



Women's empowerment in coastal areas: waste management based on circular economy paradigm (a case study on Pasaran Island, Bandar Lampung)

Ayu Wulandari*, Bambang Utoyo, and Susana Indriyati Caturiani

Universitas Lampung, Administrative Science Department, Bandar Lampung, Lampung, Indonesia, 35141

Abstract - Coastal areas have potential resources and are projected as tourist attractions because they are the meeting point between land and sea. However, this potential is threatened by pollution and damage in coastal and marine areas originating from human activities. Marine debris causes marine pollution, damages marine ecosystems and coastal areas, and can even endanger human health. In 2021, approximately 2,864 kg of waste accumulated on Pasaran Island, of which more than 64% was residual and low-value waste. The circular economy is a new paradigm that is widely adopted in sustainability-based waste management in Indonesia. The role of the community in the implementation of the circular economy is very important, one of which is through women's empowerment. This research aims to describe the importance of women's role in waste management through empowerment schemes. This research uses a qualitative approach through observation, interviews, and literature studies to obtain information. The results showed that through the empowerment of women and the implementation of the circular economy in Pasaran Island, more than 29,000 kg of household waste could be reduced, new employment alternatives could be created, and the community in Pasaran Island increased its awareness of managing household waste.

Keywords: circular economy, coastal area, Pasaran Island, waste management, women's empowerment

1 Introduction

Marine debris is currently a global challenge and issue [1], [2] that is included in the agenda sustainable development goal 14 'life below water' subordinate in point 14.1 'reduce marine pollution'. [3] Plastic waste is one of the largest contributors to 710 million metric tons of marine pollution [1], which can be found in almost all areas of the ocean [4], including the coastline, sea surface, and seabed [5]. Dependence on plastic materials causes the amount of plastic waste in coastal areas to increase [6], and can even be found in some small locations around the world [2].

As a developing country that is mostly surrounded by waters and oceans, marine pollution in Indonesia is currently a problem that affects people who live in coastal areas [7]. Plastic waste also results in lost revenue and increased costs for ocean users and coastal communities [2], [8]. Whereas

*Corresponding author: wulandariayu66@gmail.com

more than three billion people worldwide derive income and livelihoods by depending on coastal and marine resources [9]. Not only causing various ecological and socio-economic problems, but marine debris also negatively impacts human well-being, particularly fisheries, cultural heritage, and recreation [10].

Pasaran Island is one of the coastal areas located in Bandar Lampung City. Pasaran Island is the largest production center for salted dried fish, salted dried squid, and salted dried anchovies in Lampung Province [11]. Pasaran Island also has another various potential such as green mussels, grouper, Simba, and snapper aquaculture, other fisheries activities such as boat building, and the potential of the mangrove community in it which can be an attraction of Pasaran Island. However, this potential is not accompanied by good environmental hygiene. Since the early 2000s, pollution in the coastal area of Pasaran Island has resulted in a decreasing population of fish that can be caught. Based on a survey conducted by a Non-Governmental Organization in the local area 'Gajahlah Kebersihan' [12], in 2021, more than 2,864 kg of household waste per week was collected on Pasaran Island and more than 64% was a non-recyclable waste. The issue of marine debris and waste management in coastal areas is a complex problem involving community behavior, national policies, and cross-border collaboration [13]. The lifestyle of people living in coastal areas, such as throwing rubbish into the sea, burning, and landfilling, showed that 90% of coastal communities do not manage waste properly. This will certainly have a negative impact on public health because it affects access to clean water and sanitation in residential areas for residents living in coastal areas, which are contaminated by rubbish. The polluted environmental conditions and the large amount of rubbish scattered around make visitors hesitant to come and buy processed salted fish products. This situation indirectly affects people's income and economy because it is related to sales and production [12].

One solution currently being offered by many researchers around the world is a circular economy-based waste management model. Circular economy is a new approach used as a systematic waste management strategy [14]. The circular economy itself is the antithesis of the linear economy that has been used in the industrial world and was popularized by the Ellen MacArthur Foundation in 2013. The circular economy is a system that minimizes material becoming waste by maximizing the useful value of the material. In a circular economy, products and materials remain in circulation through circular processes such as maintenance, reuse, repair, remanufacturing, recycling, and composting [15]. The circular economy has been proposed as a solution to minimize raw material input and waste generation [16].

