

Analysis of Fish and Waste Sorting Sensor Innovation Design Using the SROI (Social Return on Investment) Method in the Simanja Ecotourism Program (Jagapati Mangrove Conservation), PT. Pertamina Patra Niaga Integrated Terminal Cilacap, Indonesia



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ABSTRACT: The SIMANJA Ecotourism Program was motivated by various problems that have existed for a long time and in turn the impact was felt when this program was first formed. The main problem in question is the rampant condition *illegal logging* in the mangrove forest. The types of innovation developed in the SIMANJA Program include types of social innovation including in community systems and organizations and increasing community cohesiveness by reducing society's individualist attitudes. The innovation element of the SIMANJA Program is the Innovation Design of Fish and Waste Sorting Sensors. Garbage is a problem that is often faced by Indonesian citizens, especially in managing waste. Waste that is not managed properly will cause the spread of disease easily and make the place smelly and dirty. In this research, an innovative design analysis of fish and waste sorting sensors was made using the SROI (Social Return on Investment) method. Trash caught by fishermen while fishing will be put into the conveyor, then the trash will be picked up automatically by the separator machine sensor, so that the output from this tool is fish without trash. Through the SROI study, it is hoped that it can help companies understand and manage the benefits of social, environmental and economic values that impact program implementation Environmental Social Responsibility or TJSI with the company's commitment to focus more on corporate responsibility for its environmental impact, such as environmental protection efforts, waste reduction, and sustainable use of natural resources through the Design of Fish and Waste Sorting Sensor Innovations.

KEYWORDS: Simanja, SROI Method, Kutawaru Cilacap, Pertamina Patra Niaga ITC

I. INTRODUCTION

Every company that operates is guaranteed to have an impact on the surrounding environment, both social impact and impact on environmental quality. The government through Law Number 40 of 2007 concerning Limited Liability Companies requires companies to be responsible for the impacts they produce. One form of accountability is through activity programs *corporate social responsibility* (CSR) (Law, 2007). CSR which was originally in nature *voluntary* then it turns into an obligation. The form has also changed, from the original grant (*charity*), then developed into community empowerment and community development (Canopy Foundation 2018). As a form of appreciation and evaluation of the performance of the person responsible for business and/or CSR activities in the environmental and social fields, the government through the Ministry of Environment issued Minister of Environment and Forestry Regulation Number 1 of 2021 (PermenLHK 1/2021) to replace Minister of Environment Regulation Number 3 of 2014 concerning the Company Performance Rating Assessment Program in Environmental Management (PROPER) (Ministry of the Environment and Forestry, 2021). Environmental management as intended in PROPER also includes assessment of the implementation of CSR programs. The implementation of PROPER first began in 1996, since its implementation PROPER has undergone several changes. The last change occurred in 2021 through Minister of Environment and

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Forestry Regulation Number 1 of 2021 (PermenLHK 1/2021) which replaced Minister of Environment Regulation Number 3 of 2014. The last significant change was the increase in the required assessment aspects, one of which was Innovation Social.

Activity analysis of innovative design of fish and waste sorting sensors using method SROI (*Social Return On Investment*) on Simanja Ecotourism (Jagapati Mangrove Conservation) PT. Pertamina Patra Niaga Integrated Terminal Cilacap is an approach to understanding and managing impacts on social values (*social value*), economics, and environments created from analysis Design of Fish and Waste Sorting Sensor Innovation. Garbage is a serious problem faced by many cities in Indonesia. Rapid population growth and changes in modern lifestyles have increased waste production significantly. Efficient waste management is important to maintain environmental cleanliness, public health and technological continuity. However, effective waste management is also a big challenge, especially in the context of coastal areas that receive waste from upstream areas. Therefore, improving effective and efficient waste management is a must.

