



## A Circular Economy-Based Plastic Waste Management Policy in Indonesia (Compared to China and EU)

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### Abstract

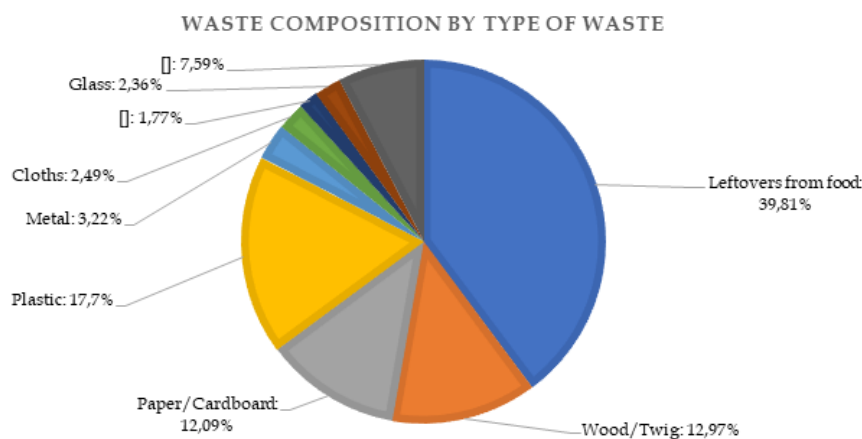
*Indonesia is a significant plastic waste producer and has more responsibility. In response, the Indonesian government has issued several plastic garbage-related policies. However, the policies are viewed as ineffective. Through the circular economy concept, this study examines potential waste management policies for sustainable development by examining existing policies and comparing China's and the European Union's policies. The study shows that Indonesian plastic waste management is highly dependent on the government. The policy affecting many sectors should require synergic participation from the related stakeholders, namely employer, investor, academician, and civil society. As learned from those two countries, they have regulations related to an integrated waste management system, so there are no overlapping regulations. Furthermore, waste management should also consider the availability of a market for environmentally friendly items.*

### I. Introduction

The human being as both an individual creature and a social creature always lives dynamically through adapting to their environment, but in the adaptation process, sometimes human being also changes the condition of the environment ([Arif & Nurwati, 2022](#)). In the adapting process, human beings often tend to change negatively, leading to the ever-degrading quality of the environment and harming human life ([Candrakirana, 2015](#)). One of the environmental problems still attracting attention today is waste

management. Waste management not implemented well will, of course, result in various problems either directly or indirectly. The problems likely arising are water, air, and soil pollution. Furthermore, the non-well-managed waste may result in disasters like floods and increased greenhouse gas, implying climate change ([Pratama & Marsoyo, 2022](#); [Safitri et al., 2018](#)).

A study entitled “Plastic Waste Inputs from Land into Ocean” found that China is the state with the largest plastic waste production in the world, 8.82 million ton of plastic waste per year ([Jambeck et al., 2015](#)). There are three industrial sectors most responsible for plastic waste production were packaging: 46.7%, textiles 13.9% and the consumer-institutional product sectors 12.3% (Ballerini et al., 2018). Meanwhile, in Indonesia, National Waste Management Information System (SIPSN) of Living Environment and Forestry Ministry KLHK) informs that the annual solid waste generation reaches 30,881,803.15 ton/year in 2021, 17.7% of which constitutes plastic waste equivalent to 5,249,906.53 ton/year (The Ministry of Environment and Forestry, 2021). From the data, Indonesia is on the second rank as the state contributing the largest quantity of plastic waste to sea pollution ([Maskun et al., 2022](#)). Considering this, a waste management proportional to the quantity of waste production is required. However, in fact, the waste management has not been maximal yet in Indonesia. Moreover, as shown in Figure 1, in fact plastic waste is on the second position as the largest waste production (17.7%) in Indonesia, following domestic waste.