The waste problem is an issue that will never be resolved in Indonesia, including in the coastal area of Bandar Lampung City, which in this research is Pasaran Island. It is not only the responsibility of the local government but also the concern of people living in coastal areas. The involvement of women in the public sector is an interesting thing to study, considering that waste management has a real impact on the environment where they live and ultimately on their lives. [13] Integrating environmental activities, including waste management, and economic development is one of the main pillars of a circular economy [17]. This research tries to describe the role of women in waste management efforts in coastal areas on Pasaran Island through the concept of community empowerment carried out by some non-governmental organizations based on a circular economy.

2 Materials and methods

This research uses qualitative research methods that emphasize observation and understanding of social phenomena, which are then interpreted and explained in the form of verbal descriptions. The object of this research method is the human, relationship with interaction, and the relationship [18]. This is very suitable with the topic studied in this research, namely discussing the role of women in

empowerment in waste management in coastal areas using Najati's theory [19] : equality, participation, self-reliance, and sustainability. This research was conducted on Pasaran Island, Kota Karang Village, East Teluk Betung District, Bandar Lampung City, Lampung Province, Indonesia. This research used data collection methods in the form of observation, interviews, and documentation. Data collection was carried out in natural conditions (natural setting). The research period consisted of three parts, namely pre-research which was carried out in October 2022, data collection which was carried out from May to July 2023, and report preparation was carried out from August to September 2023. The research subjects consisted of bureaucratic holders, in this case, the Head of the RT, a local level non-governmental organization, namely Gajahlah Kebersihan as the person in charge of the empowerment program, as well as women from the Pasaran Island community who are members of the Kartini Pasaran group. The name of the Kartini Pasaran group was inspired by the name of the national heroine, Kartini, who pioneered the emancipation of women in Indonesia. This is expected to represent the purpose of the formation of a women's empowerment group in Pasaran Island to more actively contribute to the community, especially in Pasaran Island.

3 Results and discussion

The empowerment program on Pasaran Island was initiated by several organizations outside the government, consisting of Gajahlah Kebersihan an NGO that works on marine waste issues at the local level, Askara Scholar a non-profit organization based on research and community empowerment, and Angkuts as a start-up providing waste transportation services. This community empowerment program, especially for women on Pasaran Island, is known as Pasaran Wawai. Pasaran Wawai is a waste management pilot project by empowers coastal communities in Bandar Lampung City with a participatory circular economy concept funded by the Anak Bangsa Bisa Foundation (GoTo Foundation) from September 2022 to May 2023.

The Pasaran Wawai project carried a waste management model through a circular economy-based community empowerment scheme that is closely related to sustainability. The circular economy concept has been widely used in various countries to reduce the potential for increased gas emissions resulting from the accumulation of waste and various other human activities. According to Islami [11] , by adapting the circular economy concept to waste management, it is hoped that the benefits and value of a product can be optimized so that the life span of the product will be longer and the volume of existing waste can be reduced.

According to Hermosa [2] , to be able to decide where to focus interventions to minimize plastic waste in the sea and coasts, sources, pathways, types, amounts, and locations of accumulation must be considered. Gajahlah Kebersihan as a representative of one of the non-governmental organizations that runs a women's empowerment program in managing waste decided to choose Pasaran Island as the location for implementing the program due to some considerations such as : (a) accessibility, as a small island located on the coast of the city, Pasaran Island has the bridge as the only access to and from the island which is quite easy to reach from the city center, the location of Pasaran Island also only takes about 30 minutes by motorized vehicle; (b) complexity of the waste problem, although other coastal areas have a wider complexity of waste problems, but based on the results of a survey conducted by Gajahlah Kebersihan, the waste problem on Pasaran Island is more structured; (c) regional potential, as mentioned earlier, Pasaran Island has diverse fisheries and tourism potential. This potential will be more visible if the waste problem can be resolved; and (d) social factors, one of the important points that makes Pasaran Island a pilot project in empowering women in waste management in coastal areas is because the community lives in harmony and together, this will facilitate the implementation of community empowerment programs on Pasaran Island.

