Circular Economy in Marine Waste Management Through Triple-Layered Business Model Canvas Approach

ABSTRACT

Aims: The shift from linear to circular business models is becoming increasingly necessary at the environmental level. There are many ways to make business and the environment an inseparable unit, one of which is by promoting the circular economy business model.
Methodology: This study focuses on the Triple Layer Business Model Canvas (TLBMC) approach to apply the circular economy concept by using the example of a marine waste processing company.
Results: The results showed that the mapping of the waste processing business model with the TLBMC approach can be described as a whole, the sustainable value of the company in three integrated layers, namely the economic layer, the environmental layer, and the social layer. Despite the limitations resulting from this study.

Keywords: [Circular Economy, Triple Layer Business Model Canvas, Trash

1. INTRODUCTION

Currently, the world population reaches 7.85 billion people and it is estimated that in 2050 it will reach 9 billion in 2050. According to the United Nations, this world population growth will cause several problems, especially in environmental issues (Hammam et all, 2021). One of the environmental problems in Indonesia that has received international attention is waste. The World Economic Forum (2016) report estimates that by 2050, there will be more plastic than fish in the oceans. For this reason, stakeholders are encouraged to play a role in every stage of waste management, namely the government, business/industry, academia and the community at every stage of waste management, starting from limiting generation, recycling, reuse, to other efforts. handling which includes sorting, collecting, transporting, processing and final processing.

In general, Indonesia has not been optimal in managing its waste properly. The Ministry of Forestry and Environment said that only 60 percent of the 64 million tons were transported to landfill and only 10-15 percent was recycled. However, the remaining 30 percent is simply dumped into the environment without any control measures (Hijauku.com, 2019). The resulting plastic waste can pollute the environment which poses a very significant risk to human health and the environment. Every year, 100,000 marine life is killed by plastic because 90% of bottled water contains plastic particles. The economic loss of plastic waste on marine ecosystems reaches up to 13 trillion US dollars. Meanwhile, based on the NPAP report (2020), a total capital investment of $18 billion is required between 2017 and 2040 to address the challenges of shifting business as usual practices to a system change scenario for effective waste management and recycling in Indonesia. This investment has the potential to generate revenues of up to $10 billion per year by 2040. This profit is derived from increased sales of recycled plastics, material substitution, and the existence of other new business models towards a circular economy in waste.

The circular economy model is an economic model that pthe principle is based on the 3R (Reduce, Reuse Recycle) concept with optimal production levels in utilizing natural resources by minimizing natural exploitation, minimizing environmental pollution, reducing emissions and waste levels by implementing a sustainable concept(Strielkowski, 2016). According to the European Environment Agency, a circular economy can be defined “as one of the restorative economic models, and which aims to maintain the utility of products, components and materials and maintain their value” (EEA, 2016). Many organizations, academics, companies, and policy makers have recognized the circular economy as a business opportunity with enormous potential (EC, 2020; Ellen MacArthur Foundation, 2015, 2013, 2012; Accenture, 2014; WEF, 2014). The circular economy encourages business people to pay more attention to the end result of their products than to the profit earned by the company by designing systems and products that require less resources, ensuring that the extracted raw materials are used efficiently and maximize life span.

De Angelis (2018) argues that the circular economy itself is an economic system approach with a close loop system method that is different from the linear economic model, where materials, components, and products are maintained as useful and valuable as possible to reduce the amount of waste material that is not reused and disposed of. to a landfill. Kasztalan (2017), andLakshmi, Aruna Devi and Jhansi Rani (2020) say iimplementation of the circular economy also contributes to sustainable production and consumption patterns which are the 12th goal of the Sustainable Development Goals (SDGs). With the circular economy, it is hoped that it can encourage Indonesia to move towards economic transformation, especially to promote a green economy and low-carbon development strategy.