In Law number 18 of 2008 concerning waste processing, it is stated that waste is the remainder of the results of human activities. Based on the type, waste is divided into 3, namely waste from animals and plants (Organic), waste from non-biological materials such as plastic (Non-Organic) and metal waste. Improper waste processing will disturb the environment, such as spreading odors and causing disease. In an effort to overcome this problem, technology plays an important role as a tool to increase efficiency and accuracy in waste management. especially to help in sorting the waste brought in during fishing in the Segara Anakan area, Cilacap, so that the people of Kutawaru are helped in sorting fish.

The PROPER award aims to encourage companies to comply with environmental regulations and achieve environmental excellence (*environmental excellence*) through the integration of sustainable development principles in production and service processes, implementation of the 3R environmental management system, energy efficiency, resource conservation, and ethical and responsible business implementation towards the community through community development programs (*Community Development*). A measurement framework to help organizations understand and manage the social, environmental and economic value they generate. The measurement process is based on cost-benefit analysis, social accounting, and social audit. In simple terms, SROI is a way to monetize (monetize) the value of social impact so that the impact can be measured in financial units or from a financial perspective. Through the SROI study, it is hoped that it can help companies understand and manage the benefits of social, environmental and economic values that impact the implementation of CSR programs. The result of the SROI analysis is a ratio that shows the relationship between investment costs and the resulting impact value.

II. RESEARCH METHODS

Methods in preparation for carrying out analysis of innovative design of fish and waste sorting sensors using secondary data collection methods. Secondary data collection methods are methods that involve collecting data indirectly, namely in the form of books related to the research being carried out.

A. Location

The research was carried out in June-September 2024 in Jagapati Village, Kutawaru Village, Central Cilacap District, Cilacap Regency. Jagapati itself is the name of the village, which is unofficial and not in any administrative regional unit. Its origin is from the name of every settlement that existed in the past, even before the government regulated the administrative area.

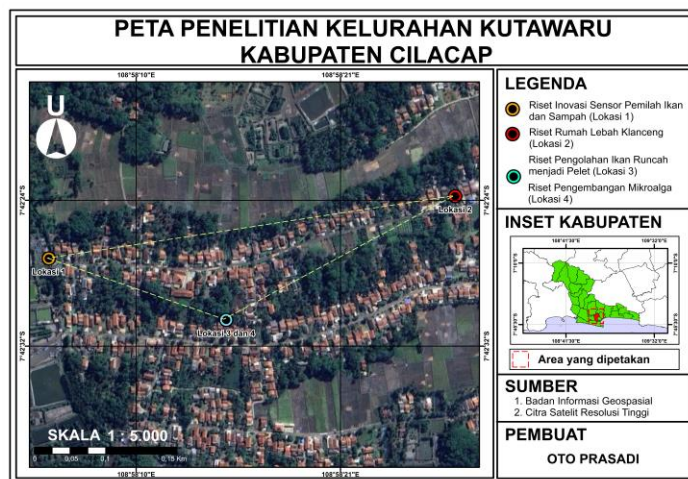


Figure 1. Research Location

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B. System Development Life Cycle

SDLC (*System Development Live Cycle*) is a framework or model that describes the steps in completing a system from start to finish. Using this method will make it easier for system makers to design smart trash cans. The stages carried out are:

- 1) **Planing**
At this stage the researcher identifies the problem that will be solved by the tool fish and waste sorting sensor innovation.
- 2) **Analysis**
After knowing the problems faced, the researcher will analyze what is needed to make the tool fish and waste sorting sensor innovation.
- 3) **Design**
After carrying out the needs analysis, the researcher will carry out a design, namely how the tool will work, how the components will be connected and what the shape of the system cover will be.
- 4) **Implementation**
The next step taken is to implement it on site tool fish and waste sorting sensor innovation namely starting with making the frame, installing components to assembling the components so that they can work as desired.
- 5) **Testing**
Testing is carried out before installing components and after installing components.
Before installing components, testing is carried out on sensors and other components.
- 6) **Maintenance**
After testing, the final step is the process *maintenance* that is, after the smart trash can is running well, the next step is to ask *feedback* to the user. *Feedback* This serves as a further development tool.