3.1 Empowering Women in Waste Management on Pasaran Island through implementing a circular economy.

The circular economy is an economic model related to sustainable production and consumption processes as the antithesis of the linear economy. According to Purwanti [20], in a linear economy, the process of producing and consuming goods is carried out using a take-produce-dispose scheme without paying attention to the impact on the environment. So, the circular economy has a production-use-dispose-return scheme also known as 5R (Reduce-Reuse-Recycle-Replace-Repair). The aim of the circular economy scheme itself is to try to extend the life cycle of products, raw materials, and existing resources so that they can be used as long as possible. Islami [11] also added that the circular economy seeks to minimize wasted resources through a system of extending product life, design innovation, maintenance, reuse, remanufacturing, recycling to become another product (recycling), and recycling into other products (upcycling).

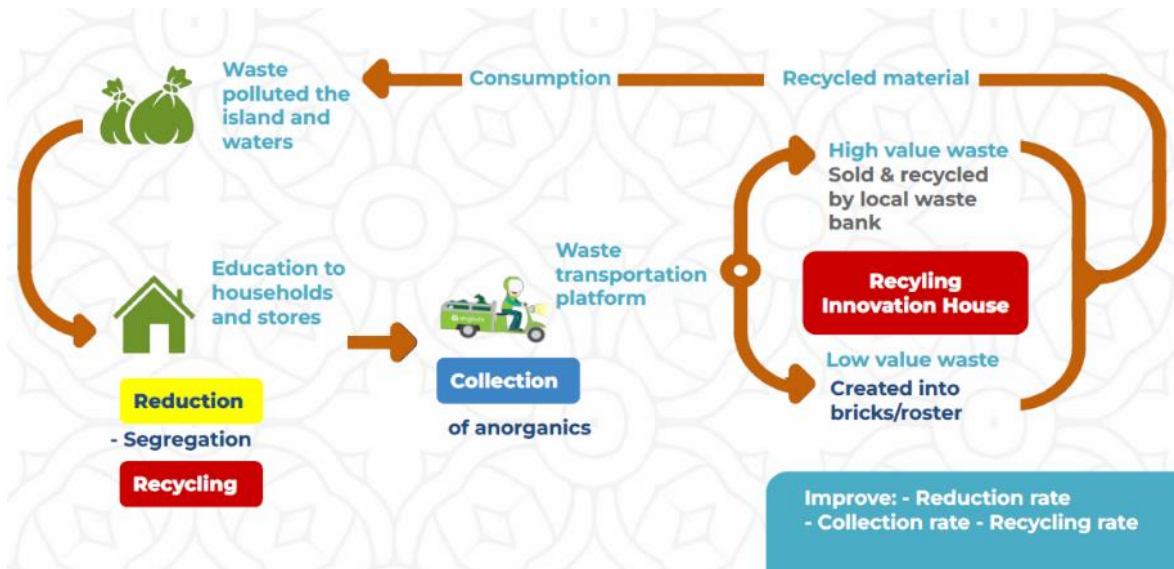


Fig. 1. Circular Economy Model in the Pasaran Wawai Program [12].

Three important points are the focus of the 'Pasaran Wawai' women's empowerment program (Fig 1), namely: (1) Education, namely integrated environmental education for housewives, store owners, and other stakeholders. (stakeholders); (2) Initiative waste transportation using three-wheeled vehicles (tricycles); (3) Utilization of waste recycling technology which converts low-value waste into rosters for the Recycling Innovation House (RINDU). At the household level, the community, especially mothers, are given education on waste reduction, segregation, and recycling before collecting it to the communal dropping point provided by Pasaran Wawai Team. For organic waste such as leftover vegetables and fruits from kitchen products can be used as raw materials for making eco enzyme liquid, while for inorganic waste such as detergent packs, baby diapers, and others can be collected and disposed of at the communal dropping point around the residents' homes. The waste that has been collected at the communal dropping point is then transported by the waste collection officers using tricycles to the RINDU. At RINDU, waste from coastal community households is sorted again based on its type. The types of waste are divided into three, first, high-value waste, which is inorganic waste that has a selling value and can be recycled by the local waste bank such as plastic bottles; second, low-value waste, such as plastic of shampoo sachets, plastic of flavoured drink powder sachets, and etc., which categorized as inorganic waste that has low value and difficult to disintegrate in nature but can still be utilized as additional ingredients to make eco-roster, and third,

organic waste that is not sorted by residents such as food scraps, vegetable and fruit slices from kitchen scraps that can be used as food for magot.