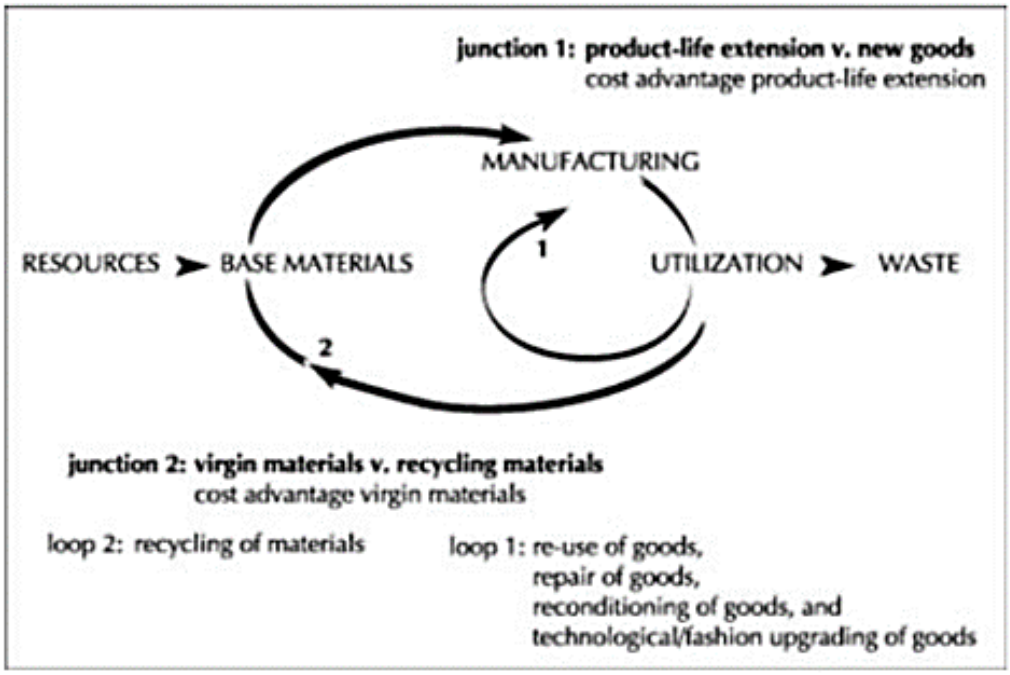
Based on the above background, companies need to innovate business through the circular economy business concept. This study aims to develop a concrete business concept of a circular economy using a triple layer business model canvas approach to waste utilization in the Kuta Mandalika area, West Nusa Tenggara. Although there have been several studies examining the circular economy business concept, very few have taken an approach through the triple layered canvas model. This research will be divided into 5 chapters, namely: Chapter 2 provides a literature review on the main topics of the article such as the circular economy concept and waste management through an integrated model. Chapter 3 broadly analyzes business model concepts in the literature, focusing on the Triple Layer Business Model Canvas methodology applied to companies that process waste. Chapter 4 provides an analysis of the Triple-Layer Business Model Canvas for a waste management business, focusing on the main items that make up the environmental parameters and social layers. Chapter 5 will provide conclusions and some policy recommendations

2. MATERIAL AND METHODS / EXPERIMENTAL DETAILS / METHODOLOGY

2.1 Literature Review

2.1.1 Circular Economy and Its Development

Environmental damage caused by human activities is a trigger for making changes in aspects of life, one of which is changes in the economic system. In recent years, greater awareness has emerged of making efforts to implement a transition into a circular economy system (Borrello et al, 2020). Although the circular economy concept has emerged for several decades, its development has been so rapid since the early 21st century (Prieto and Jaca, 2018). As a result, the circular economy has become a hot topic of discussion not only in the political sphere, but the circular economy has also attracted wide interest in academic literature (Hopkin, 2021; Zink: 2017). There are many writings that try to define and explain the concept of circular economy. Origin of the term "Circular Economy"

