Opportunities to improve plastic waste management in Indonesia

Quick mapping of plastic sector
East Java – Banyuwangi Regency

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WASTE

IKEA Social Entrepreneurship

Cover photo: Waste picker on the landfill and the inside of a bigger junkshop
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LIST OF ABBREVIATIONS AND INDONESIAN TERMS

Abbreviation / Bahasa word	Meaning / explanation
3R	Reduce, Reuse, Recycle
Bank Sampah	Waste Bank - Socio-entrepreneur organization who collect waste on a community level
CLOCC	Clean Oceans through Clean Communities
Desa	Village
DLH/DLHK	Regional environmental agency
Environmental Agency	Governmental organisation with responsible for solid waste management on district level
EPR	Extended Producer Responsibility - https://www.epr-indonesia.id/
FINILOOP	Financial Inclusion and Improved Livelihoods Out of Plastics – a programme of WASTE
IKEA SE	IKEA Social Entrepreneurship
IPI	Ikatan Pemulung Indonesia (Indonesia Waste-pickers Union- IPI)
ISE	IKEA SE
ISWM	Integrated Sustainable Waste Management
IWB	Itinerant waste buyer - private recycling entrepreneurs, usually working as family enterprises, who go door to door in one or two villages and buy marketable recyclables from households.
Jakstranas	*Kebijakan dan Strategi Nasional untuk Pengelolaan Sampah Rumah Tangga dan Sejenis Rumah Tangga* – National Policy & Strategy on Management of Household Waste and Household-like Waste
Kecamatan	Subdistricts
Kelurahan	Urbanised villages
Kemenko Marves	Coordinating Ministry for Maritime and Investments Affairs
KLHK	*Kementerian Lingkungan Hidup* dan Kehutanan = Ministry of Environment and Forestry
MFIs	*Micro Finance Institutions*
MLP	Multi-Layered Package
MRF	Materials Recovery Facility – a general name for the local term TPS3R a solid-waste management plant that processes recyclable materials to sell to manufacturers as raw materials for new products
MSW	Municipal Solid Waste
Pemerintah Daerah	Regional government/Local government
PP	*Peraturan Pemerintah* (Government Regulation)
PWM	Plastic Waste Management
RPJMD	Rencana Pembangunan Jangka Menengah Daerah (Midterm Regional Development Plan)
SGBs	Small and Growing Businesses
SIPSN	National Waste Database of the Ministry of Environment
SWM	Solid Waste Management
SWOT	Strengths, Weaknesses Opportunities, Threats
TAS	Take-a-Stake – a programme of WASTE
TPD	Tonnes per day
TPS	*Tempat Penampungan Sementara* (Intermediary site before transfer to final disposal)
TPS3R	3R Intermediary site - A transfer station in which separation of waste is planned.
UU	Undang-Undang (Act)
WACT	Waste Wise Cities Tool an assessment tool for the waste sector

EXECUTIVE SUMMARY

This report is written for IKEA SE in order to get an impression of the opportunities to contribute to the reduction of the plastic waste in Indonesia by improving recycling of plastic waste and at the same time contribute to the improvement of the livelihood of the informal sector. The assignment was to identify gaps in the value chains that limit its development and scaling up from a responsible sourcing perspective.

An assessment of the World Bank in 2015 showed that "as the fourth most populated country in the world, Indonesian cities and municipalities produce an estimated 105 thousand tons of solid waste per day — a number that is expected to increase to 150 thousand tons by 2025, according to World Bank projections. Despite significant efforts, 40% of the country's 142 million urban residents still do not have access to basic waste collection services (World Bank, 2019a).

These figures make it interesting to work with Solid Waste Management (SWM) in Indonesia and work towards improvement of the value chains of recyclables, such as metals, papers, plastics, and organics. This assessment is specifically looking at plastics in order to see how to achieve circular economy and thus more plastic coming available for recycling and less plastic waste ending up in the environment.

The assessment included a desk study and the selection of a research area, Banyuwangi Regency, where the site visits and interviews took place. This accumulated in this final report with recommendations.

The main findings of the assessment in the Banyuwangy Regency are the following:

- Most of the plastic waste generated ends up in the environment, either being buried, dumped in waterways or being burnt. Only 15% is sorted for recycling.
- Although intentions of the national government to improve SWM and Plastic Waste Management (PWM) are good, implementation is weak.
- The informal sector is not recognised nor valued for their work in PWM and have no opportunities to be integrated in formal systems.
- Plastic waste value chains for PET and hard plastics (HDPE and PP) are quite well developed, value chains of low grade plastics, such as flexibles or Multi-layered Packaging (MLP) need to be supported and are not financially sustainable.
- There is a lack of data in SWM and PWM and therefore transparancy and tracebility is lacking in supply chains of plastic waste.
- The enabling environment to support social businesses in the plastic waste sector is lacking.

Considering that the whole plastic waste value chain needs to be improved to ensure a better recovery of recyclables and to ensure inclusive, transparent and circular supply chains on the long run, we recommend starting with a FINILOOP programme or consider working with similar programmes. FINILOOP is a WASTE programme that executes specific actions to develop the enabling environment for enterprises in the plastic waste sector and to support them to start, professionalize and scale.

Next to this, IKEA SE can consider supporting supply chain management programmes for the plastic value chain to address the most pressing environmental and social issues, in which verified transparency is key, in order to improve IKEA's plastic waste procurement.

A third option for engagement is to support accelerator programmes to enable social businesses to start and to grow, but always in parallel with the support of the enabling environment to prevent the risk of failure of these social businesses. Support of the enabling environment will have to include

working with the policy makers and implementors to acknowledge the type of business, and at the same time take the existing system and actors into account to avoid competition and pushing the informal workers out of the waste sector.

The Banyuwangi Regency was chosen because of the recent solid waste management assessment which had been done in the CLOCC project in 2022. This gave the research team the opportunity to work with recent and confirmed data and information in the SWM sector.
Also in case the project would be taken to a phase 2, the activities and planned policies in the Banyuwangi Regency could facilitate opportunities for the businesses in the sector.

1. Introduction

1.1. Project background

Opportunities to improve plastic waste management in Indonesia is being prepared by WASTE for IKEA Social Entrepreneurship (IKEA SE) as part of a two-phased assessment on the nature of social entrepreneurship in the waste and recycling sector. This study includes formal and informal businesses in Indonesia with special attention to those currently handling plastic waste from consumers and industries (but other materials may also be relevant). This study will focus primarily on a region in East Java but will also give insights on other regions in Indonesia.

The purpose of this two-phase assessment is to identify opportunities where IKEA SE can:

- Support social and micro-entrepreneurs

Support social and micro-enterprises who focus on improving livelihoods of those working as informal collectors of recyclables, buyers and processors and who already substantially contribute to limiting environmental pollution.

- Build understanding

Increase the understanding of relevant IKEA SE staff and management on how the social enterprise concept can support indigenous and local micro enterprises to contribute to responsible supplying of secondary material in Indonesia and inspire IKEA SE to promote the integration of micro enterprises in its own supply chains.

- Explore circular economy opportunities

Gain input to assess the possibilities of increased usage of recycled plastic waste or other relevant recycled materials, such as paper or metals, in its supply chain which are preferably socially and environmentally fairly sourced by social and micro enterprises.

Eventually, the results of this assessment will:

- Explore sustainable local partnerships, approaches, and operational funding to support waste and recycling social and micro entrepreneurs.
- Assess a potential role for WASTE's FINILOOP and/or Take-a-Stake (TAS) programmes
- Possible links or integration with eventual IKEA SE supported activities.

1.1.1. Scope of the project phase 1 and phase 2

Phase 1 is a scoping study based on desk research and a quick mapping exercise which included four-day based data collection in the field in order to define the main challenges, policy and institutional context, potential gaps and opportunities for engagement by IKEA SE.

It includes:

- Describing the national solid waste management (SWM) and plastic pollution prevention policy, legal and institutional environment.
- Mapping the activities and projects of major stakeholders engaged in addressing social challenges in pollution prevention and the solid waste (plastic) economy
- Summarising the main business challenges and opportunities of social and micro entrepreneurship in the waste value chain (with special attention to plastic waste from consumers and industries).
- Describing social challenges and working conditions of the (informal) waste collectors and workers in the waste value chain.
- Identifying existing social businesses, level of current technologies, previous and current initiatives and good practice business models.

- Identifying financers and development funds, as well as potential investors including assessing a potential role for TAS[1].
- Identify gaps in the value chain that limit its development and scaling up from a responsible sourcing perspective, including a potential role for FINILOOP[2].

Phase 2, if planned, will be based on the outcome of this report. A short proposal for this phase can be found at the end of this report in chapter 7.

1.2. Methodology study/framing

The methodology of this quick mapping exercise is based on a desktop study and a four-day field visit to Banyuwangi Regency during which stakeholders were interviewed in order to define the main challenges, policy and institutional context, potential gaps and opportunities for IKEA SE engagement based on ongoing developments in the plastic waste sector.

1.2.1. Desktop study

During the desktop study the overall solid waste management sector in Indonesia has been studied and described with a focus on the legal and institutional environment for solid waste management and plastic pollution prevention, policies and circular economy. Most of this information can be found in chapters 2 and 3.
Leading questions during the desktop study were asked:

- To describe the national SWM and plastic pollution prevention policy, legal and institutional environment.
- To describe legal, institutional, and governance challenges in the Indonesian solid waste landscape in cities, urbanised areas ("kellurahan") and villages ("desa").
- To map the main ongoing projects of key stakeholders and other donor and private sector activities that address challenges of solid (plastic) waste management in Indonesia.

Based on the desktop study it became clear that the informal sector has a significant role to play in the collection of recyclables and plastics. This information has been used to establish further research and interviews in Banyuwangi Regency and its main market for valorised plastics in Surabaya.

1.2.2. Field research – Banyuwangi Regency

The researchers opted to do the actual field research in Banyuwangi Regency as a region that like many regions in Indonesia is in full development, with the expected urbanisation, tourism is coming up. As such it is expected that the outcome of this mapping will be valid in more regions that have similar characteristics. The advantage of choosing for Banyuwangi Regency, a region of Java, is that it recently underwent a thorough assessment on the solid waste management system within the Clean Oceans through Clean Communities (CLOCC) project[3]. This gave the interviewers the opportunity to focus mainly on interviewing the stakeholders in the sector to gain more insight on the functioning of the service and value chain. The information of the CLOCC assessment has been used to obtain a good picture of the waste generation and flow in the region. The quick mapping exercise meant that the research team interviewed a 2 to 3 persons from each identified stakeholder group.

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[1] TAS or Take a Stake is a programme developed by WASTE Foundation. More information can be found on the following link: https://www.take-a-stake.org

[2] FINILOOP is also a programme from WASTE Foundation. More information can be found on paragraph 6.2.1 of this document, or visit the link: https://www.waste.nl/cases/finiloop/

[3] CLOCC is a project in Indonesia. Info on CLOCC: https://www.cloccglobal.org/

Choice for Banyuwangi Regency

When getting to the phase of the interviews, it was our opinion that the surroundings of Jakarta were already overloaded with projects on plastic waste prevention and that it would be worthwhile to look to slightly more peripheral areas.

The choice then fell on the Banyuwangi Regency in the east of Java, based on the fact that the area offers interesting options to intervene and work towards a circular economy for plastic waste. To begin with the Banyuwangi Regency's local government is currently actively working towards a SWM plan to develop a fully integrated waste management system. This plan can also offer an opportunity for IKEA SE to intervene. Other reasons to look specifically at this area were:

- It is located on one of the bigger and densely populated islands, which means that a lot of plastic waste is expected to be generated.
- This amount is expected to rise due to the growing tourist economy in the Banyuwangi Regency.
- The actual project towards the ISWM plan has resulted in an extensive solid waste management assessment, using the Waste Wise Cities Tool (WACT) of UN Habitat. The data on solid waste in the area are therefore recent and quite accurate.
- Currently there is one project in the region focussing on plastic waste, the project STOP in Muncan, but the region is not flooded with initiatives.
- And lastly there is a market for valorised plastics not too far from the Banyuwangi Regency, like Surabaya, Mandang and some more surrounding cities in East Java.

The basic data on solid waste in the Banyuwangi Regency used for this report are primarily based on the so-called WACT[4] assessment done during the CLOCC project by InSWA[5]. **These are checked against the desktop study done on the overall situation of the SWM sector in Indonesia.**

The WACT assessment is an assessment tool developed by UN Habitat in collaboration with solid waste experts under the Waste Wise Cities Project. The tool aims to establish a unification in the data collection for municipal solid waste worldwide. The Waste Wise Cities Tool (WaCT) guides users through seven steps to collect data on municipal solid waste (MSW) generated, collected, and managed in controlled facilities. The tool provides a household survey guide for total MSW generation, a questionnaire to identify the MSW recovery chain and criteria to check the environmental control level of waste management facilities in a city.

The results are depicted in a Waste Flow diagram and a San Key diagram, which have been depicted in this report as well. See for example Figure 7 and Figure 8

A preset of questions was used as a guideline for the interviews. The main aim of the interviews was to gain a good impression of the main activities of the stakeholders, their relationships and what they perceived as opportunities and obstacles in their work. Due to the short time available to the research team, follow up interviews and focus group discussions were impossible, but these are foreseen in a possible part 2 of this mapping exercise.

The developed questionnaire and the full list of interviewees can be found in Annex 1 and 2

[4] More information on the WACT assessment can be found on: https://unhabitat.org/waste-wise-cities

[5] InSWA (Indonesian Solid Waste Association) – is an association in Indonesia that aims to reduce ocean plastic leakage and improve the lives of Indonesia's informal waste workers by working closely with their families and utilizing micro-privatization service models, as well as engaging with local recycling associations to explore opportunities within the EPR and waste bank systems. More information: http://inswa.or.id/

The stakeholders approached and interviewed during the field visit were:

Sector	Stakeholder
Informal sector	• Waste pickers • Itinerant waste buyers (IWBs) • Small junkshops
Formal Sector	• Bigger junkshops • Social entrepreneurs • Waste Banks
Government	• Environmental agency • Municipal collection organisation under the environmental agency • Waste Banks
Others	• Associations

The approach for this field visit is based on the Integrated Sustainable Waste Management (ISWM) approach and supported by an analysis along the service and value chain.