According to Ocean Conservancy [21] in 2019, in Indonesia, women are a key demographic to impart awareness concerning sorting and segregating, linking such behavior with conservative messaging such as religion and morality, self-improvement, and everyday life. Najjati [19] defines empowerment as increasing ability, energy, strength, or power. This women's empowerment program is an effort to increase the skills and knowledge of women living in coastal areas in managing waste. Not only do they reduced the amount of waste produced, but women, the majority of whom are housewives, also gained economic benefits from collecting waste, for example turning plastic waste from sachet packaging into recycled bags.

This empowerment group on Pasaran Island is named 'Kartini Pasaran'. The use of the term Kartini itself represents women as strong and capable figures. During the Pasaran Wawai program, Pasaran Kartini is provided with some pieces of training to increase their knowledge and ability to manage waste so that it is more useful and even produces economic value, such as training in making compost, training in making eco enzymes, training in making products from plastic waste into bags, tissue holders, etc. This is in line with the Pasaran Wawai which carries the concept of circular economy-based waste management.

According to Najjati [19] , four principles are often used for the success of empowerment programs, namely the principles of equality, participation, self-reliance/independence, and sustainability. This principle can also be adapted to be implemented in women's empowerment programs on Pasaran Island.

3.1.1 Equality

Equality is the main principle that must be adhered to in the empowerment process [19] . In empowerment programs, men and women have the same position to gain access during the education process to implementation. Women could be the entry point for community empowerment in coastal areas. In a circular economy (Fig 1.) Education is not only given to men, but also women. Every community on Pasaran Island has the same right to obtain knowledge about how to sort and process household waste properly so it is hoped that it will be able to increase awareness and concern for the surrounding environment.



Fig. 2. Educational Activity on Circular Waste Management by the Pasaran Wawai Team ([instagram.com/pasaranwawai/](https://www.instagram.com/pasaranwawai/))

For the first stage of the Pasaran Wawai program, the Pasaran Wawai Team (Gajalah Kebersihan, Angkuts, and Askara Cendikia) held waste management education activities for the community on Pasaran Island. This circular waste management education was attended by 120 residents divided into 2 sessions, namely Saturday, 13 August 2022, and Sunday, 14 August 2022. The educational activity contained an introduction to marine waste, how to manage waste, and how to utilize waste such as how to make compost and make liquid. eco-enzymes from organic waste (Fig. 2).

In addition to having the same opportunity to get education about waste management, both men and women in the Pasaran Island community also have the same responsibility in preserving the environment. Every people in Pasaran Island, whether male or female, fish businessman, housewife or fisherman or anyone, has an equal position to gain access to waste management services and also has the same obligation to manage waste in their environment.

3.1.2 *Participative*

Empowerment programs that can stimulate community independence are programs that are participatory, planned, implemented, supervised, and evaluated by the community. [19] This is also what is done in the Pasaran Wawai program by involving the participation of women in sorting household waste before throwing it into the trash cans provided. Kartini Pasaran mothers who were also present and had been provided with education on circular waste management were then also empowered to provide education door-to-door to every home of Pasaran Island residents, around 18 mothers from Pasaran Island residents joined the Kartini Pasaran group. The function of Kartini Pasaran is to help educate the public regarding the waste management process, started from sorting waste from the house.

This waste management program, which is part of Pasaran Wawai, is then monitored and evaluated to find out how many residents on Pasaran Island have been educated and started implementing waste management and what educational targets have been delivered correctly and according to the objectives. Three members of the Kartini Pasaran group were also empowered to be waste sorting officers and collect cleaning fees every month. The majority of Pasaran Island residents sorted their rubbish first at home before collecting it in communal dropping point. Waste is separated based on type, making it easier for waste processing officers to sort it back at RINDU. RINDU (Recycling Innovation House) is one of the facilities provided by the Pasaran Wawai Team which is used as a center for collecting and processing waste from Pasaran Island. RINDU was built to support the implementation of the circular economy model in waste management in coastal areas, both organic and inorganic waste, as well as empowering coastal communities in economic terms. Based on the data of Gajalah Kebersihan, from September 2022 to May 2023, more than 19.000 kg of household waste recycled, 35% of household no longer dispose their aste to the river and sea, and more than 29.000 kg of household waste reduced.

3.1.3 *Self-sufficiency*

The principle of self-reliance is respecting and prioritizing people's abilities rather than the help of other parties. [19] The majority of men on Pasaran Island work as fishermen and spend most of their time catching fish at sea. Meanwhile, the majority of women on Pasaran Island work as housewives and fish sorters. However, the amount of fish that can be sorted is not the same every day, this is influenced by the tides and the weather which results in an uncertain amount of seafood catches, depending on the season.