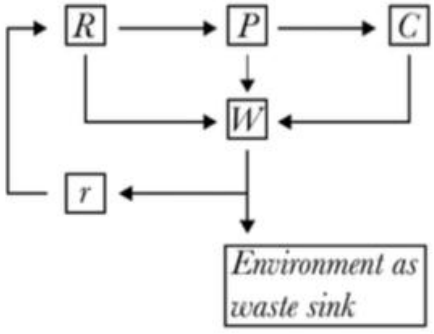


Source: Stahel and Redy, 1981

Figure 1
Early Models of the Circular Economy

The concept discovered by Stahel and Reday, then described and defined more clearly in an economic perspective by Peace and Turner (1990). For these two economists, natural resources are able to influence the economy in providing input for production and consumption as well as output in the form of waste. Perce and Turner try to explain the circular model, namely by analyzing the characteristics of the linear economic system and the open-close contemporary economic system in which production, supported by capital goods, is aimed at the production of consumer goods, the ultimate goal of which is to create utility.

Peace and Turner (1990) also write about some things that are often overlooked by other economists regarding the circular economy. First, it relates to the Second Law of Thermodynamics to emphasize that not all materials and materials can be recycled 100% and the physical impossibility of recycling energy (for example, heat from burning fossil fuels can never return to its original concentrated form). In addition, Peace and Turner also focus on the cost factor of the recycling process once it reaches a very high level. In this sense, a fully circular economy can never be achieved. However, Pearce and Turner (1990) also show that the environment has an 'assimilative capacity'. which allows some of the waste to be reabsorbed harmlessly into the environment and may even become useful products. Many emissions to the air and biodegradable waste fall into this category. The waste can be part of a larger “circular system”. However, if the assimilative power is exceeded, then the waste becomes pollution that can damage both natural systems and human health and welfare.



Note: Key: R=resources, P=production, C=consumption, U=utility, W=wastes, r-recycling

Source: Peace and Turner (1990)

Figure 2
Circular Economy System

Years later, the Ellen Foundation (2013: 2015)) published a report containing an updated definition of the circular economy as follows: a restorative industrial economy with the intent to use renewable energy minimizing, tracking, and eliminating the use of toxic chemicals. Not only that, the report also lists a more complex circular economy model. Although the circular economy has not yet become a general economic model because of its limited application and potential for further development, the circular economy remains a topic that is widely debated by economists and academics. The implementation of the circular economy can be seen in public policies in governments such as the European Union (2014); circular economy zero waste program. One of its programs contains a road map to facilitate the application of closed loop economic principles in European Union countries. The document also includes promotions and explanations related to stages at all stages of the product life cycle, starting from product design, through obtaining raw materials, processing, production processes, consumption and ending with waste collection and management both at the international and national levels. country. The road map also emphasizes that all elements of the production chain must remain in the “closing the loop” process. The process of "closing the loop" means how the turnover of resources, materials and products, materials/energy and economic value in the economy is maintained as long as possible, so that products have a long life (Ragossnig and Schneider, 2019).

In general, some researchers have begun to shift the focus from the macro (implementation of the circular economy at the city, region or country level) to the micro level of analysis (companies) (Ostermann et al, 2021; Brendzell, 2021). The application of the circular economy concept that will be adopted by the company to be implemented deserves special attention. The implementation of a circular economy in companies can lead to major changes in the company's operational practices; for example, in more efficient use of energy, materials and resources to reduce environmental impact. Another potential implementation of the circular economy in companies is through three dimensions of sustainable development: economic, environmental and social (Korhonen et al, 2018). If this potential can be achieved, there will be many benefits to be achieved, from reducing raw material and energy costs, to diversifying material and material reuse along the value chain. In addition, this situation will encourage opportunities and growth of new focus for stakeholders towards a sharing economy and an environmentally friendly corporate vision.

2.1.2 Circular Economy Business Model

According to Lahti et al (2018), the circular business model is designed to create and add value in order to achieve sustainable use of natural resources. Linder and Williander (2017) define a circular business model where value creation is based on the use of retained economic value in the product. Thus, the objective of the business model shifts from making a profit through the sale of products or services to making a profit through the flow of resources, materials, and products over time, including the reuse of goods and recycled resources (Upward and Jones 2015). This objective implies that companies can reduce negative impacts on the environment by providing added value through a circular business model.