1.2.3. Analysis, SWOT of the relevant stakeholder

As a first analysis of the stakeholders relevant for business improvement a SWOT (Strengths, Weaknesses, Opportunities, Threats) has been made, showing their strengths and weaknesses as a business whether formal or informal.

The Opportunities and Threats of the SWOT give a short insight into how, and what, the stakeholder can gain from an improved SWM system, and where the threats lie for this stakeholder when the system changes, due to political or economic interventions.

1.3. Approaches

1.3.1. ISWM and the service and value chain

ISWM is an approach developed by WASTE in collaboration with partners around the world who set up a collaborative working group (CWG) on solid waste management.

ISWM is a working model based on a comprehensive approach towards SWM (and sanitation), in which the stakeholders, waste system elements (service chain/product chain) and the enabling aspects are all considered. This is due to each having an impact on the actual functioning of the SWM and all needing to be taken into account when improving the system.[6]

Within WASTE, the ISWM working model has formed the basis for other approaches, for such as:

- The models around service and value chain.
- The Diamond approach, a method developed by WASTE to work successfully with stakeholders in a project area, striving towards continuation after the project ends, which has been adopted and adapted by multiple Dutch NGOs.
- The so-called FIETS approach, a method to constantly check how the Financial, Institutional, Economical, Technical and Social aspects of ISWM can be put to work to improve solid waste and/or sanitation.

[6] See publication: Putting Integrated Sustainable Waste Management into Practice, WASTE

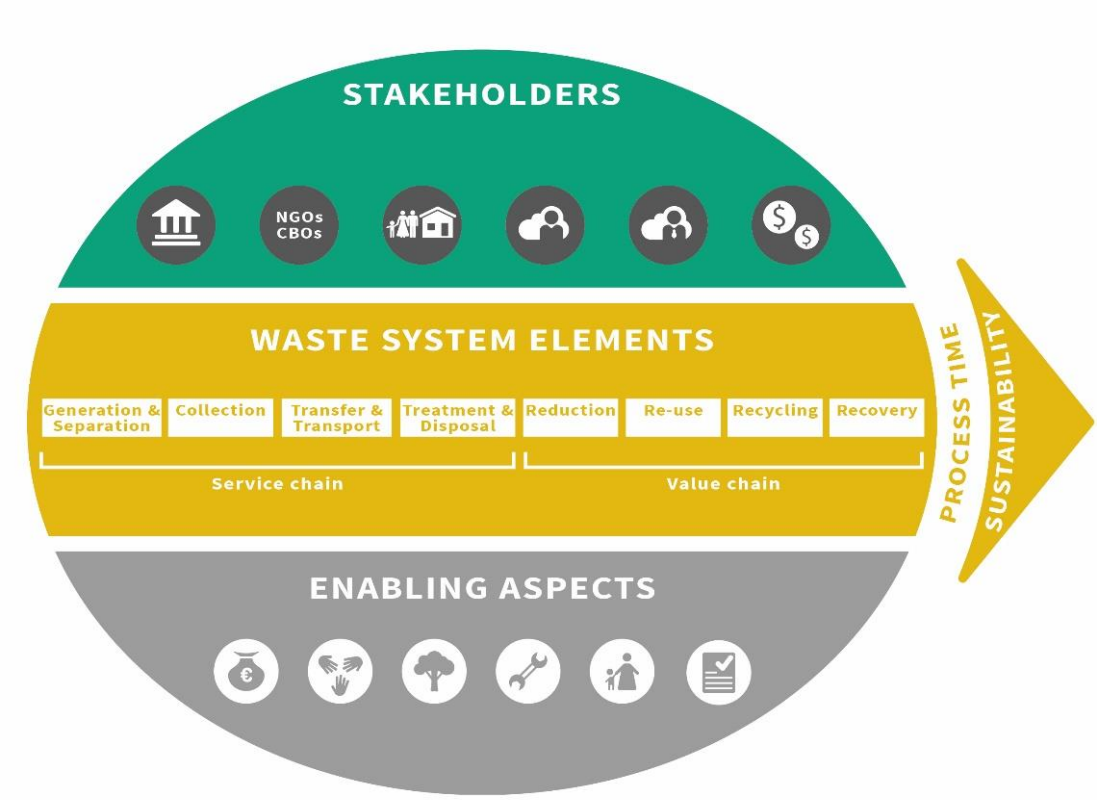


Figure 1. ISWM model (WASTE)

Figure 1 shows the identified stakeholders, the enabling aspects and the waste system elements. The stakeholders include: the government, NGOs and CBOs, the users of the service, private informal sector, private formal sector and the financial institutions. The enabling aspects are the financial, institutional, environment and health, socio-cultural, technical and political. Both the stakeholders and the enabling aspects, have an influence on the so-called waste system elements or the route waste takes, from where it is generated up to the final disposal. These waste system elements can be divided into the service chain and value chain, as depicted in Figure 1. The service chain, by definition, are the activities done within the system in which the action does not add to the value of the waste handled, but the activity is a service done for a client who is willing to pay for it. In comparison, the value chain is a process in which value is added to the waste collected.

1.3.2. Value chain analysis

As mentioned above, the value chain is the part of the waste system elements in the ISWM model in which a value is added to the material by treating it in some way. A value chain analysis is a widely used tool to analyse complex systems in order to identify bottlenecks, which hamper development, and to the potential for job creation. The overall objective of the value chain analysis is to create the basis for recommendations on how to intervene in the present system to create jobs. This is done by evaluating where and how the change towards increased recycling can be made, by overcoming the major bottlenecks and creating jobs simultaneously. Bottlenecks are defined as factors that limit the performance and efficiency of the value chain and thus prevent or limit the move towards increased recycling. The bottlenecks can be either technical or non-technical (financial, organisational, legislative or societal) in nature, which relate to the enabling aspects in the ISWM Figure 1.

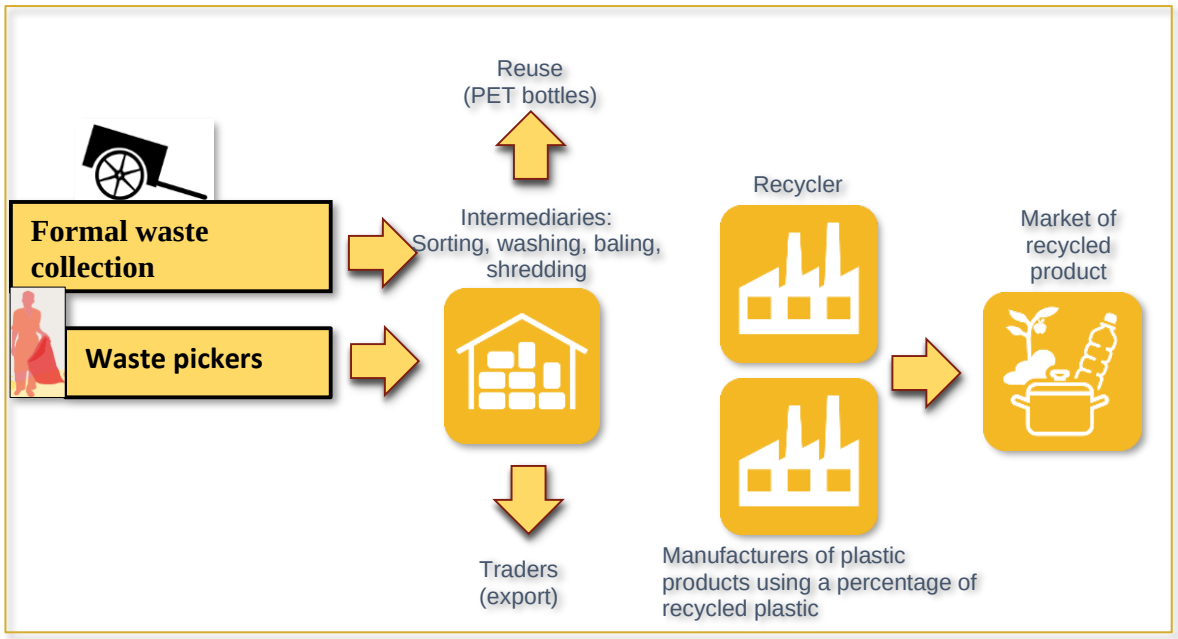


Figure 2: The value chain map for plastics in Mali (WASTE)

Examples of value chain analyses can be found in Figure 2 and Figure 3. Figure 2 shows the different stakeholders and their relations in the value chain in Bamako, Mali, where small collection businesses and informal collectors service the city. The mapping can vary per city and in most cases these actors can be found. Social enterprises can be any of the one of the actors within this figure.

Figure 3 shows the actual valorisation of the product with each activity within the value chain in India in 2019. Unfortunately, this study did not allow for an analysis in Banyuwangi, as gathering this information takes a more in-depth research than a quick mapping.

Hard plastic HDPE (shampoo bottles/jerry cans (1 l up to 20 l))			
	Price (Rs./kg)	Actor	
Unsorted (mixed colour) Quantity 5-25 kg/day	30	Waste picker/buyer	
After sorting and aggregation (one colour, regular supply) Quantity 750–3000 kg/day	35	Intermediary/ Broker	
After shredding (one colour)	40		
After washing	45		
After pelletizing	55-60	Recycler	
Final product: electricity tubes	102	Final producer (recycler or plastic product manufacturer)	

Figure 3. Value added during each step of the value chain, India 2019 (WASTE)

2. National level of solid waste management

With the recent global attention from Indonesia's marine debris pollution generation, Indonesia has further developed the policy involving waste management which will be detailed within this chapter. Table 1 provides a quick overview of the policies around SWM on the national level. A more complete list of the various existing and planned policies on national level can be found in Annex 1.
Here some of the aspects are highlighted such as a listing of the national stakeholders involved in the SWM and some of the of the elements in the SWM policies, such as EPR and the governance challenges SWM faces.

Table 1. Overview of existing and planned policies on SWM in mentioning circular economy and plastic waste

Regulation	Title
Act 18/2008	Solid waste management
Government Regulation 81/2012	Household and household-like waste management
Presidential Decree 97/2017	National policy strategy for solid waste management (household and household-like waste)
Presidential Decree 83/2018	National action plan to combat marine debris 2018-2025
Presidential Decree 18/2020	National mid-term development plan 2020-2024
Ministry of Environment and Forestry Regulation 10/2018	Guidelines for regional policy strategy for SWM (household and household-like waste management)
Ministry of Environment and Forestry Regulation 75/2019	Waste reduction roadmap by producer 2020-2029 à EPR
Ministry of Environment and Forestry Regulation 14/2021	Waste management through Waste Bank

The regulations listed in the table above include all regulations available within the national and provincial level regarding waste management. The following sections will provide a brief explanation of the different acts and decrees relevant to waste management in Indonesia. There is no new waste management policy approval in progress at the moment.

2.1. General Overview of National Waste Management Stakeholders

Many stakeholders are involved in the waste management sector. At least six ministries are involved in policy making in Indonesia which, due to the many islands of Indonesia and the ocean plastic problem, also includes the Ministry for Maritime and Investment Affairs.

Table 2. Indonesia's identified stakeholders on national level

Ministries	Donors and international NGOs	Associations – NGO	Startup Companies
• **Coordinating Ministry for Maritime and Investment Affairs** • **Ministry of Environment and Forestry** • **Ministry of Public Works and Housing**	• Danish, Norwegian, French Embassy • GIZ, KFW (Germany) • World Bank • Asian Development Bank (ADB) • FMO (NL)	• Packaging and Recycling Association for Indonesia Sustainable Environment (PRAISE) • Indonesian Plastic Recycling Association	• SYSTEMIQ • Waste4Change • Rekosistem • Octopus • Rebricks • Duitin • eRecycle • Gringgo • Armada Kemasan • Angkuts

• **Ministry of National Development Planning** • **Ministry of Industry** • **Ministry of Energy and Mineral Resources**	International initiatives some examples • Delterra • STOP (Stop Ocean Plastics) • CLOCC	• Indonesia Packaging Recovery Organization • Indonesian Solid Waste Association (InSWA) • Alliance of Solid Waste Indonesia (AZWI) • Indonesian Waste Pickers Association • Indonesian Waste Bank Association • Indonesian Waste Entrepreneurs Association • Indonesian Waste Platform	• Mulung.co • SMASH • BuangDisini

2.2. Extended Producer Responsibility

In the field of waste management, Extended Producer Responsibility (EPR) is a strategy to add all of the environmental costs associated with a product throughout the product life cycle to the market price of that product. In Indonesian law, EPR has already been described in article 15 of the 2008 Waste Management Law, which states that producers are responsible for the disposal of packaging and products that cannot be composted or are difficult to compost. Government Regulation No. 81/2012 further clarifies the law by mandating industries to use recyclable materials and to take care of the packaging recycling. Presidential Regulation No. 97/2017 (also known as Jakstranas) builds on the regulation from 2012 and formulated concrete targets for waste reduction and specified a broad range of possible measures on how to achieve these reductions.

In 2019, a "Waste Reduction Roadmap", was defined (Minister of Environment and Forestry Regulation No. 75/2019) It specifies the implementation of the Jakstranas targets for the consumer goods industry, retail sector, and hotel and restaurant industry. With this “roadmap”, the development of an EPR system is expected to gain momentum. According to the regulation, from 2030 onwards, there will be a complete ban on plastic straws, plastic bags and single-use polystyrene packaging. The passing of the regulation has led to several initiatives from the industrial sector to comply with the new requirements. For example, Coca-Cola re-established its Plastic Reborn 3.0 initiative which aims to increase the capacity of garbage workers by increasing the usage of technology and educating the workforce about recycling activities. Another example is Kentucky Fried Chicken (KFC) which has collaborated with Divers Clean Indonesia in launching the #NoStrawMovement campaign and stopped using plastic straws in 2017 (https://business-indonesia.org/waste_management).

2.3. Social entrepreneurship

Social entrepreneurship is **the process by which individuals, startups and entrepreneurs develop and fund solutions that directly address social issues**. A social entrepreneur, therefore, is a person who explores business opportunities that have a positive impact on their community, in society or the world. In the waste sector they often function as intermediaries between waste collectors from the informal sector and businesses working towards waste valorisation.