C. Document review or desk study

In the preparation stage the team will review documents related to study needs, such as:

- 1) Social Mapping Report Document, 2023
- 2) Community Satisfaction Index Report Document, 2023
- 3) Social Return On Investment Calculation Report Document, 2023

D. In Depth Interview

This activity was carried out by several parties who had special roles in implementing the activity. The list of respondents who were interviewed is in table 1 as follows.

Table 1. Identification of Stakeholders in the PEPES SEGA K-CAP program

No	Stakeholders	Role in the Program	Impact
1	PT. Pertamina Patra Niaga Integrated Terminal Cilacap	Provider of financial needs in the implementation of the program	Fulfillment of obligations Improvement of good name reputation
2	PEPES SEGA K-CAP Group	Beneficiaries of the implementation of the program	Increase in group income Group capacity building Improving the quality of human resources
3	Politeknik Negeri Cilacap	As a channel of innovation and realizing innovation	Improved good image

E. SROI Analysis

Social Return on Investment (SROI) is an approach to understanding and managing the impact of social, economic and environmental values created by an activity or organization. A measurement framework to help organizations understand and manage the social, environmental and economic value they generate. The measurement process is based on cost-benefit analysis, social accounting, and social audit.

In simple terms, SROI is a way to monetize (monetize) the value of social impact so that the impact can be measured in financial units or from a financial perspective. The result of SROI analysis is a ratio that shows the relationship between

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investment costs and the resulting impact. For example, an SROI ratio of 1:5 shows that by investing IDR. 1, a social impact worth IDR 5 is generated.

SROI works by understanding the impact of activity programs that have been/will be implemented. How the change occurs, how activities correlate with the goals to be achieved, and what the roles of stakeholders are. SROI has a framework that focuses on answering five key questions. The five key questions are listed in table 1 as follows:

Table 2. List of key questions in framework SROI

Question	Information
Who changed?	Calculate everything that changes. People, groups of people, organizations or institutions and environments
How did they change?	Focus on all positive changes and negative changes that occur. There are not only expected changes, but also unexpected changes
How do you know about these changes?	Collecting evidence of change that does not only come from the opinions of certain people or society or institutions
How big a change has occurred?	Calculate all changes and influences provided by activities. Not only positive influences, but also negative influences.
How important are the changes that occur?	Understand how important the changes are

III. RESULT AND DISCUSSION

One of the problems experienced by fishermen on the coast of the Segara Anakan area, especially Kutawaru Village, is the large amount of garbage that can hinder the process of searching for fish, fishermen who use fishing gear using nets traditionally find it quite difficult to sort between garbage and fish, the catch sometimes has poor quality because it is damaged due to mixing with marine debris, especially plastic waste. In addition, fishermen face inefficient time constraints because they have to manually separate fish from garbage. Waste that has been lifted using nets by fishermen is thrown back into the sea due to the limited land for waste disposal and the lack of public awareness in processing waste, so that waste thrown into the sea will be caught in fishermen's nets and this incident repeats every day, so that fishermen suffer losses. With this problem, there is a social innovation in the form of a fish and waste sorting sensor device. The existence of this tool is to minimize the time used by fishermen to sort fish. In addition, this tool can also maximize fishermen's income.

Design is a process of creating or making a new product. By making a design, the researcher can determine the shape of the tool to be made. The design of the fish and garbage separation sensor innovation is based on the design and system requirements.