Urbinati et al. (2017) proposes an idea that classifies adoption of a circular economy by taking advantage of a business model perspective. (Osterwalder & Pigneur, 2010) and identified two analyzes of the circular economy business model:

1. Value Network ; refers to the extent to which a company leverages key resources, activities, and upstream partners to improve the circulation of its products and processes.
2. Value Proposition; refers to customer value, which considers the extent to which a company demonstrates to customers its compliance with the principles of the circular economy.

One example of a business with a circular economy principle is the waste bank program (Purwanti, 2021). The waste bank is a circular economy innovation program in Indonesia, which is usually formed on the basis of the initiation of the government, universities and local communities. The waste bank program according to Utami (2013) is a collective dry waste management system that encourages the community to participate actively in it. This system accommodates, sorts and distributes waste with economic value to the market, so that the community gets economic benefits from saving waste. It is hoped that with this waste management, the community will get two economic benefits, in the form of added value/income and value added in the form of a clean place to live/environment.

2.2 Methodology

This study used qualitative research methods. Researchers use the Triple Layered Business Model Canvas analysis tool, which is a tool to develop business models to provide and create value not only from an economic perspective, but also from an environmental and social perspective (Joyne and Paguin, 2015). The data used in this study are primary and secondary data. Primary data collection in this research is by direct observation and interviews with business people who are in the marine and coastal marine waste processing business ecosystem. Secondary data collection was obtained from reports and literature studies. The researcher also conducted interviews with the community represented by the community and the private sector to obtain comprehensive results.

The Triple Layer Business Model Canvas (TLBMC) extends the economic-oriented business model by adding a new canvas layer that explores for environmental and social value creation (Sherman, 2012). In other words, TLBMC is a valuable tool for companies to become better at planning the production of innovative products according to economic models taking into account social and environmental impacts. TLBMC can also be integrated with a circular economy system so that it offers many advantages for companies that adopt it (Lathi et all, 2018).

In figure 3, TLBMC provides a “horizontal” consistency within each layer to explore individual economic, environmental and social values. On a "vertical" consistency, TLBMC integrates value creation across three layers. That way companies can develop a deeper understanding of sustainable business value creation (Lozano, 2008).

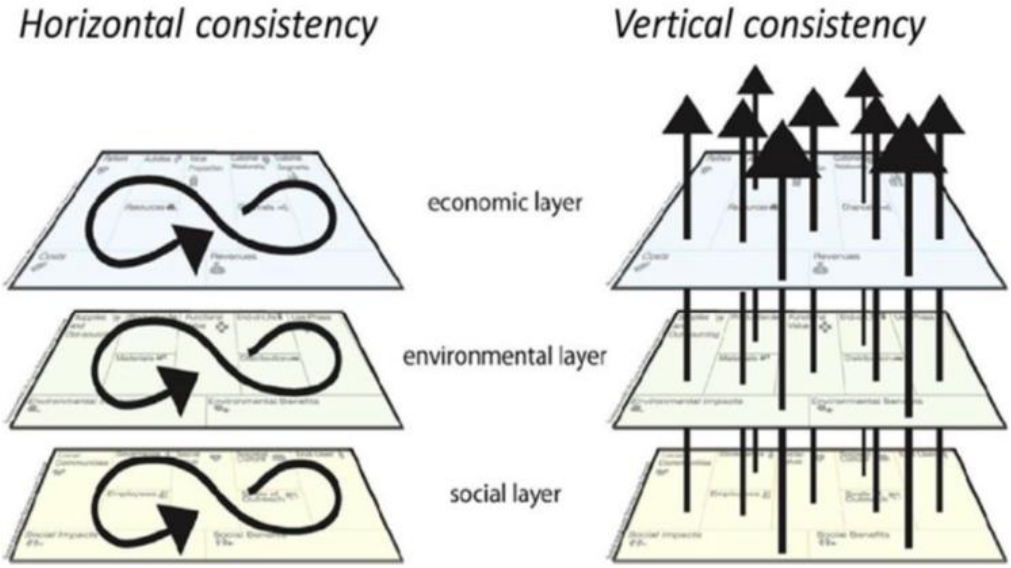


Figure 3 Horizontal and Vertical Consistency TLBMC (Joyce and Paguin, 2016)