Many funders are interested in funding social entrepreneurs to work in SWM, and as such bigger companies, like Danone and Unilever or even IKEA, are known to fund and implement initiatives around clean-up activities and recovery of plastics and pilot projects around recycling. In addition, there are funded projects from international NGOs or other funders who support (social) businesses on many levels in order to combat ocean plastic pollution.

Initiatives are diverse and vary from allocating budget for infrastructure such as landfills, supporting, clean-up activities in certain rivers and beaches to supporting pilot projects around recycling and setting up Waste Banks.

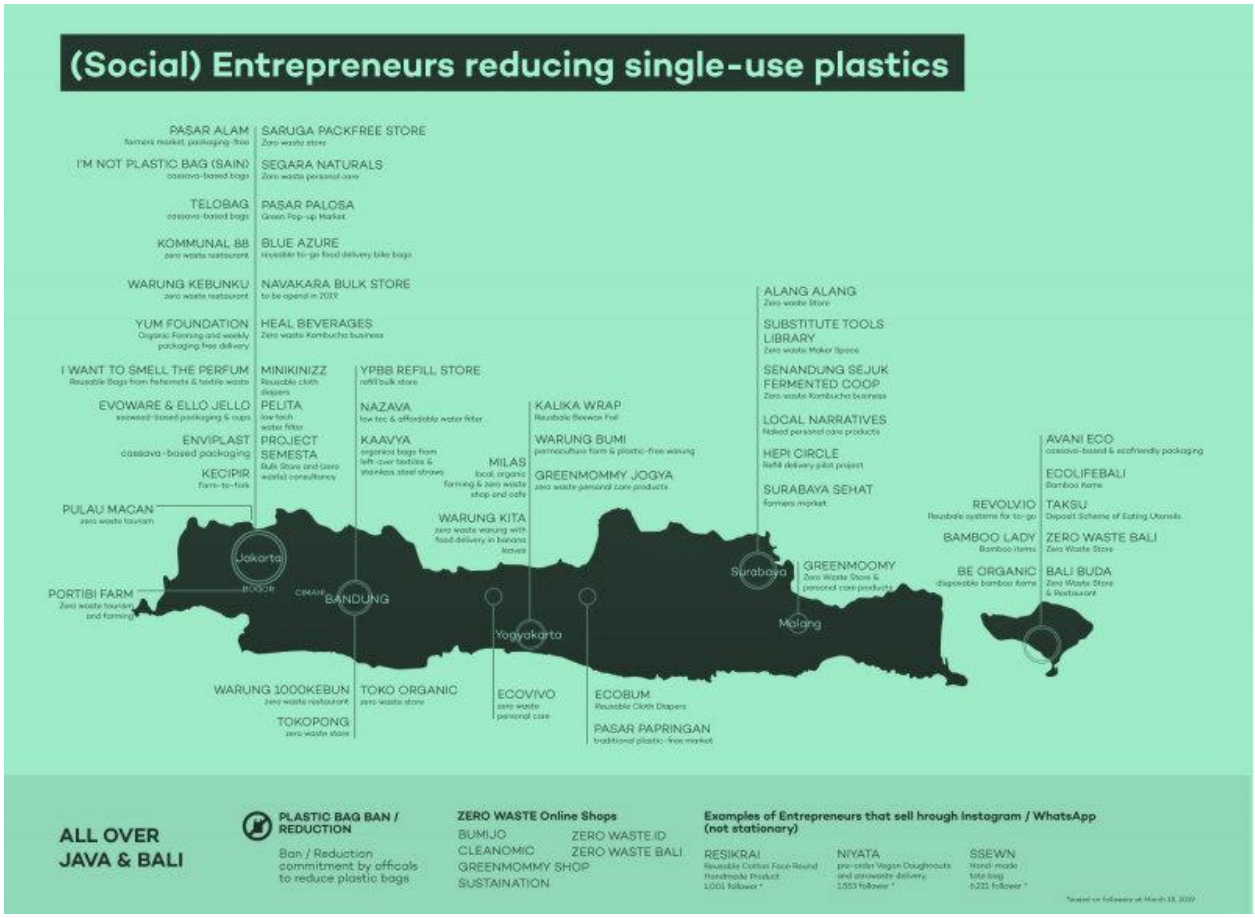


Figure 4. Social Entrepreneurs for reducing single-use plastics on the islands Java and Bali

Source: https:// zerowastelivinglab.enviu.org/blogs/the-indonesian-zero-waste-market-a-promising-niche-market-with-the-potential-to-accelerate

Zero Waste Living Lab, an NGO active around circular economy, has mapped existing activities and initiatives around social entrepreneurship and circular economy. A map is presented in Figure 4 showing a concentration of the social businesses in Jakarta, Bandung and Surabaya, showing that there are many initiatives focussing on only plastics.

2.4. Gap analysis of solid waste management in Indonesia

There are reasons why illegal dumping and improper waste management activity can still be found in Indonesia despite the services provided by the formal sectors, private parties, and informal sectors. The reason is that several key challenges or gaps are still identified within the whole system, including legal, institutional, and governance aspects and are commonly found in the waste management sector within the cities and urbanised areas.

2.4.1. Legal challenges

Laws governing waste management are currently being developed in Indonesia, this began in 2018, when marine debris and waste management became more of a national priority. The government is still working towards strengthening its legal framework. However, at the moment, several legal challenges can still be identified within the sector.

2.4.2. Minimum consequences

All regions in Indonesia have governing laws to regulate waste management. However, it is found that there are no real consequences for not following the proper waste management practices. For example, despite the DKI Jakarta's Regional Law 3/2013 (Perda DKI Jakarta 3/2013) for waste management, where point 126e and 130b states that it is forbidden to burn waste and conduct improper waste management, it was not until 2022 that the media started pressing for enforcement of the fines on those who violated the set regulations. Furthermore, for regions outside the bigger metropolitan areas, improper waste fines are found to be hard to implement, as there is no waste structure and infrastructure that makes proper waste management and environmental conduct possible. Due to this, more rural areas have not implemented fines enforcement but hope to be able to implement them soon to contribute to the National Action Plan to Combat Marine Debris.

2.4.3. Different targets set for different regions

Indonesia is a country that implemented a decentralised government system, which means that even though national targets are set for the country, each region is operating on its own, with the national target being used as their basis to develop the regional scale target. This means each region has jurisdiction to set their own targets and methods for their waste management practices. Thus, the main priority of the region is to meet their regional targets to contribute to the set national target. In terms of reporting, the regional government submits regular progress reports to the national government to give a general overview and evaluate the regional progress of their waste management programme.

For example, the national waste reduction target for 2020 – 2024 is set for 20%, indicating that at least 20% less waste is produced. Jakarta's target for the same year on the other hand is a 30% reduction, while Semarang's target is a 22% reduction. The difference in the set targets can be affected by various factors such as budgetary allocations, government officer's political targets, and the community's income level.

2.5. Governance challenges

The Indonesian government acknowledges the lack of proper waste management in Indonesia, resulting in solid waste ending up in the environment or being burnt, and is working towards improvement of the situation developing policies and regulations which can be found in ANNEX 1. Unfortunately, reality shows that the actual improvement of waste management is facing several challenges such as:

- Low priority: waste management is quite a low priority compared to other subjects on the budgets of local governments.
- Actual follow-up on new policies and regulation has proven to be difficult, this also asks for budget.
- No acknowledgement of the informal sector working in waste management.
- Minimal incentives: the incentives are not well-implemented.

3. Plastic recycling in Indonesia

Reports, such as the study of the NPAP, state that 70% of the Indonesian plastic waste is considered mismanaged of which 47% is being buried or burnt, 13% is dumped on land or in poorly managed official dumpsites, and 10% leaks directly into waterways and the ocean. Of the managed plastic waste 20% ends up on a managed disposal site and only 10% is recycled.[7] The same report calculated that 72% of the plastic pollution originates from rural regions and small-to-medium scale cities, places where either no or few waste management services are provided by the local government. Although there is a lot of plastic waste being imported, up to 234,000 tonnes in 2020[8], the NPAP report states that more than 95% of plastic pollution comes from waste generated within Indonesia.

The study of the NPAP identified the root causes of the plastic pollution in Indonesia:

- Decentralised and fragmented governance and accountability for waste management across multiple levels of local government.
- Low investment level by the government and businesses.
- Low community awareness and willingness for proper waste management practice.
- Institutional and technical capacity gaps.
- Shortages of suitable land for waste facilities.

Plastic waste generation highly correlates with population rate, and economic development. This can be seen in more populated islands like Bali or in the city of Jakarta. Table 3 shows an overview of plastic waste generated in Java, Sumatera, Sulawesi, Kalimantan, Papua and Bali and Nusa Tenggara. The figures are based on calculations of the research team and national statistics. The findings indicate that the waste generation per person is estimated to be 0.34 kg/person/day, and 15% of this waste (by weight) is plastic, with the highest plastic waste generator being Java Island.

Table 3. Estimated amount of plastic waste generation on the big islands of Indonesia

Island	Population in 2022* (million)	Actual waste generation in 2022** (TPD)	Plastic waste generation (TPD)	Recycled plastic waste (TPD)
Java	151,600	55,530	8,330	830
Sumatera	58,560	19,520	2,930	290
Sulawesi	19,900	4,940	740	70
Kalimantan	16,630	5,730	860	80
Papua and Maluku	8.570	1,340	200	20
Bali and Nusa Tenggara	14,960	5,150	770	70
Total	270,200	92,220	13,830	1,380
Generation	0.34 kg/Person/Day **			

*Data collected from National Statistical Bureau (BPS), 2022

** data collected from National Waste Database of the Ministry of Environment (SIPSN), 2022

TPD = Tonnes per day

Although 72% of the plastic pollution originates from rural regions and smaller cities. The use of plastics and generation of plastic waste is very much related to the economic development of the

[7] NPAP, 2020 Radically Reducing Plastic Pollution in Indonesia: A Multi-stakeholder Action Plan (NPAP, 2020)

8 Charted: The Global Plastic Waste Trade: https://www.visualcapitalist.com/cp/charting-the-movement-of-global-plastic-waste/#google_vignette.

population. As such more plastic waste per person is produced in densely populated areas like Java, where the living standards are higher. Hence, plastic waste generation will be higher on bigger islands compared to smaller islands, such as Bali and Nusa Tenggara. Nevertheless, it depends on the characteristics of the region. If the region has a specific economic activity, such as tourism, it will also produce more waste.

A study from the National Waste Management Information System (SIPSN) by the Ministry of Environment and Forestry (2022) shows that Indonesia has high potential for plastic recycling. More than 7,000 tonnes of plastic waste per day is potentially processed at recovery and recycling facilities, as can be seen in the Table 4. The table also shows the importance of the private companies all defined as Junkshop which includes the informal sector and is responsible for 75% of the recycling of plastics.

Table 4. Waste processed at recycling facilities

Island	TPS 3R	Waste Bank (unit)	Waste Bank (centre)	Recycling Centre - PDU	Junkshop
Sumatra	37.46	46.74	88.52	28.61	967.35
Java	532.63	185.41	239.84	62.52	3,537.13
Kalimantan	11,58	34.41	23.64	1.91	459.82
Sulawesi	19.59	17.78	19.25	1.06	214.54
Bali	122.99	15.82	222.42	0	38.09
Nusa Tenggara (West and East)	3.15	13.16	4.96	0.76	65.27
Maluku & Papua	0.85	0.32	1.30	0	7.09
TOTAL (tonnes/day)	716.67	313.64	599.93	94.86	5,289.29

Source: National Waste Management Information System (SIPSN) - MoEF (2022)

Table 3 shows that currently only 10% of the plastic waste generated is being recycled one way or another. With improvement of the waste management system this figure can increase, and plastic recycling can scale up. At this moment the plastic recycling industry in Indonesia is made up of around 600 large and 700 small industries. The recycling industry processes waste single-use packaging and other plastic items into value-added products, ranging from recycled resins to finished products such as plastic goods, textiles and pallets. The plastic recycling industry in Indonesia has an investment value of up to IDR 7.15 trillion and a production capacity of 2.3 million tonnes per year, with an added value of more than IDR 10 trillion per year, while the production of plastic waste is 6.8 million tonnes per year. Moreover, Indonesia's recycling industry also impacts the socio-economic aspect. It has a great opportunity to absorb up to 3.3 million workers.

Unfortunately, 50% of the plastic recycling industry is currently idle or not working at full capacity. The challenge for the recycling industry is the availability of waste that is suitable as a raw material for recycling.

Among the collected waste, PET bottles, hard/rigid plastics, (PP or Polypropylene) and soft plastics (PE or Polyethene) are the main waste types taken out of the waste stream as they have a clear economic value. Lower value plastic types such as plastic bags, even if collected at first, are disposed of and can be found frequently within the open waterways and on the land. In the last four years big companies that produce vast amounts of bottled water, or other packages, such as Danone, Mayora, Le Minerale, and Coca-Cola, have set up recycling facilities for recycling PET bottles in West Java (Karawang Regency) and East Java (Pasuruan and Jombang Regency)[9]. Therefore, the increase of recycling in

[9] https://www.cnnindonesia.com/ekonomi/20230208203553-97-910683/bumi-indus-padma-jaya-pabrik-daur-ulang-pet-berteknologi-foodgrade; https://finance.detik.com/industri/d-6557625/resmikan-pabrik-daur-ulang-botol-rp-556-m-di-cikarang-luhut-not-bad.

Indonesia will be able to contribute to the reduction of marine debris. Two things must be noted regarding these initiatives:

- These reductions are mainly being achieved in valued plastics; the challenge is to get the lower valued plastics out of the waste stream as well.
- The aforementioned initiatives are still quite recent and need some proper evaluation on how the recycling facilities can become self-sufficient.

Furthermore, for a specific situation, such as on the smaller islands, working towards plastic recovery will be more difficult as collection of sufficient plastics to make the transport worthwhile, and the longer distance to the market for plastic waste makes it more challenging to achieve a circular economy.