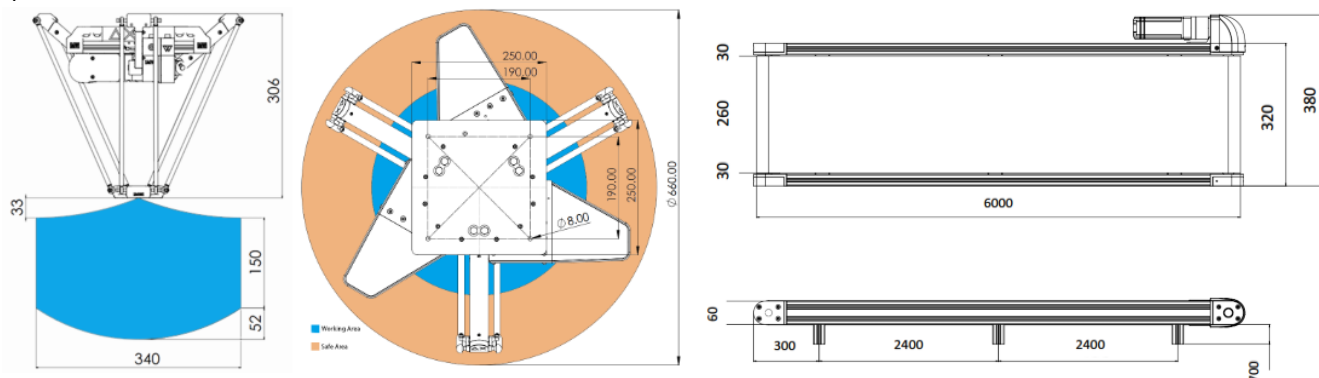


Figure 2. Draft desain sortir machine

The initial stage of the design analysis of fish and waste sorting sensor innovations is to conduct a needs analysis that the researcher will design, namely how the tool will work, how the components will be connected, and how the shape of the system cover will be. This analysis is carried out before entering the implementation, testing and maintenance stages to minimize failures. The analysis was carried out not only related to the preparation of the tool but also the analysis of the positive impact of the tool being made for the beneficiary community.

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There are indicators and impact values of a tool that we analyzed related to the Analysis of the Design of Fish and Waste Sorting Sensor Innovation Using the SROI (Social Return on Investment) Method in the Simanja Ecotourism Program (Jagapati Mangrove Conservation) by conducting direct interviews with beneficiaries, namely the community in Kutawaru and several other stakeholders as contained in the table below:

Table 3. Indicators and impact values of sorting machines

No	Outcome	Computational Approach	Monetization Approach	Resources
1	There is the manufacture of an innovative machine for fish and waste separation sensors to help fishermen sort fish catches accompanied by garbage	The fish caught enter the conveyor and are sorted before entering the next stage	Fish that are sorted using tools will be waste-free	Interview
2.	Able to ease the work of fishermen in sorting	Can do other activities or can prepare for the next process	Reduction of fishermen who do sorting	Interview

Impact is the difference between the initial condition and the long-term outcome of a program. In this evaluation, the evaluator assesses the impact of a program by comparing the results of a program with the assumption that the program is not implemented. Impact evaluation will certainly be more valuable if external factors that affect the results of the program can be known, so that the contribution of parties involved in achieving the goals can be known more.

An impact evaluation should be able to provide an adequate framework for understanding whether beneficiaries actually benefit or benefit from the intervention carried out by the company in a social innovation program (not from other factors). To provide this framework, this report will feature a presentation of the SIMANJA Ecotourism Social Innovation Program using the Logic Model (LM). In addition to LM, this study is also equipped with verification of the impact of the program through the presentation of qualitative research results on the impact of the program

CONCLUSIONS

The SIMANJA Ecotourism Program is backed by various problems that have existed for a long time and in turn the impact was felt at the beginning of this program. The main problem raised in this topic is related to the Analysis of the Design of Fish and Waste Sorting Sensor Innovation Using the SROI (Social Return on Investment) Method in the Simanja Ecotourism Program (Jagapati Mangrove Conservation), where the condition of illegal logging is rampant in mangrove forests. One of the types of innovations developed in the SIMANJA Program is the development of fish and waste separation devices, so that fishermen who catch fish and their garbage are carried away in nets, after landing can be sorted automatically using this tool, so that the community can increase their productivity in community systems and organizations and increase community cohesiveness by reducing the individualistic attitude of the community.

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