The principle of 'start from what they have' is one of the foundations of the emergence of an initiative to increase the ability of Kartini Pasaran mothers to have additional skills capable of turning

unused waste plastic into economically valuable products. Types of inorganic waste such as plastic sachet fabric softener waste, plastic waste coffee sachets, and other drinks, can be reused to make products that have economic value such as bags, tissue holders, carpet mats, etc. (Fig 3.) The involvement of women aims to provide alternative employment for women in the form of skills to make products from processed plastic packaging waste.



Fig. 3. Mrs. Dahlia showed the results of processed plastic waste products

According to Mrs. Dahlia, head of the Kartini Pasaran group, plastic packaging waste that has been collected by mothers can be created into bags, tissue holders, fruit plate mats, and others. The resale value of these processed waste products varies from IDR 50,000 to IDR 250,000, depending on the type of product creation. The value of this product is more emphasized on the value of creativity and efforts to collect plastic waste which also takes time, so the price is quite expensive. In a month, they can earn a turnover of up to Rp. 2,000,000,- if there are lots of orders. This amount is quite helpful in increasing additional income for the mothers of Kartini Pasaran cadres. This handicraft product from Pasar Kartini is labeled 'Sea Mama'. Sea Mama is taken from the words 'sea' which means sea, and 'mama' which means mother. This product is expected to be able to empower women in coastal areas who have transformed waste into products that have a function and economic value. The advantage of this plastic waste craft product is that it is strong and durable. This is due to the weaving process from one form of plastic weaving to another plastic weaving which is interlocked with each other.

3.1.4 Continuity

Empowerment programs need to be designed to be sustainable even if initially the role of the Pasaran Wawai's Team is more dominant than the community itself. But slowly and surely, the role of the Pasaran Wawai's Team will be reduced, even eventually eliminated, because people can manage their activities. [19] According to Dicky Dwi Alfandy as sustainable director of Gajahlah Kebersihan, after the Pasaran Wawai program, the Pasaran Wawai team will continue to assist for up to 6 months. This aims to monitor and evaluate activities as well as open opportunities for the community to continue to consult with companions so that this program remains sustainable. In addition to mentoring, the provision of facilities is also being improved, such as increasing the number of communal dropping points spread across Pasaran Island. The impact of the sustainability of this empowerment program is also slowly being felt by the community on Pasaran Island. On the environmental aspect, the

geographical location of Pasaran Island, which is directly adjacent to the ocean, means that the area is often affected by tidal floods that bring garbage from the sea to the mainland. The coastal area of Pasaran Island, which was previously full of garbage, has now become cleaner. According to Mrs. Ropiah, one of the residents of Pasaran Island, the environmental conditions on Pasaran Island are now much cleaner after the Pasaran Wawai program.

In the social aspect, there is a change in behavior in the community in managing waste. As many as 35% of the community no longer threw their household wastes into the sea or river. According to Ms. Juju, one of the residents of Pasaran Island, many residents are now more courageous to reprimand fellow local residents if there are still those who throw garbage out of place. On the economic aspect, soft skills training for mothers to make handicrafts from plastic waste into products of economic value, becomes an alternative job that can provide additional income for them.

4 Conclusion

Empowering communities in coastal areas to manage waste is one strategy that involves community participation to consciously and actively manage waste. In line with the principles of empowerment consisting of equality, participation, self-reliance, and sustainability proposed by Najati [21], women's empowerment in Pasaran Island is able to change the behavior patterns of the community, especially housewives, in dealing with waste issues in their environment. Education and facilitation initiated by a number of non-governmental organizations were able to increase public awareness that women can also be actively involved in efforts to manage waste generated from households, starting from the process of sorting, reducing, to recycling waste into products of economic value. By women empowerment program in Pulau Pasaran, more than 19.000 kg of household waste recycled, 35% of household no longer dispose their wastes to the river and sea, and more than 29.000 kg of household waste reduced. The Pasaran Wawai program implemented on Pasaran Island is a concrete manifestation that the community is able and willing to manage waste consciously, with integrated and sustainable facilitation and assistance. By empowering the community, especially women in waste management, it can create changes in the community.

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