4. Solid waste management in Banyuwangi Regency

4.1. Introduction

To be able to identify possible opportunities for IKEA SE to become involved in Java's plastic waste sector, Banyuwangi Regency has been selected to look at the system in more detail. Chapter 4 describes the SWM system in Banyuwangi Regency, looking at the amount of waste generated and infrastructure. Based on the study around the national waste management system, stakeholders have been selected to be interviewed. This information can be found in chapter 5. Both chapter 4 and 5 rely mainly on the data collected by the CLOCC and InSWA in a project funded by the Norwegian Waste Management Association (Norad). WASTE received permission to make use of the aforementioned documents and their project waste data baseline for Banyuwangi Regency from 2020-2021[10]. In addition to this assessment, the CLOCC project has engaged the stakeholders to get the full picture of the solid waste sector in the region and to engage them in the process. During the publication of the report, this programme is still ongoing, which means that many stakeholders are still engaged and easy to approach The current situation of the SWM sector in Banyuwangi Regency will be shown in a waste flow diagram to be able to highlight the leakages and challenges (Figure 6).

In addition, to the literature analysis, the research team has visited Banyuwangi Regency to conduct interviews with the identified stakeholders in and around Banyuwangi Regency to gather additional information through field visits and observations in-situ. Based on these interviews a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis is made after the descriptions of the various stakeholders in chapter 5, as a start for the conclusions.

Banyuwangi Regency is located along the east coast shoreline of East Java, covering approximately 5,700 km^2 of land. Administratively, Banyuwangi Regency is divided into four Regions which are North region, South region, Mid-East region and Mid-West region, which are further sub-divided into 25 kecamatan (subdistricts), 189 desa (villages), 28 kelurahan (urbanised villages) and a number of smaller "off-road" hamlets or rural areas.

Banyuwangi Regency has an estimated total population of 1.7 million. Banyuwangi itself is located very near Bali Island and has a harbour with plenty of ferrying and marine shipments from and to Bali. As the interviews mentioned, plastic is also transported by ship from Bali to Eastern Java through Banyuwangi.

[10] Consulted documents:

- CLOCC, Integrated Sustainable Waste Management: Waste Data Baseline Report: Banyuwangi Regency, Indonesia, 2021
- CLOCC, Final Report, Waste Management Survey in Banyuwangi Regency, 2021

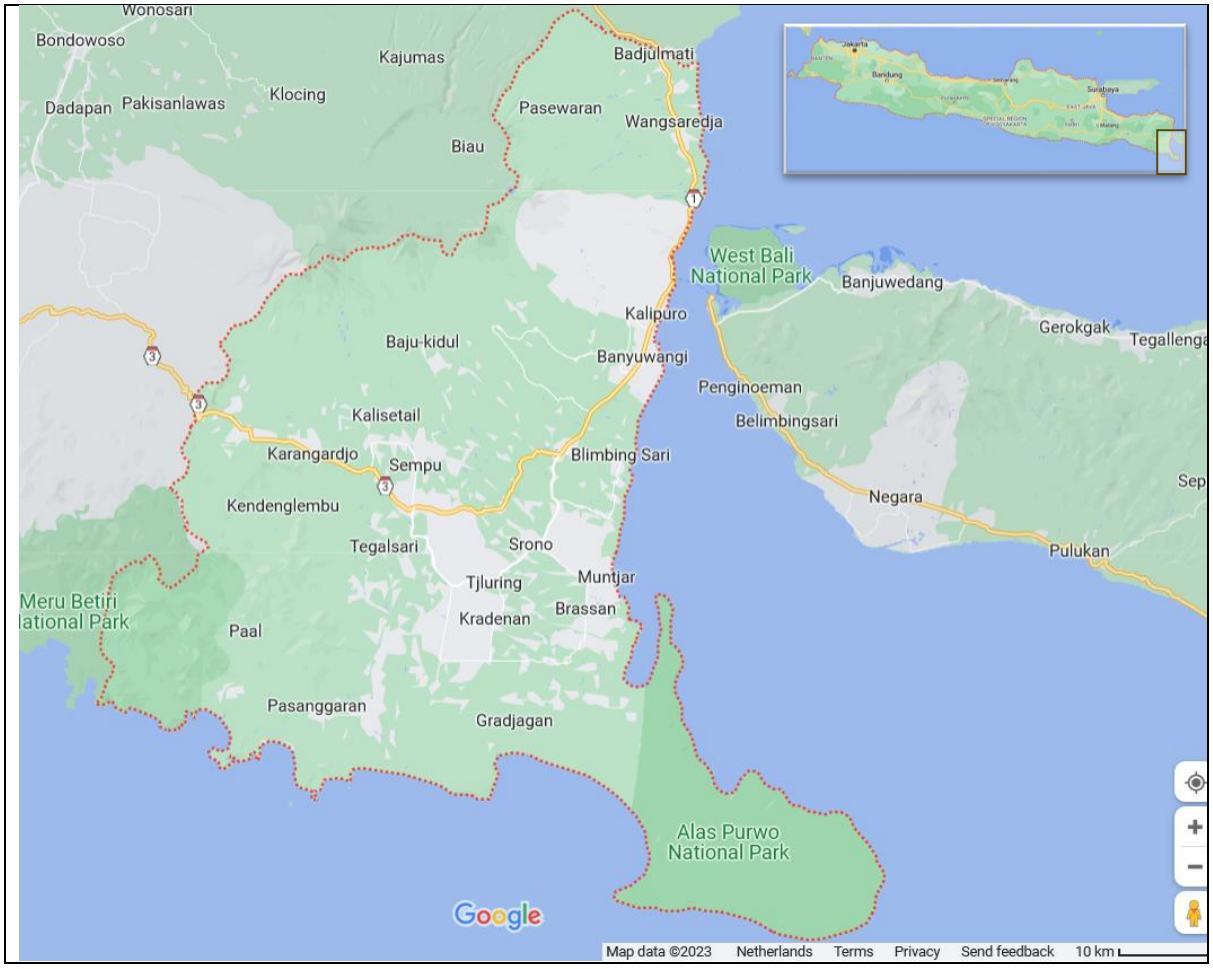


Figure 5. Banyuwangi region / Java
Source: Google maps Solid waste management assessment of regency Banyuwangi

The Banyuwangi Regency is increasingly becoming a tourist destination, and this has caused the region to opt for an improvement of their SWM, with the support from Norad, CLOCC and national partner InSWA.

A full assessment on the Banyuwangi Regency SWM system can be found in the Waste Data Baseline Report: Banyuwangi Regency, Indonesia, 2021. The baseline report will be used as a starting point for the short mapping exercise of this project.

For this report we will only highlight the outcomes of this assessment, which are of direct relevance for this mapping. This means that we will look at:

- Main figures on SWM in Banyuwangi Regency
- Waste flow diagram
- Waste recovery
- Leakages of the unmanaged solid waste
- The actors, informal, formal and government
- A brief overview of the legal and institutional framework
- Challenges and opportunities

4.2. Main SWM figures for Banyuwangi Regency

4.2.1. Waste composition

As mentioned in 1.1.2 The CLOCC study on Banyuwangi Regency has made use of the WACT Tool, this tool measures the amount of waste along the whole waste chain resulting in a complete overview of the generation, collection, reuse, recycling and final disposal with all the losses along the way. The assessment in Banyuwangi Regency shows that the average waste generation in the whole area, both urban and rural zones, is 0.37 kg per person per day.

The main fraction in domestic waste is organic waste (56%) which is predominantly food and kitchen waste. 15% (by weight) of the total composition are various types of plastics. The non-domestic waste has a smaller amount of organic waste up to 28%, but the same average weight of plastics is 15%. The composition of the waste arriving at the landfill also shows a 15% weight of plastics and 70% organic waste, made up of a mix of kitchen and garden waste.

4.3. Mass balance and waste flow in Banyuwangi Regency

A total of 853 tonnes of waste is generated each day in Banyuwangi Regency, 666 tonne/day (78%) is from domestic waste sources and 187 tonne/day (22%) is from non-domestic waste sources. The image below shows the different streams identified in the Banyuwangi Regency: how it is being collected, transported and where it ends up.

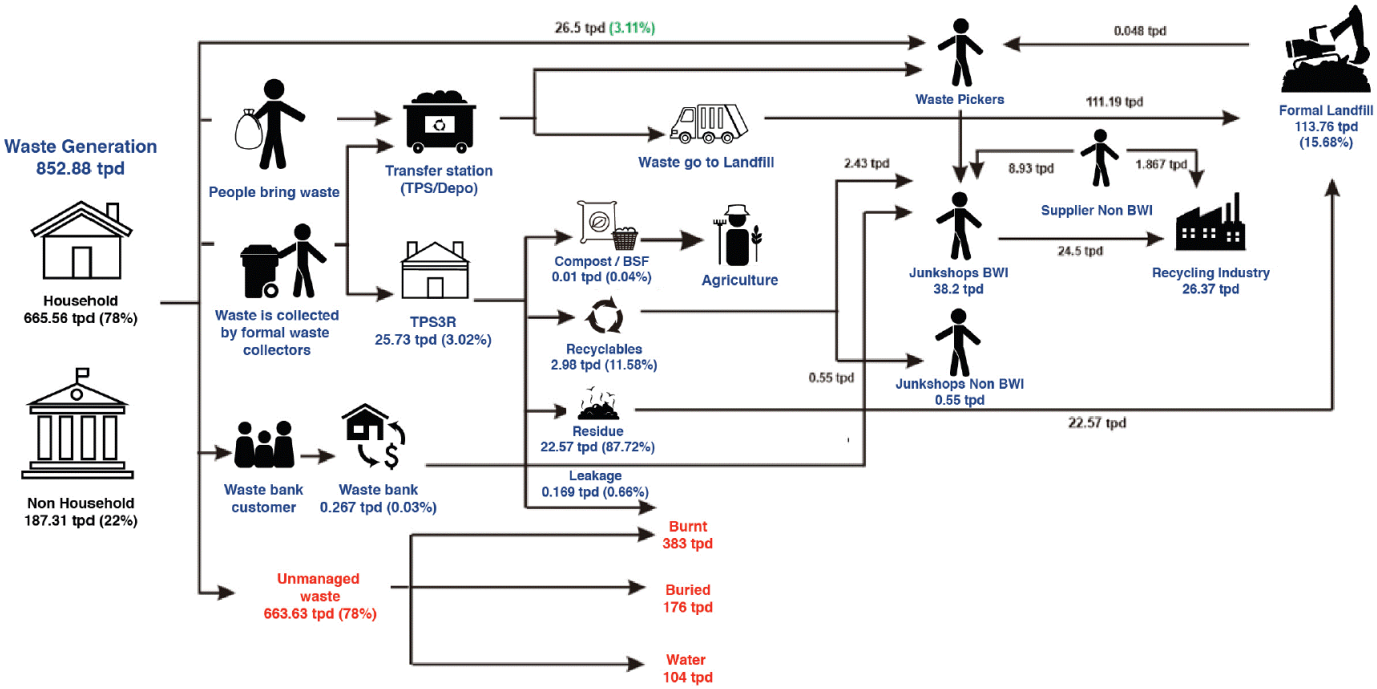


Figure 6. The Waste Flow Diagram and the stakeholders involved mass balance[11] in Banyuwangi Regency per day.

Source: CLOCC, Final Report, Waste Management Survey in Banyuwangi Regency, 2021

As shown in Figure 6, over 78% or 666 tonnes/day of waste is believed to be leaking into the environment, thus polluting the air, the soil and the waterways. This adds up to over 243,000 tonnes of waste annually not being managed and shows the need to improve SWM in Banyuwangi Regency.

[11] Mass balance is the tonnes of waste per day going through the waste system elements.

A Sankey flow (Figure 7) on the waste management makes the flow clearer and gives a good impression of the amount of waste ending up in the environment without any management.

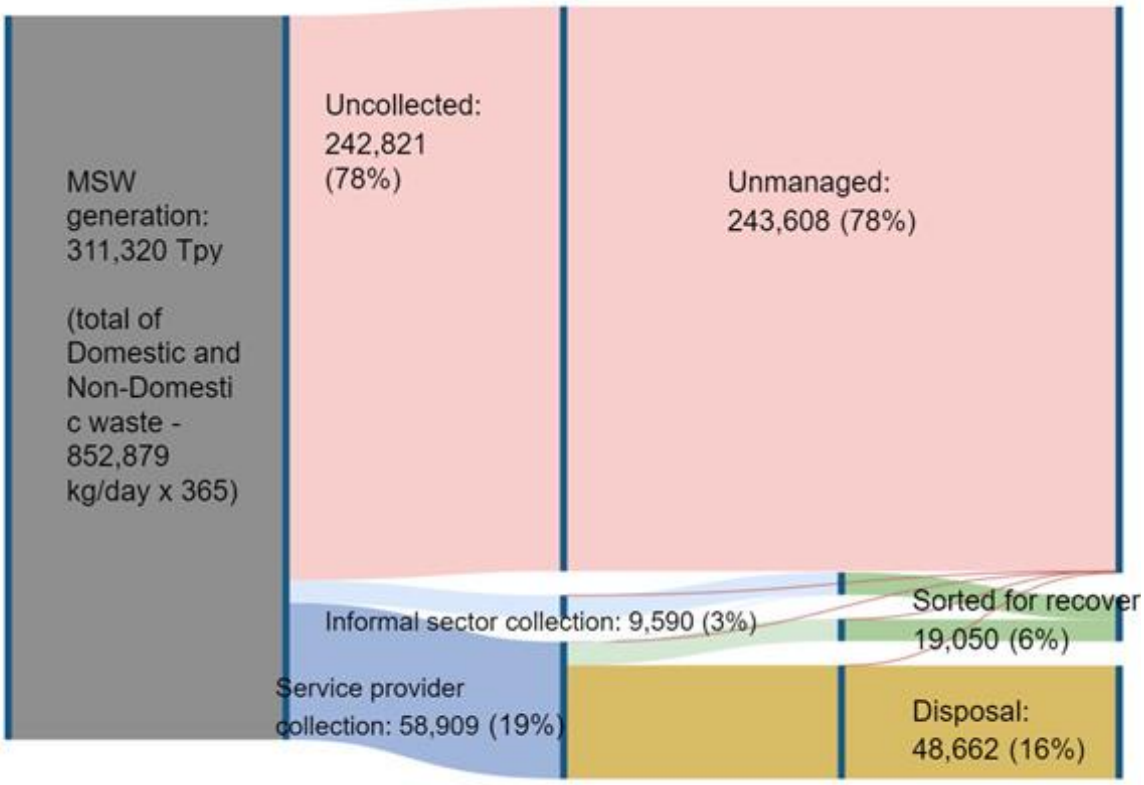


Figure 7. Sankey showing the waste flow from generation to final disposal in Banyuwangi Regency

Source: CLOCC, Final Report, Waste Management Survey in Banyuwangi Regency, 2022

4.3.1. Plastic waste

When considering that 15% of the generated waste is plastics, the calculations show that, annually, up to 48,500 tonnes of plastics end up in the environment.