**Gambar 1.** Waste Composition by Type

Source: (the Ministry of Environment and Forestry, 2021)

Indonesia has taken some attempts to reduce plastic waste by applying some policies. The policy of using environment-friendly or reusable material-based shopping bags has been made but many stores, either department store or traditional store, are found still using plastic bag ([Tristy & Aminah, 2020](#)). In addition, Indonesian Retailer Association has agreed to apply paid plastic bag policy costing IDR 200 – IDR 1000 in 2019 ([Rahmi & Selvi, 2021](#)). However, this policy is perceived to less effective, recalling that a survey conducted by Indonesian Yayasan Lembaga Konsumen Indonesia (YLKI) or Consumer Institution Foundation states that out of 21 (twenty-one) transactions in a retail, 10 (ten)

consumers still use plastic bag with 3 plastic bag on average in each of their transactions (YLKI, 2016). In addition, in fact, Indonesian government through the Coordinating Ministry for Maritime and Investment Affairs has launched National Plastic Action Partnership program as an attempt of reducing plastic waste by establishing partnership with business sector, academician, non-government organization, and community or religious group. In addition, Radically Reducing Plastic Pollution in Indonesia: A Multistakeholder Action Plan is manifested into the implementation of action plan and roadmap including Policy, Financing, Innovation, Behavior Change, and Metrics. Unfortunately, this has not effectively dealt with plastic wastes in Indonesia, particularly post-pandemic phase (Nugrahadi, 2020). This fact indicates that the policies published by the Government have not successfully gotten maximum result. The causes of high plastic waste pollution in Indonesia are, among others, limited technical knowledge, poor implementing ability, and limited investment made by the government at both central and regional levels (Syarif et al., 2022). In relation to the ineffective policy made by the government, a new attempt should be taken by applying circular economic system.

Circular economy is a concept to integrate economic and environmental activities sustainably through focusing on closing the production-to-consumption cycle. It is intended to make the product life longer, in order to be reused and recycled (de Kock et al., 2020). Furthermore, this circular economy aims to reduce environmental damage and to facilitate the increase in plastic demand by switching disposable plastic to plastic model focusing on product value and waste reduction (Payne et al., 2019). Circular economy has 3 basic principles: reducing waste and plastic pollution through product design, maintaining resource and product used and regenerating and conserving natural system (World Economic Forum et al., 2016; World Economic Forum & Ellen MacArthur Foundation, 2017).

In its implementation, circular economy can be a solution to plastic waste problem. It is because the disposable plastic product is the basic source of spreading environmental pollution by plastic waste (Syberg et al., 2021). Recalling the importance of circular economy, this concept is eventually promoted by the government and the international organizations in particular in production-to-consumption aspects that use materials made of waste, particularly reused, recycled and recovered plastic waste (van Eygen et al., 2018). The concept of circular economy is embodied through applying 5R principle: Reduce, Reuse, Recycle, Recover, and Revalue (McGinty, 2020). The application of circular economy in recycle industry is expected to create 1,000 new companies by absorbing 3 million laborers, to improve Gross Domestic Product (GDP) by IDR 200 trillion rupiah in 2030 and to reduce waste by 50 percent that will have an implication to the emission of green effect gas by 29 to 41 percent (Kementerian PPN/Bappenas, 2020; Mairizal et al., 2021; Tenrini & Damayanty, 2020).

Considering the background, this study aims to explore policy option in the form of waste management for sustainable development through circular economy concept. To support this analysis, this study first sees the regulations existing, and then analyzes the weaknesses of and the prevention of plastic waste. Lastly, it elaborates the circular economy-based waste managing strategy in Indonesia.

The method used in this study was doctrinal legal research ([Marzuki, 2015](#)). In this case, the doctrinal legal research emphasizes the description of current legal condition. In this case, the doctrinal legal research emphasizes the description of legal condition today. Meanwhile, legal materials were studied, examined, and analyzed in-depth as an argument to draw analytical conclusion.