Regarding horizontal consistency, each layer allows a certain level of depth in clarifying the different types of value creation, which have the potential to support the overall business model. On vertical consistency, alignment of each layer component in the canvas layer supports alignment of actions and possible interconnections across different value types. These actions and potential interconnections demonstrate how environmental and social concerns, through TLBMC's perspective, can motivate companies to become more active towards sustainability-oriented innovation.

3. RESULTS AND DISCUSSION

3.1 Economy Business Model Canvas

The business model canvas has 3 main functions. First, this business model explains how the different components and aspects of a company can be integrated so as to provide value to customers. Furthermore, this business model which consists of strategies and interconnections serves to describe the relationship between suppliers and stakeholders. Finally, this business model explains how from this interconnection will create value, so that the company will profit (Joyce and Paguin, 2015). This business model consists of nine interrelated elements, namely customer segments, value proposition, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structure.

Table 1
Economic Business Model Canvas

Partners	Activities	Value Proposition	Customer Relationship	Customer Segment
Local Community	Looking for Raw Material	Processing marine and coastal waste into new products that are needed	Product knowledge Long term relationship	Manufacturing companies that require raw materials
Supplier of water	Loop Production			
Transport Service	Logistics Planning	**Channel**	**Cost**	**Resources**
Financial Services	Optimization (increasing product efficiency and performance, eliminating waste throughout the supply chain	Website	Production Cost	Human capital
Supplier of electricity	Sales and Marketing	Call Center	Marketing Cost	Waste as raw materials
Government	Customer Service	Office		Brand
		E-mail	**Revenue**	
		Local area meeting	Volume of sales from product	

The value proposition element is the most important key factor in the marine waste processing business. This element can explain the benefits created by companies in selling products to their customers and why they should choose that company over other companies that provide similar products or services (Zilia et all, 2021). In marine waste processing companies, the value proposition is the element that gives what customers will get in this business, namely providing raw material products from waste in the sea and coastal areas. Processed products are also ensured to have high quality

standards of goods sold throughout the supply chain. This claim must be able to attract certain target customers to choose products from the company over other companies. However,

3.2 Environmental Life Cycle Business Model Canvas

The objective of the environmental layer is to ensure that the full life cycle of a product or service is considered, when a new business is launched, with an emphasis on environmental impact. This objective is based on Life Cycle Analysis (LCA) which is important to know the mapping of environmental impacts (e.g., carbon and water footprint) originating from a product or service over the entire life cycle (Cardea et all, 2020). With this layer, the company will easily identify negative and positive externalities in the environment generated by the company's activities. As in the economic layer, the environmental and social layers consist of 9 elements. Specifically, the environmental layer consists of the following items: supply and outsourcing, production, materials, functional value, end of life, use phase, distribution, environmental impact, environmental benefits

Table 2
Environmental Business Model Canvas

Supplies and Outsourcing	Production	Functional Value	End of Life	Distribution
Electricity for processes	Dryfer Machine	300-400 tons max capacity for current situation	Packaging	Ship transport, Truck Transport
Water photo processes	Press Machine			
gas oil	Production Machine	**Materials**	Product Disposal	**Environmental Benefits**
Use Phase	Sack	Raw materials from waste	**Environmental Impact**	Energy recovery
Optimization of electricity, water and gas	**Distribution**	Energy	Air Pollution emission from waste production, water and energy consumption	Reuse raw materials
Clean Production	Ship transport, Truck transport			

This layer describes the development of a waste processing business even though it is still on a small scale, but can provide benefits to the environment. In this layer, environmental impacts can be evaluated further using the Life Cycle Analysis (LCA) approach. The environmental impacts that will often occur in companies are the use of energy and water consumption, CO2 emissions and waste production. Meanwhile, to analyze the actions taken by the company in an effort to reduce the negative impact on the environment, it can be in the form of reusing discarded products and recovering energy for the sake of creating a sustainable green economy.