The waste flow diagram for plastics (Figure 8) shows this stream for plastics, including the data for all plastics combined, PET, PP, PE, and mixed plastics, both hard and film. The estimate is that approximately 4,500 tonnes of plastics per year leak into waterways and most likely end up in the ocean, 7,000 tonnes per year are dumped or buried on land and 16,500 tonnes are burnt openly.

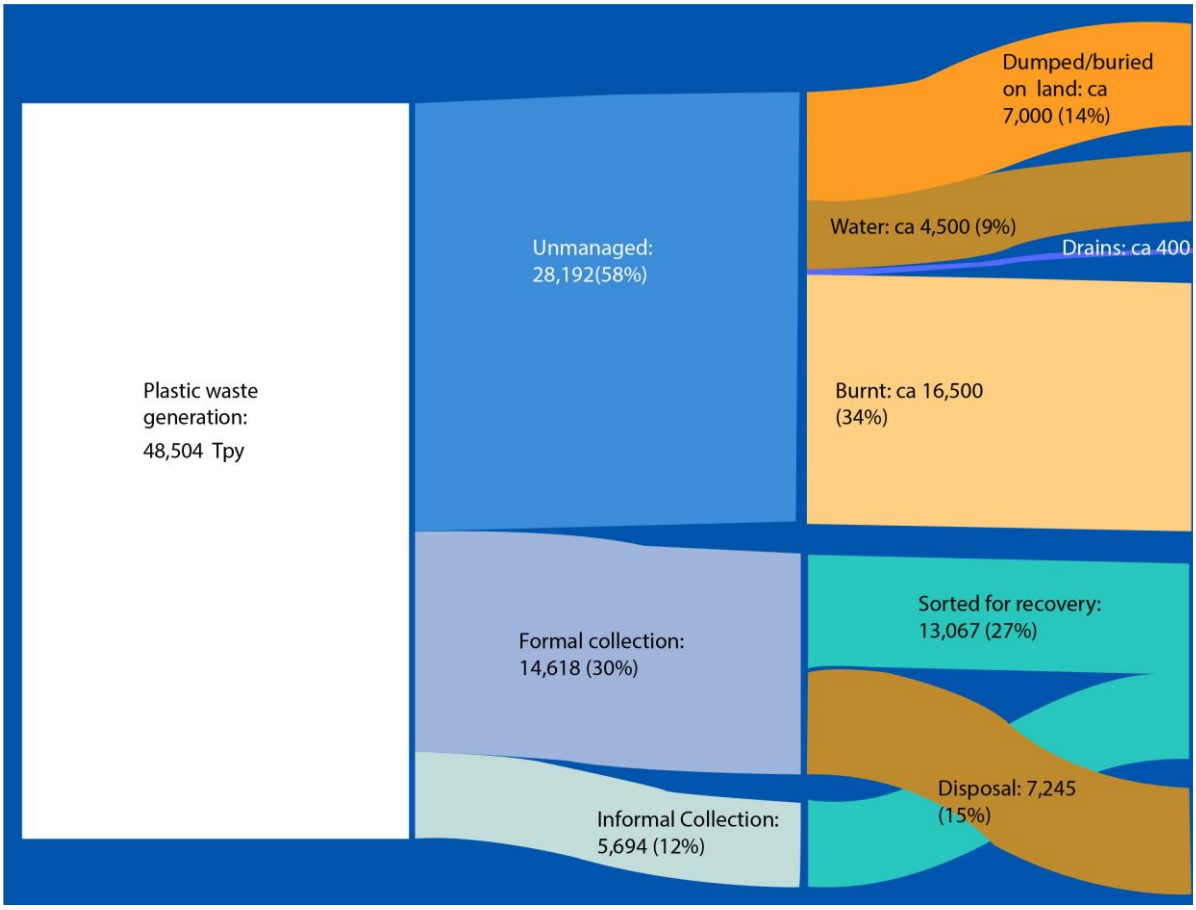


Figure 8. Sankey of the plastic waste flow in Banyuwangi Regency

Source: CLOCC, Final Report, Waste Management Survey in Banyuwangi Regency, 2021

The CLOCC report does not go into detail on the different types of plastics, even though it does make a distinction between hard plastics and film plastics. Hard plastics, being mostly PET and PP take 4.54 % of the total weight of waste and the film plastics 10.87%. An overview can be found in the waste composition graph below (Figure 9).

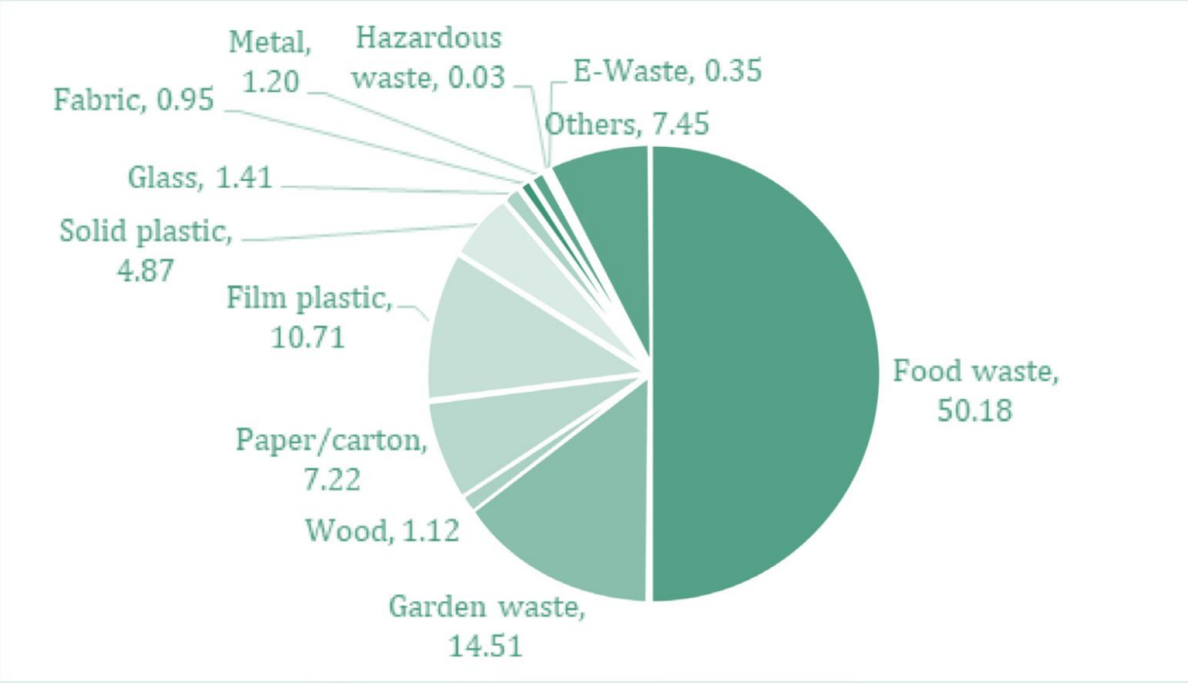


Figure 9. Waste composition in the Banyuwangi Regency

Source: CLOCC, Final Report, Waste Management Survey in Banyuwangi Regency, 2021

Research in 2020 showed that the composition of the collected plastics in Java are mainly the five major economically interesting plastic types that are collected from the generated waste, in particular: rigid PP (25%), film HDPE (20%), rigid PET (20%), rigid HDPE (14%), and film PP (9%). In addition, more than 80% of the collected plastic waste originating from waste pickers and IWBs, this means that only 20% of the reclaimed plastic waste comes from the formal collection.[12] This can also be seen in Figure 8, in the lowest part of the Sankey Flow.

The interviews of the actors in the waste sector in Banyuwangi Regency largely confirmed this, indicating that the other plastics, such as composites and unidentified plastics are not in demand and thus are largely ignored by the waste pickers and IWBs.

4.4. Waste infrastructure

While a big part of the solid waste ends up leaking into the environment, it is important to look into the existing solid waste infrastructure and the actors working in these infrastructures, because even when they are not functioning well (or at all), they represent a resource or starting point for improvement for the Banyuwangi Regency and its citizens and for the IKEA SE project.

As mentioned earlier in 1.3.2, a service and value chain can be identified, along which the waste system elements of generation, collection, reuse, separation, valorisation and final disposal flow. In the service chain a service is being offered by the actors, meaning that there is no value added to the material, but a service is rendered to the person or community. In the value chain, however, the activities taking place add value to the type of waste. A very general outline can be found in Figure 3 earlier in the text which show examples of the accumulation of the value of the plastics.

[12] 2020, An Overview Of Plastic Waste Recycling In The Urban Areas Of Java Island In Indonesia, Nurdiana Darus, Maya Tamimi (et al) funded by UNILEVER. link: https://scholarhub.ui.ac.id/jessd/vol3/iss2/10/

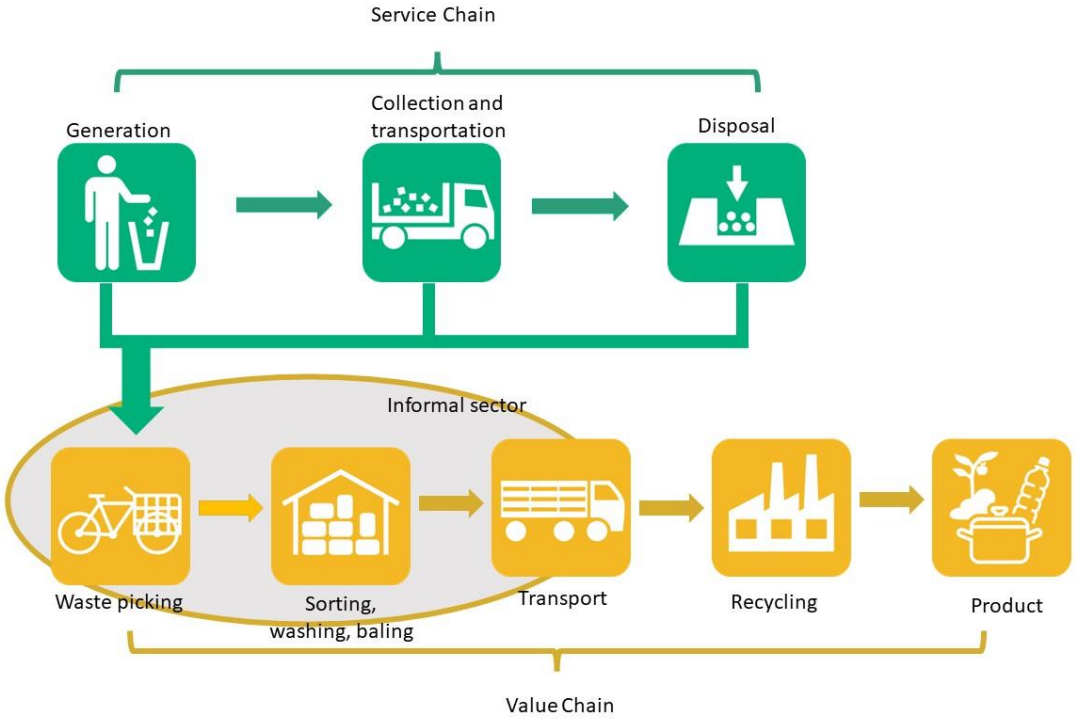


Figure 10. Service and value chain in solid waste management

Source: WASTE

Looking back at the Mass Balance of Banyuwangi Regency in Figure 6, the system elements and different actors are already depicted along the waste chain. This chapter will look further into the identified infrastructure and the basis on which the improvement of the solid waste system can build upon. As such we will discuss:

- Waste generation
- Collection service
    - Formal waste collectors
    - Informal waste collectors
        - IWBs
        - Waste pickers
- Transfer stations, Waste treatment centres
    - TPS3R
    - Waste Banks
    - Junkshops
    - Composting site
    - Plastic shredding and granulation
- Recycling industries
- Final disposal site

The information gathered in the interviews will be covered in the next chapter, in which the actors working in the various infrastructures are discussed.

4.4.1. Waste generation

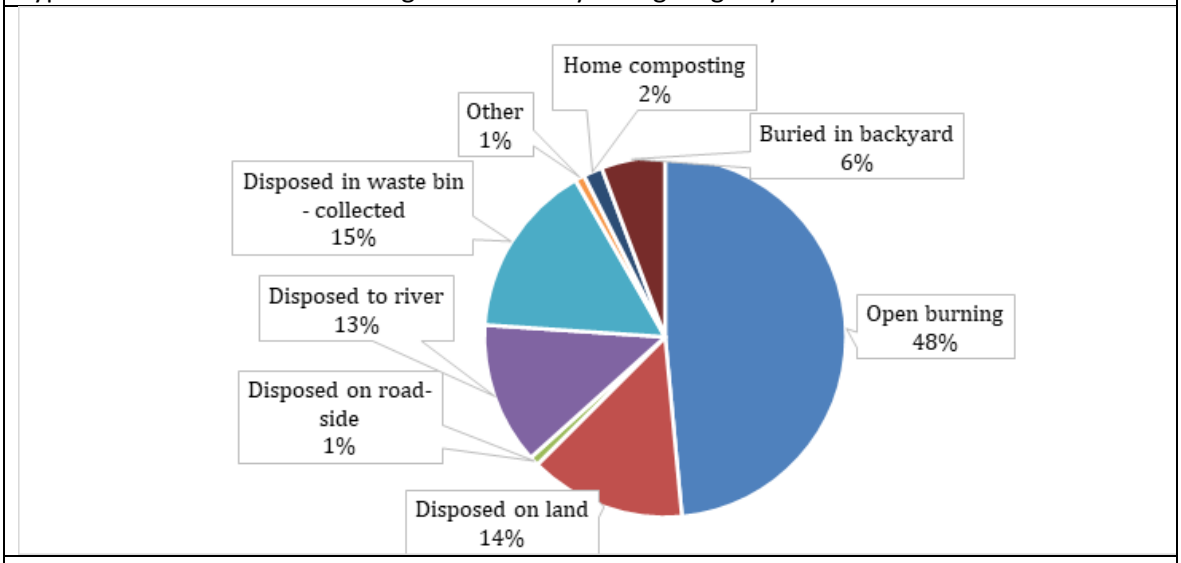
The amounts of waste generated has already been depicted in the earlier chapters. The way the generated waste is handled varies across the Banyuwangi Regency as previously discussed. More than 78% of waste ends up into the environment, in most cased burnt, buried or simply dumped by the

generators themselves. In some cases, an IWB will pass and buy the high-value waste fractions from the households or generators, mainly plastics, paper, and metals.