## II. Legal Instrument for the Application of Circular Economy to Plastic Waste Management

### A. Indonesian Legal Instrument for Plastic Waste Management to Circular Economy Application

The concept of circular economy to be applied in Indonesia is closely related to the readiness of current legal instruments, as the rules of law are important to a circular economy. However, some studies stated that the rules of law existing in Indonesia tend to inhibiting due to law uncertainty, governance inefficiency, cross-sector regulation overlapping, and limited innovation made by either government or citizen in implementing circular economy ([Dąbrowski et al., 2019](#); [Fonseca et al., 2018](#); [García–Quevedo et al., 2020](#); [Kazancoglu et al., 2021](#); [Kirchherr et al., 2018](#); [Mahpour, 2018](#); [Smol et al., 2021](#); [Tura et al., 2019](#)). Furthermore, legal instruments needed include cross-sector legal instrument particularly in industrial, business, tax, trading, investment, energy, construction, agricultural, living environmental, and research and innovation sectors ([Backes, 2017](#)). It indicates the readiness of cross-sector legal instruments connected and integrated with each other playing an important part in the implementation of circular economy.

As explained in the 1945 Constitution of the Republic of Indonesia (hereinafter written as UUD 1945) and other legislations, the concept of sustainable development emphasizes not only economic improvement but also living environment friendliness and conservation as the manifestation of environmental sovereignty principle ([Asshiddiqie, 2009](#)). Therefore, the state should obligatorily ensure that everyone deserves good living environment and organize national economy by applying sustainable and environmental-oriented principles. On the other hand, no regulation present to govern circular economy as a national legal instrument becomes a distinctive challenge to Indonesian government despite some regulations having contained the material about sustainable economic activities and corresponding to the concept of circular economy and 5R principles in several sectors as shown in **Table 1**.

**Table 1. Regulatory Matrix related to the Circular Economy**

No.	Sector	Regulation	Essential content
1	Business/ Business	Law Number 40 of 2007 on Limited Liability Companies	It regulates CSR and the company's business environment as a means of sustainable development in order to improve the quality of life and the environment for the company, the local community and society in general, which are mandatory and contain sanctions.
		Law Number 20 of 2008 on Micro, Small and Medium Enterprises (MSME)	There are incentives for MSME actors who carry out business activities in the field of environmental preservation.
2	Trading	Law Number 3 of 2014 on Trade	There are rules on trading in environmental services and trading activities that have the goal of preserving the environment.
3	Investment	Law Number 25 of 2007 on Investment	It regulates the provision of facilities for investors whose capital meets the criteria for preserving the environment in the form of reductions to exemptions from duties and taxes, land rights, immigration service facilities and import permits.
4	Industry	Law Number 7 of 2014 on Industry	It regulates green industry that protects the environment and is sustainable.
5	Agriculture	Law Number 22 of 2019 on Sustainable Agricultural Cultivation Systems	There are provisions on the protection and maintenance of agriculture as well as sustainable nurseries and nurseries
6	Energy and Mineral Resources	Law Number 22 of 2001 on Oil and Gas	It regulates the obligations of business entities and other permanent establishments to actively participate in environmental management efforts to prevent, mitigate

No.	Sector	Regulation	Essential content
			and recover if environmental pollution or damage occurs, including being responsible for developing the environment and the local community and carrying out environmental restoration obligations after mining operations.
		Law Number 30 of 2007 on Energy	It regulates energy conservation and supply and utilization of renewable energy.
		Law Number 30 of 2009 on Electricity	It contains the provision of renewable energy-based sources of electricity.
		Law Number 3 of 2020 on Amendments to Law Number 4 of 2009 on Mineral and Coal Mining	It regulates the responsibility for carrying out post-mining reclamation in order to manage and restore the environment.
7	Environment	Law Number 18 of 2008 on Waste Management	It regulates waste management activities that are systematic, comprehensive and sustainable both in terms of reduction and handling and also regulates the rights and obligations of waste management both from household waste and waste similar to household waste.
		Law Number 32 of 2009 on Environmental Protection and Management	It regulates waste management; and has provisions on the utilization of natural resources that are environmentally friendly and sustainable, environmental economic instruments, as well as control and prevention of environmental damage.
8	Economic Instruments	Government Regulation Number 46 of 2007 on Environmental Economic Instruments	It regulates development planning and environmental economic activities, environmental funding, and incentives and disincentives that will be obtained in exchange for environmental services

