, rising and falling in sync with the tidal movements. This dynamic approach ensures that the distance of the chart lights to the sea water is strategically maintained between 5 meters to 9 meters, accommodating the changing water levels.

Initially, the lights are positioned high, near the support bars of the chart. This deliberate placement serves a dual purpose: it allows the light to be visible from a distance, attracting the attention of the fish and guiding them towards the chart. Once the fish have gathered around the illuminated area, the lights are gradually lowered. This gradual descent is deliberate, enabling the fish to focus their attention on the midpoint of the chart.

By skillfully manipulating the positioning of the lights, this method exploits the natural curiosity of the fish, compelling them to concentrate at the central point beneath the lamp. The strategic interplay between the lighting arrangement and the tidal movements demonstrates a nuanced understanding of marine behavior, resulting in a highly effective and sustainable fishing technique.

This method is meticulously executed to ensure that when the net or waring is raised, the fish remain trapped within it, unable to escape. The temperature around the lamp is maintained within a specific range, typically between 20°C to 30°C. This temperature control is crucial because different species of fish have specific temperature preferences for feeding and movement. By aligning the lamp's temperature within this optimal range, the natural instincts of the fish are harnessed.

Fish, by nature, are drawn to environments that offer the right temperature for their activities. If the lamp's temperature exceeds 40°C, it creates stressful conditions for the fish, prompting them to instinctively avoid the illuminated area around the chart lamp. Therefore, by carefully regulating the temperature, this method ensures that the fish are not only attracted to the light but also find the surrounding environment conducive for their natural behaviours.

This nuanced approach reflects a deep understanding of marine biology, enabling the optimization of the fishing process while prioritizing the well-being of the fish, ensuring a sustainable and effective fishing technique.

The process of night lighting at the time of capture as shown in Figure 13 follows:

Figure 5. Placement of Tor Location of Lights on the Stamp Chart

3 SUMMARY

The research findings on the Installation of Solar Home System for penmoaning chart tancap in Lasiana waters provide valuable insights and implications for various aspects:

3.1. Optimizing Solar Home System Components.

With the lamp's power capacity set at 250 Watts, the research facilitates the calculation and determination of the required panels/modules, Solar Charge Controllers (SCCs), inverters, and safety batteries. These calculations are crucial for ensuring the solar system is appropriately sized, efficiently harnessing solar energy to power the chart tancap effectively.

3.2. Dynamic Testing and Measurements.

The research underscores the importance of testing and measuring the solar power system both on land and at sea. This dynamic evaluation is vital because solar power generation can experience distinct variations in different environments. Factors such as sunlight angles, water reflections, and weather conditions can affect solar power production at sea differently than on land. Understanding these variations is fundamental for optimizing the solar system's efficiency and reliability under real-world conditions.

By acknowledging these implications, researchers and practitioners can design, install, and maintain Solar Home Systems for penmoaning chart tancap in Lasiana waters with a comprehensive understanding of the specific requirements and challenges posed by the marine environment. This knowledge-driven approach ensures the sustainability, effectiveness, and longevity of the solar power solution, contributing to environmentally friendly and reliable energy practices in maritime applications.

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