The household waste management

The statistics on the management of the waste on household level household waste management show that 48% of the households burn their waste, and 27% dumps it, either in waterways or on vacant land. The graphic below shows some the types of the households waste management.

Types of household waste management in Banyuwangi Regency



Source: CLOCC, Final Report, Waste Management Survey in Banyuwangi Regency, 2021

Overall, the outcome of the research was that only 54 villages (29%) have a formal SWM system in place and of those villages 18 villages have a TPS3R of which only eight were operational. In conclusion, only approximatively 15% of the household waste is being collected in an organised way with the municipality involved.

4.4.2. Waste collection

There is not much organised waste collection in the Banyuwangi Regency, the CLOCC study mentions five towns that have some sort of waste management plan, including the city of Banyuwangi. Two types of collection systems can be identified. Formal collection is done by the environmental agency, a municipal department. This covers a mere 19% of the total waste generated. The informal sector, in most cases IWBs, handles 3% of the total waste generated. These IWBs contribute to the system by buying valuable waste from the households and sells them to the local junkshops after a further sorting process. In some cases the waste will be directly dropped off at a Waste Bank, but this does not contribute to more than 1% of the total waste collected.

An exception is the city of Muncar, a city in the east of the Regency, which has been in partnership with the STOP project since 2017.[13] During the project, the city has improved the collection and reduced the plastic leakage by setting up waste processing facilities. After the project, however the

[13] Project STOP Stop Waste, go circular link: https://www.stopoceanplastics.com/en_gb/muncar/

system seemed to have collapsed due to lack of finance. Not much information is available on this as of now, but it is a scenario worthwhile looking into.[14]

Formal collection methods from the households are done by different vehicles depending on the street conditions of where the households are located. In areas that are hilly and narrow streets, the waste will be picked up by using carts or tricycles. However, in areas with wider streets, the waste will be collected using trucks. After collection, the waste will be delivered to the transfer stations, which are called TPS or TPS3R depending on the activities they undertake at the transfer stations. Difference in TPS and TPS3R will be further elaborated on in the following sub section.
For the informal collection, the IWBs sell their collected waste to the (small) junkshops after further sorting.

As stated earlier, the waste generated in Banyuwangi Regency is 853 tonnes/day. In 2021 the collected waste that ended up in landfill was found to be only 330 tonnes/day (38.7%). In 2022 it was measured as being even lower, at a rate of 160 tonnes/day (18.75%)[15]. The waste transported to landfill was reduced due to the closure of the existing landfill in 2022 and the move to the temporary final disposal site in Karangbendo. On top of this, the landfill site in Karangbendo had to overcome a social issue: there were complaints from the surrounding communities. Subsequently, the landfill now has limited operation times (6 am to 12 pm) and this might have had an additional negative impact on the waste ending up at the site.

4.4.3. Small and big junkshops

Junkshops are waste aggregators that buy specific waste fractions from the collecting and sorting stakeholders, both from the informal sector and the government related infrastructures such as the TPS 3Rs and Waste Banks. In general, the size of the junkshop determines whether it is seen as informal or formal, although the official criteria are whether they are a legal entity. Small junkshops often function as intermediary between waste pickers, IWBs and the big junkshops, selling their wares after further valorisation, like sorting on colour, to the bigger junkshops. The latter undertake further treatment, such as compacting and shredding of the materials, before selling it in bulk to off-takers, who will process it into new products. The off takers are mainly located in the area just outside the Banyuwangi Regency. Most of the merchandise goes to Surabaya, where many plastic industries are operating.

[14] Information received via informal talk with involved consultant.

[15] National Waste Management Information System (SIPSN) – Ministry of Environment and Forestry (https://sipsn.menlhk.go.id/sipsn/public/home/fasilitas/tpa-tpst)

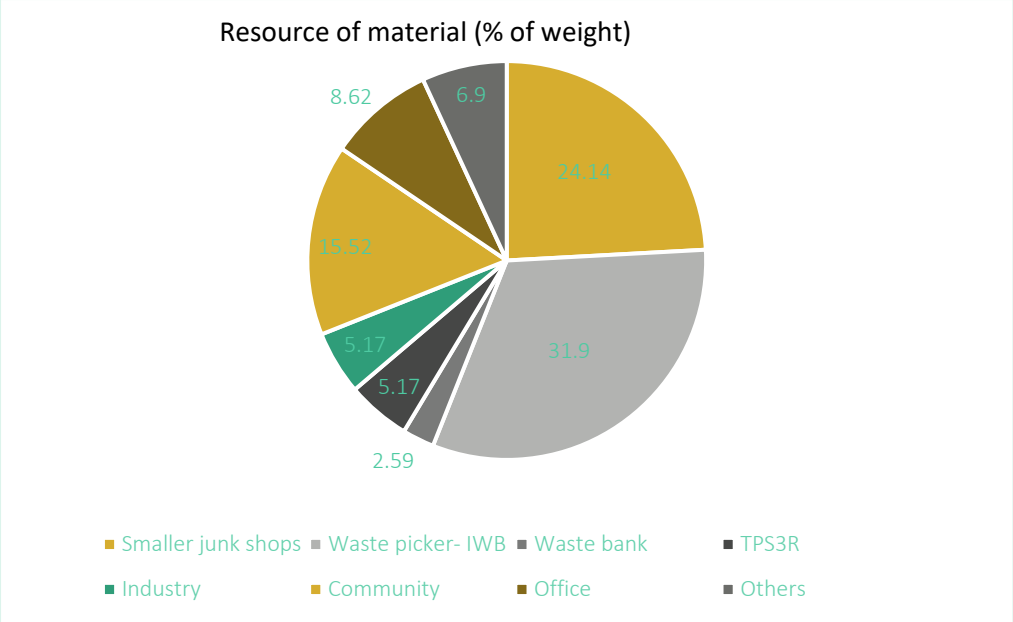


Figure 11. Junkshop sources of waste (% of weight)

Source: CLOCC, Final Report, Waste Management Survey in Banyuwangi Regency, 2021

47 junkshops were identified in the Banyuwangi Regency in the CLOCC assessment. This coincides with the estimation given by the junkshops in the interviews.
The majority of these junkshops (55%) are not officially registered and thus informal, and in many cases family enterprises. As mentioned above, most of the junkshops interact with each other, exchanging different types of waste, selling to the bigger ones who are capable of further sorting and stocking quantities that are of interest to the off takers.

4.4.4. Transfer of waste: TPS, TPS3R and Waste Banks

Various types of transfer stations were identified in the Banyuwangi Regency, the TPS (transfer station) and TPS3R (transfer station with some valorisation and or recycling activities onsite). Alongside this, it was found that there are some Waste Banks that also collect waste from the community/household and sort the waste. All these infrastructures are set up by the local government or linked to a community activity.

TPS

The TPS is a type of transfer station where waste is aggregated onsite before the waste is sent to the final disposal site. Waste is not processed formally in this location, except for sorting and scavenging activities done by informal sectors, and occasionally it is burned by the formal operators or eventually transported further to the disposal site. It is also a place where you can find waste pickers sorting the waste that they will sell to the junkshops.

The Depo is a special type of TPS, mainly a place for transferring the waste for further transport to the disposal site where there is no activity planned, but waste pickers can be found there.

TPS3R

A TPS3R is similar to a TPS. The only difference being recycling activities that are implemented onsite. The activities done at TPS3Rs are separation and even some valorisation from waste, varying from

washing, crushing of plastics to composting of organic waste. The management falls under the responsibility of the local government.

The environmental agency mentioned in the interview that there are 50 intermediary sites (TPS) in 18 sites while there are 19 TPS 3Rs in the whole regency, of which 2-3 are inactive. This does not coincide with the assessment of the CLOCC report.

The CLOCC report indicates that there are 18 TPS 3Rs, of which only 7 are fully functioning and 11 facilities are not operational at all.

The TPS3Rs receive up to 771.85 tonnes of waste per month (TPM) and manage to separate 89.6 tonnes that will go towards reuse or recycling. Approximately 667.2 TPM arrives at the disposal site, which means that an estimated 15.05 TPM leaves the official waste stream, being dumped or burned, or possibly picked by waste pickers. The conclusion, however, is that that only 11.6% of the collected waste is redirected from the landfill towards reuse or recycling.

It must be said that management of these types of transfer stations is not easy due to various reasons such as the fluctuating prices of the sorted products and the small profit margins on the products and the limited funds from the government not filling the gap.

Waste Bank

Waste Banks are waste management facilities serving a community, with the goal to raise awareness and offer education for an improved waste management practice. The initiative for the realisation of Waste Banks varies, but mostly they are related to the local government. The Banyuwangi Regency records 57 Waste Banks, most of them located in urban areas. The WACT study has measured that the Waste Banks receive 6.2 TPM which is not even 1% of the amount of waste that the TPS3Rs receive. As such the Waste Banks play a small role in the waste flow. However, the Waste Banks do take up an educational role by raising awareness on waste management within the community.

4.4.5. Waste disposal

The waste disposal site is where the collected and unrecycled waste should end up. In the case of Banyuwangi, only 21% of all waste generated is collected: 19% by the official collectors, of which 16% ends up at the disposal site and the remaining 3% is sorted for recovery, and 3% of the generated wasted is collected by the informal sector and as they IWBs buy recyclables the full amount is been sorted for recovery. This means that during the official trajectory from collection to disposal little to no waste is being recovered. See also Figure 7. Sankey showing the waste flow from generation to final disposal in Banyuwangi Regency

At this time there is no formal final disposal site available for the Banyuwangi Regency but instead a temporary designated area which has been provided for the final disposal site. There is hardly any infrastructure on the temporary site. As such no supervision or weighing bridge can be found onsite. As shown previously in Figure 6 on the waste flow diagram, all residues are to be sent to this area, which includes residues from the TPS3Rs and Waste Banks.

On the temporary disposal site, waste pickers daily pick up the materials with value. The research team counted 20 persons on the day of their interview. According to the CLOCC study, the average collected waste by the waste pickers from the final disposal site is approximately 17 TPY. Materials collected will be sold to a nearby junkshop and directly sold by the end of the day to minimise the need of stockpiling in their house.

5. Mapping of stakeholders in plastic waste management in Banyuwangi Regency

In this chapter, we will add the information from the stakeholders gathered by the research team during the field visit of Banyuwangi Regency.

Stakeholders identified for the interviews are based on the waste management analysis in the CLOCC study in which a waste flow diagram was drawn. The waste flow diagram is used to point out the position of the stakeholders in the waste chain. Based on the CLOCC report and the interviews with the stakeholders, we have made a SWOT (Strengths, Weaknesses Opportunities, Threats) in which the Strengths and Weaknesses are mentioned.
The Opportunities will offer an overview of options to intervene which can improve the position and role of the stakeholder and what possible results an intervention can achieve. The Threats are the factors that need to be considered when implementing a solid waste management system.

The informal sector is especially taken into account as the CLOCC study and the discussions with IKEA running up to this mapping exercise also had led to interest in the informal sector within the whole service and value waste chain, with an emphasis on plastic waste. The interviews of all the stakeholders focussing on opportunities of intervention for the relevant stakeholders.

5.1. Waste generators, households and non-households

5.1.1. Households

The way households go about with the waste they generate mainly depends on sociological factors, the existing waste management system and their economic situation. In Banyuwangi as in most parts of Indonesia, the households perceive that the waste they generate is theirs to be dealt with. Especially in rural areas, they do not expect the municipality to come and collect the waste. They deal with the waste themselves, selling some of the fractions to the IWBs, the burning, burying or dumping of the rest of the waste is a longstanding custom and will be difficult to change. In urban areas where the space around the houses is limited, the demand for household collection will be more present.

If, and when, the ISWM plan[16] in the Banyuwangi Regency comes into action, the households will need to change some of these customs, starting with accepting waste collection. For the planning around collection, it might be that separation at source is an achievable goal, considering that households already keep waste separate for IWBs. However not receiving money for this separated waste, might be a barrier.

5.1.2. Non-households

Non-household waste generators, such as hotels, shops, offices, and even small industries, tend to generate certain types of waste in bulk. Hotels, for instance, will have PET bottles from the tourists, shops will have a lot of film plastics or card boxes from their stock, and industries might have PP containers.

From a collection point of view these stakeholders are profitable to have as your clientele, especially as IWB, as their waste is often in higher quantities, and as the interviews pointed out, the hotels are

[16] The executive summary can be found here: InSWA, CLOCC, Norad, ISWA, 2023, Waste Master Plan, Integrated Sustainable Waste Management (ISWM), BANYUWANGI REGENCY, https://www.cloccglobal.org/

eager to get rid of their wastes and often don't ask for payment from the IWBs as the households would do.