In practice, following the enactment of Law Number 11 of 2020 on Job Creation, content material related to the existing sectors: investment, business, human resources, research and innovation, land affairs, public service, and public administration. In principle, regulations and policies existing in Indonesia have contained the materials corresponding and conforming to the implementation of the circular economy. In Indonesia, Government Regulation Number 46 of 2017 contains the provision of incentives and disincentives to community members or business actors who implement the circular economic concept, despite not accommodating the preparation of technical instruction, making its substance supporting the circular economy less optimal as the main driver of regulation is human being. In addition, Law No. 18 of 2008 also explains the waste management paradigm, indicating the change into a better one. The linear economic approach in waste management with the main characteristics of gathering, transporting, and disposing of landfills has been replaced with circular economic holding on the principles of regenerating natural systems, designing out of waste, and keeping products and materials in use through elimination, reuse, and material circulation strategies. Implementing these principles and procedures manifests the best practice in making waste the economic basic material. However, it differs from some countries that have governed the implementation of circular economy in a more specific integrated legal document. Meanwhile, the states implementing the regulation with specific legal documents are China with the Circular Economy Promotion Law (CEPL) and the European Union with the Integrated Product Policy Directive (IPPD) ([Fasa, 2021](#)).

On the other hand, some studies found that the regulation of circular economy in more specific legal instrument or document does not ensure that the regulation has governed the implementation of circular economy comprehensively. For example, in China the regulation in CEPL still shows some weaknesses like the unanticipated resource utilization by the people circularly and sustainably thereby leading to environmental management inefficiency ([Hu et al., 2018](#)). However, Chinese government did not stop there. In 2009, Circular Economy Promotion Law (CEPL) began to be implemented in China. Unlike in other countries, this policy leads more to economic approach than to environmental approach and under National Development and Reform Commission (NDRC)'s supervision rather than State Environmental Protection Administration (SEPA).

## **B. China's Legal Instrument for Plastic Waste Management to the Implementation of Circular Economy**

CEPL is a product of follow up action taken by government for some years replacing the environment management system, while previously prevention control in the end use of product becomes management system in entire product cycle. In this case, CEPL also adopts d Producer Responsibility (EPR) aiming

to help reducing the effect of waste use and disposal on environment. Based on European Union states' experience, a study on this concept is needed by involving employer, consumer, and government's responsibility. This law views the economic and environmental effects of a product's cycle entirely, from basic material used in production and distribution process, to product consumption, potential reuse, recycle process, and to product waste disposal. The control over resource and energy use is implemented through 3R principles and supported by governmental policy and market mechanism so that expectedly the pattern created is no longer "resources – products – wastes", but "resources-products-recycled resources".

Throughout these 10 years, Chinese Government has promoted this policy through the state's legislative institution that prepares rules, regional plan, trial project, etc. The main point of waste management is the Law on Waste Pollution Prevention and Control Law published in 1996 with additions in late 2004. This law involves industry, distributor, importer, and consumer's responsibility in preventing and controlling waste pollution. However, this law does not govern specifically and clearly product collection and reuse/recycle. Chinese government has great power in governing economic activity and environmental protection. Government makes circular economic policy and implements it through some approaches such as setting resource tax, providing supporting fund for circular economic project, and providing necessary needed education and information service. Industry also plays an important role in the successful circular economy because competition also occurs among themselves so that each of industries attempt to be more friendly to environment to improve their competitiveness compared with others. Public participation in circular economy can be implemented through more pro-environment behavior including reducing packaging use to reduce waste, using one product in a longer time to lengthen the product's age, etc.