3. 3 Social Stakeholder Business Model Canvas

The social layer of stakeholders' business model canvas is built based on stakeholder aspects. This layer aims to capture the social impact of the company that comes from the relationship between the company and its stakeholders. As stated by Cardeal et al. (2020) this layer describes the “organizational structure and strategy of organizational decision-making”. Stakeholders are a set of members or groups who are able to influence the actions of the company. There are 3 stakeholders in this business development, namely the government, partners, and local communities. Figure 4.3 shows a well-established reciprocal relationship with the stakeholders involved. Mapping on each element can be described as a whole, so as to explain the social benefits and social impacts on all stakeholders. In general, the social stratum consists of

nine components: social values, employees, governance, local communities, community culture, scale of outreach, end users, social impact and social benefits.

Table 3
Social Stakeholder Business Model Canvas

<table>
<tr><th>Local Community</th><th>Governance</th><th>Social Value</th><th>Social Culture</th><th>End-User</th></tr>
<tr><td>Media Partner</td><td>Transparency in communication and relations with stakeholders</td><td rowspan="2">Poverty Alleviation through Community Empowerment</td><td rowspan="2">Waste = Money, Finding blessing in problem</td><td rowspan="2">High quality product, eco friendly product</td></tr>
<tr><td rowspan="5">Community Empowerment</td><td>Environmental Benefits</td></tr>
<tr><td>Education such Socialization/Awareness Building Seminars, Trainings, Workshops and Business Coaching</td><td>Scale of Reach</td><td>Employee</td><td>Environmental Impacts</td></tr>
<tr><td>Job Opportunity</td><td>National sales network</td><td>Local workforce</td><td rowspan="3">Damage of production activity</td></tr>
<tr><td>Creating green business</td><td rowspan="2">Long term relationship with local community as supplier</td><td rowspan="2">Soft skills training</td></tr>
<tr><td>Sustainability of community-based waste management</td></tr>
</table>

The social layer has 2 key factors, namely social value and social benefits which describe the company's mission in trying to create benefits for stakeholders and society. The social value for companies that process waste is alleviating poverty in the local community by empowering the community as partners in business to improve public welfare and awareness. With community empowerment, companies can increase household income, especially for housewives without income and marginalized communities. This social value will also encourage the active role of the community in community-based waste management efforts.

The element of social benefits is the creation of positive social value from the actions taken by the company. Some of the social benefits caused by the company's activities are related to the creation of new jobs. The public and employees can attend seminars that aim to provide knowledge and build the character of the community to be aware of and care about the environment. The company also provides social benefits in the form of encouraging the growth of new local green businesses that are able to create jobs that are oriented towards environmental conservation.

4. CONCLUSION

In recent years, with the increase in population and with the growing demand for scarce resources, there are more and more phenomena of environmental damage and pollution. Therefore, efforts are needed to counter the constant increase in production and consumption of raw materials, which cause negative effects such as pollution and waste accumulation. One of these efforts is to promote a circular economy, namely the sustainable reuse of natural resources so that products do not end up just turning into waste. It can be concluded that this business model considers waste as a useful source of raw materials

The results of mapping the waste processing business model with the Triple Layer Business Model Canvas (TLBMC) approach can be described as a whole in three integrated layers as proposed by Joyce & Paquin (2015), namely the economic layer, the environmental layer, and the social layer. This research produces a new perception that waste has a promising market. The waste processing business has a lot of potential that is beneficial not only from the company side but also from the environmental and social side. The reuse of waste is a clear example of how the circular economy model can generate profits from recycling waste.

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