5.2. The informal sector

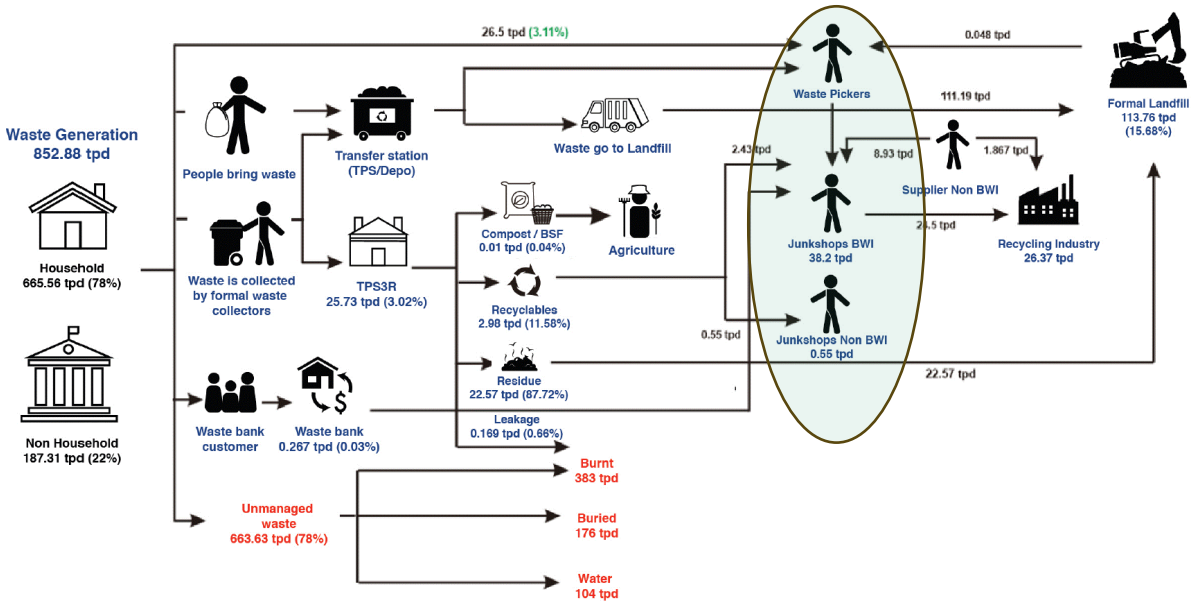


Figure 12. Waste balance of Banyuwangi Regency with informal sector highlighted in blue

The informal sector consists of small, often family-led businesses working in the waste sector. Even though these businesses have no official status, many studies show that their contribution to the actual waste management system can be considerable, as they collect valuable recyclables out of the waste. Unfortunately, the unofficial or sometimes even illegal position of the informal sector makes it difficult to assess their contribution.

Banyuwangi Regency has decided to include the informal sector in their ISWM plan. This is done to improve the Regency's overall collection rate, the informal sector's working conditions, and livelihoods. All aiming to eventually formalise the small businesses.

The stakeholders identified in the informal sector are:

- Waste pickers (at TPRs and disposal site)
- IWBs Small junkshops
- Medium junkshops

When mentioning the informal sector, the Ikatan Pemulung Indonesia (IPI) and Indonesia Waste-pickers Union (IPU) have to be taken into account. These two unions claim to represent the waste pickers and IWBs. For instance, the vision and mission of IPI are to raise the waste pickers' honour and dignity. Their goal is to assure that 100% of the scavengers, as the waste pickers are called by the IPI, are well taken care of (e.g. having an ID, medical insurance and protective clothing for work.)

Currently, the IPI focusses on Central Java, but hopes to expand their geographical outreach with the aim to provide waste pickers and IWBs with National IDs and proper medical insurance. According to the IPI the informal sector needs support on the management of their work to be able to increase and

stabilise their income and in the end formalise themselves. The IPI states as well that support from the government is needed especially on the import of virgin plastics, by regulating the price in such a way that recycling stays an interesting business. The importance of the informal sector in solid waste should be acknowledged by the government, resulting in a higher appreciation of the waste pickers.

The rest of sub-section 5.2. will look at the different stakeholders within the informal sector. An important observation is that during this mission no child labour has been encountered within the visited businesses (4), nor at the disposal site.[17] Another is that the businesses had little to no attention for environmental issues, any residues of the waste that they handle end up in the environment, there is no official or unofficial transport to the disposal site.

5.2.1. Waste pickers

Waste pickers are people who, working in their family business, go to the transfer stations, curb sides and disposal sites to collect materials that have an economic value[18]. These materials are sold to junkshops who, if they have the space, they will try to set up a storage shed and do some further separation of the collected materials. These waste pickers can even start to function as a small junkshop, buying waste from other waste pickers or IWBs, this especially happens in the rural areas where it makes sense to make larger stocks of the sellable product before going to the urban area where the bigger junkshops are.

In the CLOCC report, the amount of waste recovered by the waste pickers on the disposal site, was estimated up to 48 kg per person per day, mostly plastics, but also paper and carton. This adds up to 27 TPD of materials being recovered from the disposed waste.

The WASTE research team interviewed two waste pickers on the disposal site. They proved to be very aware of the prices of the materials they picked and adapted their collectables to the fluctuation of the prices, or if the collected material became too popular with the other waste pickers.
The following price list is what was the collected from the waste pickers in Banyuwangi as per May 2023 for several types of waste in an “as is” condition (a dirty condition where the collected waste is not properly stripped of labels).

- Aluminium cans get the highest price per kg, but the actual figure has not been given.
- Coloured plastics: IDR 600/kg
- PET: IDR 2,800/kg
- Glass: IDR 500/kg
- Clear plastics (as PET is named in Indonesia): IDR 1,100-1,800/kg

[17] The waste assessment studies done by the CLOCC project also don’t mention child labour in the analysis of the solid waste sector. InSWA, CLOCC, Norad, ISWA, 2021, Waste Data Baseline Report: Banyuwangi Regency, Indonesia, https://www.cloccglobal.org/copy-of-our-work

[18] The interviewers did not look into the background of the waste pickers. However in many cases waste pickers are migrants from the rural areas arriving at the cities and find a small income through waste picking.

Photo 1. Tents of waste pickers on the disposal site, sorting the found materials

The actual paid price fluctuates depending on location, market demands and product quality. During WASTE's site visit, it was found that prices had been rather low for the past few months due to low oil prices and thus cheap virgin plastic pellets. The factories were found to lean towards virgin plastic pellets. The price for plastic goes further down if the quality is bad, this can be unproperly sorted, not properly dried, or still sandy. The monsoon season always causes a dip in the price as drying becomes extremely difficult. The price fluctuations are most felt by the waste pickers at the bottom of the chain as the stakeholders up the chain try to keep their profit margins.

The interviewed waste pickers don't always sell their waste to the highest priced junkshop, but due to the limited storage at their home businesses and transport costs, they will sell collected materials to any available buyers nearby.

5.2.2. Itinerant Waste Buyers (IWBs)

The research team met a couple of Itinerant Waste Buyers (IWBs) near the junkshops. IWBs are small family businesses who visit households and businesses, such as hotels and shops. Businesses and hotels are interesting as they often have more waste to offer per visit. The IWBs only collect waste that is in demand and thus will not accept organic or low demand waste. Often, their houses double as a working and storage space, where some further separation and stocking of goods happen before selling the wares to the junkshops, thus increasing the price they can expect to get during the sale.

Photo 2. IWB storage of plastics and vehicle

Photo 3. IWB's vehicle with sorting space on the backseat

Having a small and informal enterprise, minor alterations can already improve the business. During the interview of the IWBs, it became clear that the intervention of the CLOCC project, as with the informal sector, helped their business in a big way. The CLOCC provided for smartphone to communicate with the waste generators and the off takers thus facilitating the logistics of the collection. The CLOCC project also set up a communication platform among IWBs to enable sharing information, particularly for the price and availability of waste to be sold.

5.2.3. Small junkshops

Small junkshops often started as IWB, but managed to grow towards junkshops, buying the stock from other IWBs without any storage. One of the interviewed junkshops changed their collectables from plastic to paper and carton, stating that the market for plastics had become too full of competitors and the plastic types too diverse to be able to sort them fully enough for their buying clients. The prices of the plastics also had plummeted.

The collection of paper and cardboard makes this junkshop even more dependent on covered storage and the need to invest in dryers to keep the product. When talking about the environmental rules, the junkshop owner is aware that he should adhere to certain rules and regulations but is not sure what these are and has never had any control.

The junkshops are in contact with each other, exchanging waste they themselves have separated from the bought stock.

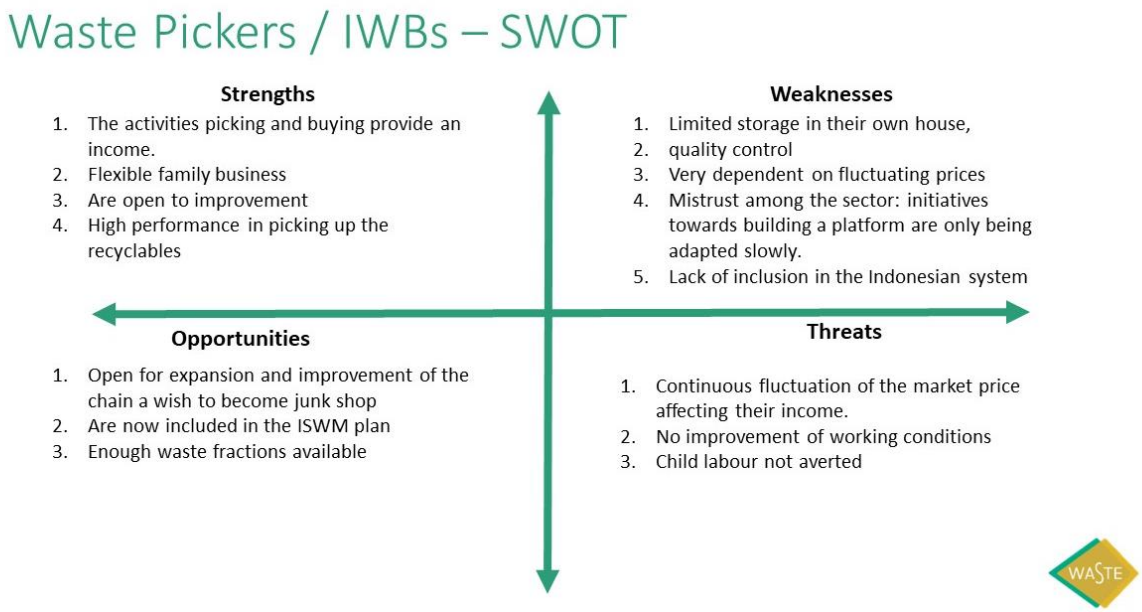
Photo 4. Small junkshop storage space

Photo 5. Small junkshop sorting the plastics before selling

5.2.4. SWOT informal sector

Considering the situation of the informal sector, especially in Banyuwangi Regency where the government has decided to include them in their ISWM plan, there seems to be ample opportunity to improve the income and working situation of the informal sector.

The SWOT offers a short overview of the strengths and weaknesses of the informal sector. The opportunities and threats are the factors that should be taken into account when planning a solid waste management including the informal sector.



As already stated in the CLOCC report, CLOCC has made some small improvements for some of the waste pickers. The donation of a scale or small shed near the house proved to already improve the income of the benefiting waste pickers and IWBs. The quality of the stock proved easier to maintain during the different seasons if it could be stored in a shed and weighed, also making it possible to negotiate a better price.

5.3. Government collection and separation

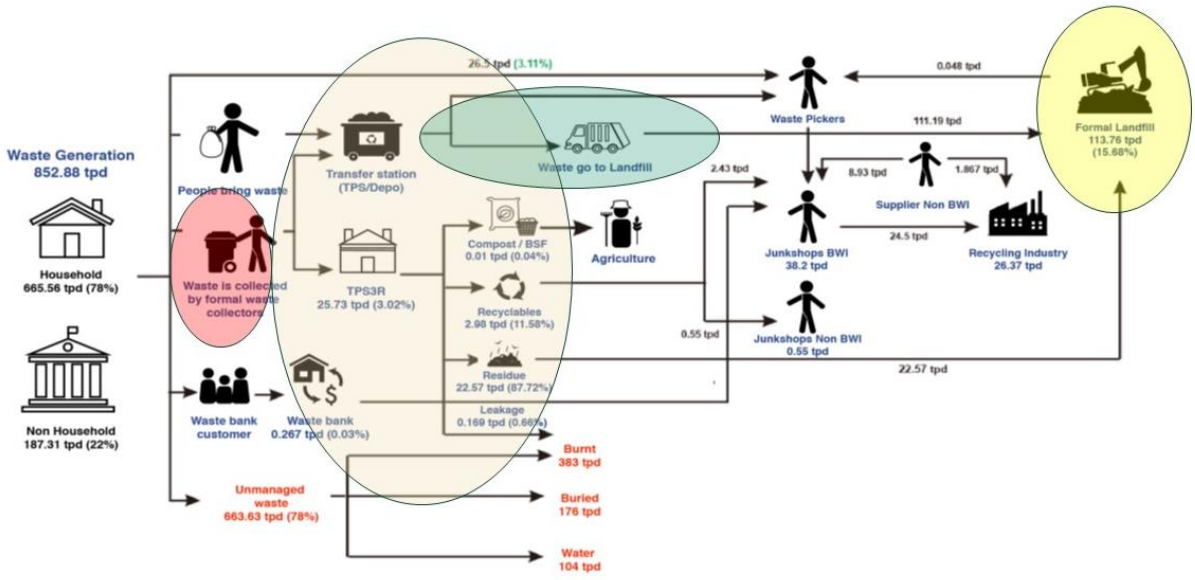


Figure 13. Four circles indicating the government parts of the waste chain

The waste flow shows the stakeholders involved in the waste system that are linked to the government: the municipal waste collectors, the TPS and TPS 3Rs and the Waste Banks, the transporters of the residual waste, and the final disposal site. Interventions for these stakeholders always go through the municipality or other local institutions with responsibility for the SWM sector.

In the future ISWM plan for Banyuwangi, there might be activities around privatisation of these various stakeholders but the responsibility on performance will always lie with the government. The SWOT of these stakeholders is taking this factor into account.

The research team had an interview with the Environmental Agency of Banyuwangi who talked about the current and future waste management system. The waste assessment of the CLOCC forms the basis from which the plan will be developed and implemented. The main obstacles the Environmental Agency sees in the current system are:

- Lack of people awareness
- Limited infrastructure and facilities
- Regional budget limitation

Based on the interview results, a couple of initiatives are already underway. As a result, the future landfill site has been chosen, and the construction is planned for 2024-2025. One TPS3R is being optimised, with the hope it will become an example for the other TPS3Rs.

In the plan, the informal sector and junkshops of different sizes will be included, thus making sure that they will be building upon the existing system. The governmental agency expects to be very active in the enforcement of the regulations, which includes among others, informing and training the households, and the informal sector. They also see it as their responsibility to ensure that the private sector management in the waste sector is monitored by the environmental agency.