### **C. European Union's Legal Instrument for Plastic Waste Management to Circular Economy Application**

European Union countries have regulations related to an integrated waste management system so that there are no overlapping regulations. In addition, IPPD ratified by the European Union also has some weaknesses in control, monitoring, and cost (Hu et al., 2018). The incomprehensive content material is still organized in regulation and distributed in some sectors through some regulations and policies related to circular economy organization and regulation. For example, regulating plastic waste is intended, among others, to the product design, including facilitating a more sustainable plastic innovation. For instance, EU Directive 2019/904 of June 5, 2019, aims to reduce the environmental effects of certain plastic products (European Union, 2019). The Directive establishes the



requirements of products for certain plastic products. It should be considered in future product design and to deal with developing harmonious standards related to the circular design.

Furthermore, there is a direction including the producer's expanded responsibility, constituting the foundation of a strategy to bring "Zero Plastic Waste" into reality (Canadian Council of Ministers of the Environment, 2018). The producer's expanded responsibility is intended to encourage the producer to change the product into one more storable in the circular value chain, thus reducing the environmental loss. Another example of regulation intended for the product design is EU Commission Regulation 10/2011 of January 14, 2011, about plastic materials and goods coming into contact with food that established a rule about the composition of food-contact material containing plastic. In addition, the Directive on single-use plastic in the European Union requires its member states to obligatorily take some measures to inform the consumers and to encourage responsible behavior among the consumers related to the use of single-use plastic products. Furthermore, the Directive aims to reduce the consumption of various single-use plastic products, including food containers and cups for beverages 2026, requiring the member states to adopt measures to reduce consumption and promote reusable alternatives ([Syberg et al., 2021](#)).

In addition to bans or over-levies on plastic, the regulation such as EU Packaging and Packaging Waste Directive aims to dematerialize and to increase recycle by introducing new standard for recycling content. This standard is intended to force the new technology to have more expansive recycling ability, to improve the market of recycle content to lower the cost, and generally, to improve recycling rate. The improvement of bioplastic production particularly from organic waste is then promoted as an element in the transition toward circular plastic economy.

### **III. Public Policy Encourages Circular Economy-Based Plastic Waste Management to achieve the objective of sustainable development in Indonesia**

The concept of circular economy is a new solution to solve plastic waste problems by means of maintaining the product value as long as possible by minimizing waste (extravagance) so that the material can be reusable and keeping the resource economic when the product no longer functions ([Pearce & Turner, 1990](#)). The procedures taken to achieve the sustainable development through circular economy are ([Robaina et al., 2020](#)):

1. Designing more durable and repairable products
2. Resource efficiency during production process
3. Improving information to the consumers related to energy efficiency, environmental concern, and spare part availability if necessary and providing tax design.

4. Waste management by means of recycling and recovering the value of product
5. Combining wastes and raw materials coming from the resource existing to increase selling value and to repair the damage existing.

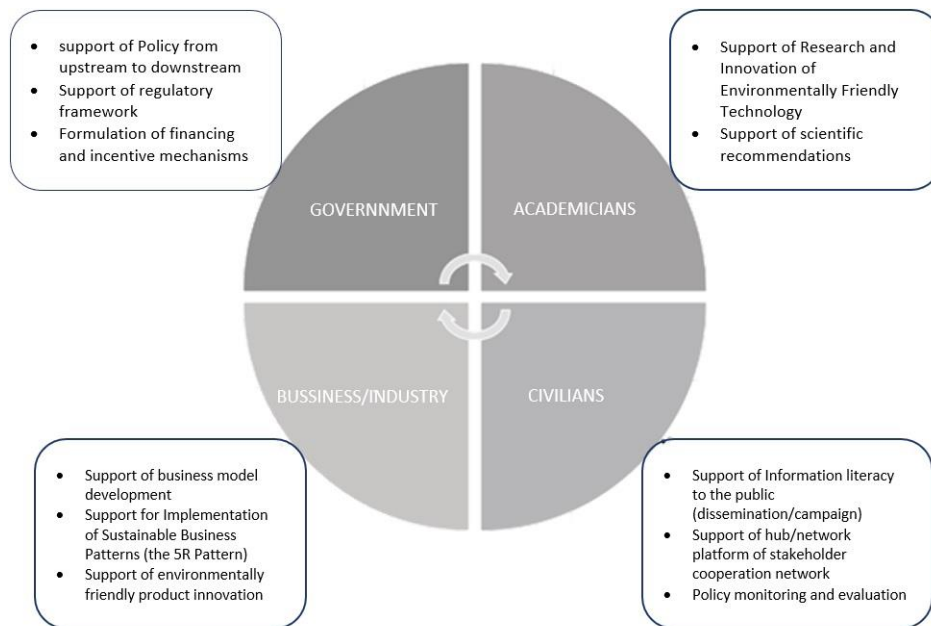
On the other hand, Indonesian government has organized upstream-to- downstream integrated waste management system by developing green industry as mentioned in the *RPJMN 2020–2024* (National Medium-Term Development Plan in 2020- 2024). Considering the report made by the Ministry of PPN/Bappenas, the circular economy focuses on some industrial sectors: food and beverage, garment or textile, construction service, electronic and plastic appliances ([Kementerian PPN/ Bappenas et al., 2021](#)). Furthermore, Indonesia Circular Economy Forum (ICEF) reports that the government keeps encouraging the implementation of circular economy by issuing Presidential Regulation (Perpres) No.97 of 2017 about National Policy and Strategy related to the management of Domestic wastes and Similar Wastes (Perpres Jaktranas).

Meanwhile, the direction of policy in the form of *Perpres Jaktranas* includes the policy related to waste reduction and management and strategy or program targeting waste reduction and management. This regulation targets the reduction of wastes by 30 percent or equivalent to 20.9 million tons and the management of wastes up to 70 percent or equivalent to 49.9 million tons in 2025, compared with the projected waste generation, 70.8 million tons ([Fasa, 2021](#)). Furthermore, waste management is also regulated in Perpres No. 83 of 2018 about Sea Waste Management including the Action Plan of Sea Waste Management in 2018-2025. This regulation indicates Indonesia's commitment to dealing with up to 70 percent of sea plastic wastes in 2025.

Considering the condition, recently Indonesian government also has announced the National Action Plan (Rencana Aksi Nasional or RAN) of circular economy (Haryo Limanseto, 2021). In developing this, the regulation developed covers three matters ([Milios, 2018](#)):

1. the management of reusing, repairing, recycling, and value-adding processes;
2. the supporting research and environment-friendly technology innovation; and
3. the availability of market for the environment-friendly products.

This policy also governs the allocation and the risk mitigation as they relate to environment. Therefore, the policy affecting many sectors needs synergic participation from the related stakeholders. The stakeholders contributing to this policy development are government, employer, investor, academician, and civil society ([Hysa et al., 2020](#)). The government serves as a regulator by supporting legal framework, governance, and funding mechanism. Employer and investor contribute to determining the development of business model and product, and the implementation of sustainable production and marketplace plan. Academician contributes to conducting research related to environment-friendly technology innovation with the output of scientific recommendation. Meanwhile, society contributes to policy supervision and evaluation, and serves as the bridge of cooperating network ([Fasa, 2021](#)).



**Figure 2. Model and Role in Formation of Policies Regarding Circular Economy**

Source: [\(Fasa, 2021\)](#)

#### **IV. The Role of Waste Bank and the Public Participation in Circular Economy-based Waste Management**

Indonesian government through the Directorate of Waste, Waste and B3 Management has the task of carrying out the preparation, formulation, implementation, coordination and synchronization of policies, technical guidance and evaluation of technical guidance, is currently promoting the circular economy programs intensely giving an idea to recycle, to reduce, to reuse wastes and to recover resource from production, distribution, and consumption [\(Kirchherr et al., 2017\)](#). It is because the waste generates very considerable effect on both government and community [\(Alfakihuddin et al., 2022\)](#). Unfortunately, the waste management in Indonesia is still highly dependent on the government. Meanwhile, the government has taken some attempts through the Law No. 18 of 2008 about Waste Management explaining that domestic waste management can be applied through 3R principle. The government’s failure eventually triggers new attempt of solving the waste problems, using the community-based waste management through Waste Bank.

As mentioned in the Article 8 of the Minister of Environment Regulation Number 13 of 2012, Waste Bank can be a foundation or a cooperative covering at least 1 (one) *kelurahan* or urban village to be its service area. This waste bank is intended to be a means of making the people aware that the wastes that are managed and processed correctly can result in material benefit or can be reusable [\(Aryenti, 2011\)](#). The waste management strategy (3R) implemented by Waste Bank is initiated through changing the people’s perception on waste in order to have economic value.

The guidelines of waste bank have explained in detail the concept of waste bank suggested by Indonesian Unilever Foundation ([Unilever](#)). In addition, according to Unilever, the waste bank is a system of managing waste collectively with the active participation of people who will later sort and distribute the wastes and make them valuable economically (Sutami, 2013). It is in line with ([Asteria and Heruman \(2016\)](#)) stating that waste bank is beneficial to the people in sorting waste, improving the awareness of processing waste and making them transportable to the landfill. The mechanism of waste bank is as follows (Sutami, 2013):

1. Domestic wastes are sorted by the customers using certain categories according to the waste bank's policy in each of regions, for example: organic, inorganic, and B3 wastes.
2. The wastes sorted are then submitted to the waste bank at the approved time.
3. Wastes are weighed to find out the wastes collected by the customers.
4. The officer records the result and then values it in rupiah, as specified in the provisions enacted and put it into savings book.

The customers benefit from these four stages, because they can have savings but in conventional waste management, the people instead should pay the cleaning service officer. The wastes collected in the waste bank are then delivered to the collector who has cooperated with the waste bank previously. Considering the processing involving public participation, it can be the solution in reducing the generation of domestic solid wastes, particularly plastic waste due to the stimulus that can result in different responses within the community. It is, of course, helpful to the government because the cost spent in plastic waste management is substantial ([Ivakdalam & Far, 2022](#)).

Considering the concept of waste bank aforementioned, the actors of waste recycling involve the people affiliated in the waste bank to the recycling industry and market ([Damanhuri, 2010](#)). The people becoming waste producer are affiliated in waste bank and then do such activities as inventorying, sorting, and saving economically valued inorganic wastes. Then, the inorganic wastes, particularly plastic, are sold to waste collector and the money obtained is deposited to the people's account according to the waste's purchasing price. Furthermore, the management of wastes in the collector place involves advanced sorting and grinding the plastic wastes into pellet and then marketing to both national and international recycling industries.

## V. Conclusion

As one of the countries contributing the largest plastic waste in the world, Indonesia clearly has more responsibility. Therefore, the Indonesian government has issued various policies and regulations in dealing with waste problems, especially plastic waste. However, the policies are considered ineffective even though regulations and policies in Indonesia have contain material in accordance with the application of circular economy.

It is because there is no integration between regulations as happened in China and the European Union.

China focuses its circular economy, especially on employers to see the economic and environmental impacts of the product cycle entirely from the basic materials used in the production and distribution process, to product consumption, and to the potential for reuse, recycling process, and product waste disposal. Meanwhile, the European Union emphasizes the plastic object, by facilitating every plastic innovation to prevent it from being disposable, and the development of fossil-based plastic into domestic waste-based bioplastic.

In Indonesia, the management of plastic waste to realize the circular economy is poured into the National Action Plan of the Circular Economy. This circular economy contains regulation on management including reusing, repairing, recycling, and adding value, supporting research and innovation of environmentally friendly technology, and providing markets for environmentally friendly products. The policy also regulates the allocation and mitigation of the environment related to involving active collaboration between the government, entrepreneurs, academics, and civil society. It is assisted by a waste bank as a forum in accommodating and managing waste from the community.

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