It is important to note that the ISWM plan for the Banyuwangi Regency is still at the draft stage and is currently being presented for approval by the Regency.[19] The vision of the Banyuwangi Regency is:

Becoming a world-class tourist destination that is free of waste through integrated and sustainable waste management in 2040.

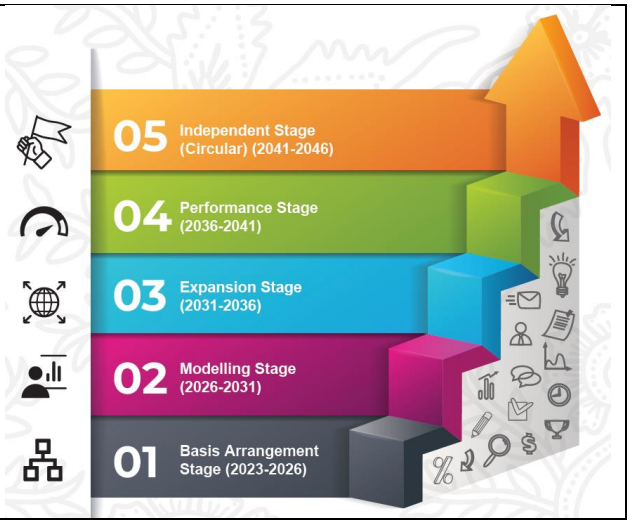
Goals the Banyuwangi Regency wishes to achieve are to:

- Develop integrated and sustainable waste management system.
- Reduce the leakage of waste into the environment to 0% in 2046.
- Increase waste sorting and processing by up to 60% in 2046.

For this the regency has set up a roadmap and divided these in the following stages, as can be seen in Table 5.

[19] Waste Master Plan, Integrated Sustainable Waste Management (ISWM), BANYUWANGI REGENCY, Executive Summary, 2023, CLOCC, InSWA, Norad, ISWA

Table 5. Stages of implementation of the ISWM plan (draft version)

Stage 1: Basis stage Initial setup and waste management incubation with society Stage 2: Modelling stage Trial and strengthening of the waste management service model. Stage 3: Expansion stage Expansion of waste services and creation value for waste management benefits Stage 4: Performance stage Strengthening and implementation of waste management system standard. Stage 5: Independent stage (circular) Integrated sustainable waste management	

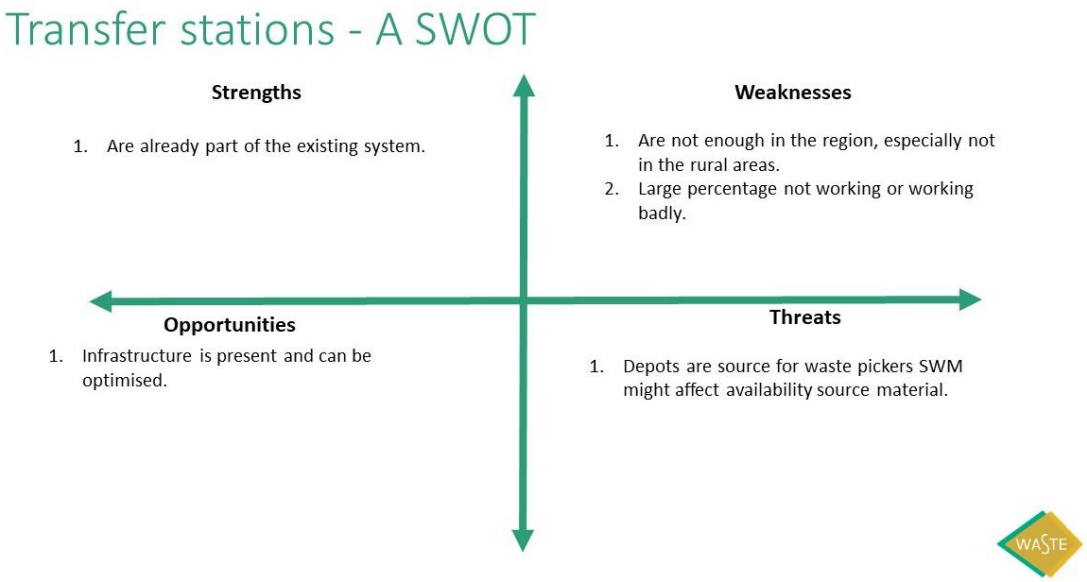
5.3.1. TPS3R and TPS

The TPS3Rs and TPS have already been described in the chapter on the waste infrastructure, in short:

- They receive the waste from municipal waste collectors and do not have any interaction with the informal collectors.
- Are part of the municipal waste management system.
- Activities vary from:
    - TPS – There is no specific activity planned. Waste pickers come and pick worthwhile fractions.
    - TPS3R – Inorganic waste. Separation and fractions sold to junkshops
    - TPS3R – Organic waste. Composting of organics to be sold to agriculture
- Most of the TPS3R are not, or badly, functioning, due to lack of funds, management and governance.
- Sorted (recyclable) materials go to the junkshops, in most cases to the bigger junkshops that are identified as formal. But most probably also to informal junkshops if they are interested in the materials.

5.3.2. SWOT transfer station TPS3R

The TPS are not taken into consideration when describing the SWOT as it seems they are not, and will not, be playing a role worth mentioning in the waste flow diagram. Regarding the TPS3R, they do have a role to play in the sorting and valorisation of collected waste. As they are under direct responsibility of the Environmental Agency, interventions will only be possible in accordance with the ISWM plan implementation of the Banyuwangi Regency. Privatisation might be an option in this plan, but for now, the plan mainly mentions the much-needed upscaling and improvement of the TPS3Rs. This upscaling and improvement are important for the junkshops as they can only grow if the recovery rate of the TPS3R goes up.



5.3.3. Waste Banks

Waste Banks receive funding from the environmental agency and as such fall under the governmental and statal part of the sector.

The research team interviewed two Waste Banks, a Unit Waste Bank, located in a neighbourhood, and a so-called Central Waste Bank. The interviews showed that there is a difference between the Waste Banks. The Unit Waste Banks are smaller and might make use of the Central Waste Bank to send their separated waste, as they have more storage. Both Waste Banks state that the contribution from the Environmental Agency and the village government is essential for their management, the income derived from the separated materials is quite low and also uncertain due to the fluctuations on the market. Contribution from the village government is often in the shape of transport of the waste and infrastructure for the facility. Products of interest are:

- Paper
- Plastic bags
- Hard plastics
- Glass

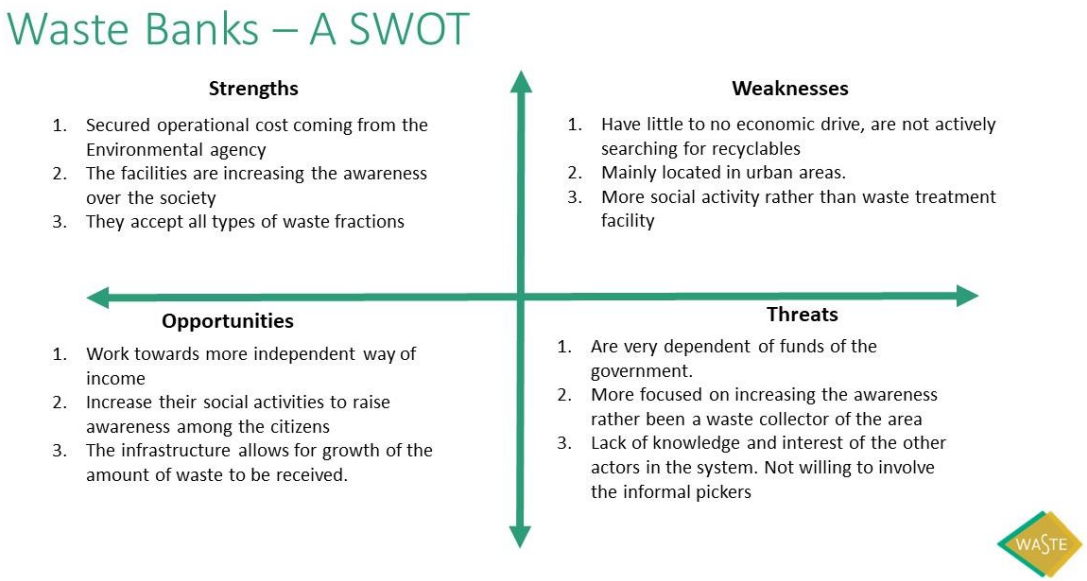
Each type of waste has its own waste stream, meaning that a Waste Bank has a wide range of off-takers, mostly junkshops, who come in to buy the material when enough has been collected.
Waste Banks do not buy from the informal sector however it does happen that they sell their sorted waste to the smaller and informal junkshops if the price is higher than other off takers.

Waste Banks don't identify themselves as being businesses, they are more focused on awareness raising of the households regarding waste and offer training to make handicrafts from waste. These activities are then funded by the government.

Photo 6. Unit Waste Bank, the collected waste is dropped there to be sorted and sold

5.3.4. SWOT Waste Banks

Even though, just as the TPS3Rs, the Waste Banks cannot be seen as businesses but are linked to the local government and or community, from which they receive funds, we still made a SWOT as they are part of the circularity of plastics and other waste. However, it is good to realise that direct interventions are not possible, all activities have to fit in the ISWM plans of Banyuwangi Regency. Knowing what is being planned is important as Waste Banks link with the junkshops and as such can be important suppliers of the plastic waste.



As such the SWOT is very much in line with the TPS3R except for the addition role of increasing environmental awareness.

5.4. Formal sector junkshops/recycling businesses

Formal junkshops are often the result of a successful informal junkshop that has become formal due to size. Formalisation means that they are registered businesses. The main activities are often more elaborate than in the small informal junkshops, as they are working on a bigger scale. The businesses buy the materials pre-selected by the informal sector, TPS3Rs, and Waste Banks, and they only tend to have an interest in specific waste fractions. More value is added to the material by separating it in more fractions (colour, cleanliness, generation), washing and compacting or even shredding it into flakes. In principle they could also be called recyclers, but they see themselves more as buyers and sellers.

The size of the formal junkshop varies, one of the two interviewed junkshop claimed to have 20 employees working in the junkshop but he second, who did not answer this question specifically, mentioned that they processed 300 – 500 tonnes of hard plastics per month, which indicates that they must have more than 15 employees to be able to come to that productivity.

Both junkshops mentioned that they buy from IWBs or smaller junkshops and have long-term relationships with them, which sometimes even results in giving out loans or pre-paying on stock to the smaller businesses.

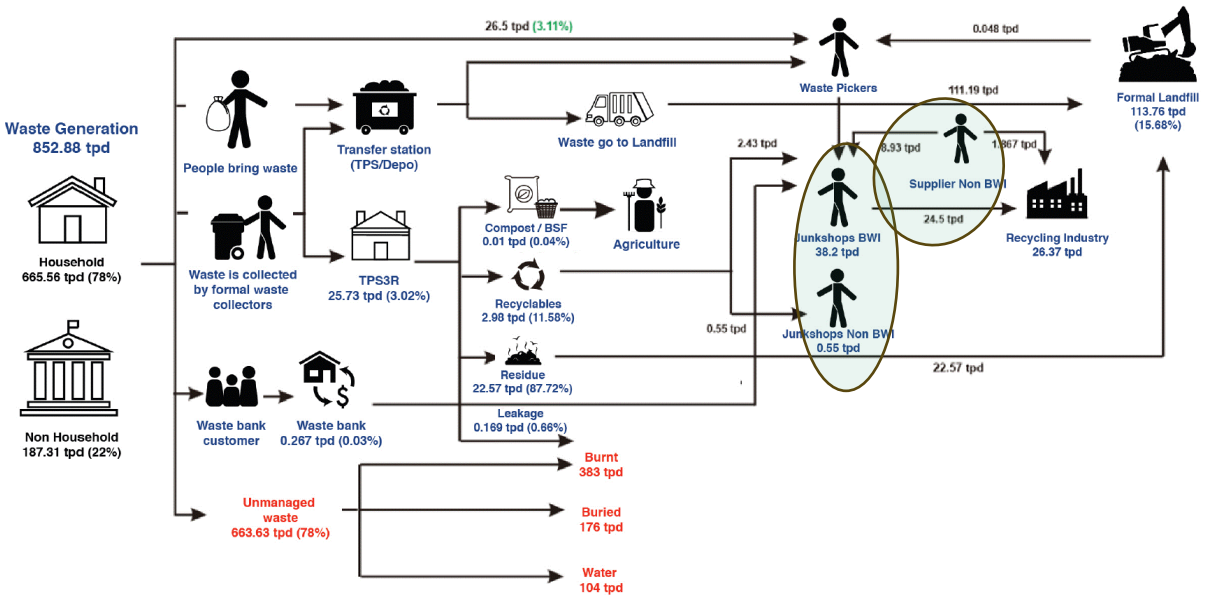


Figure 14. Position of the junkshops highlighted in the mass balance

The bigger junkshops can store their products and wait to sell it in bigger bulk, which also adds to the value.

The interviews brought some interesting facts to light. Regarding the buying of the material, one of the junkshops states that most of the time he pays the waste sellers directly after weighing the plastics, however if the salesperson is a long-standing relation, they sometimes pay in advance and deducts the price of the “loan”.

One of the interviewed junkshops receives plastics from Bali on a regular basis varying from one to three truck loads a week. The minimum wage in Bali is high compared to Banyuwangi, which makes it more difficult for a junkshop in Bali to make a profit as the profit margins are very low. Additionally,

junkshops in Banyuwangi can profit from the offered plastic as their off-taker hub is located nearby in Surabaya.

In the interviews it became clear that the junkshops also mostly deliver to the same companies as, although there are no fixed contracts, the network and regular clients are there.
There seems to be little to no environmental awareness within the junkshops, although one stated that they know that the wastewater from their equipment should be filtered, but as there is no governmental supervision on this, they do not know what the environmental standards are.

Photo 7. Big junkshop, with storage of compacted plastics

Photo 8. Plastic flakes

5.4.1. Junkshop – Social enterprise an example: Start up: Buang Disini

Buang Disini[20] is located in East Java, an area west of Banyuwangi Regency. It identifies itself as a social enterprise and is dedicated to connecting the informal sector with manufacturers.

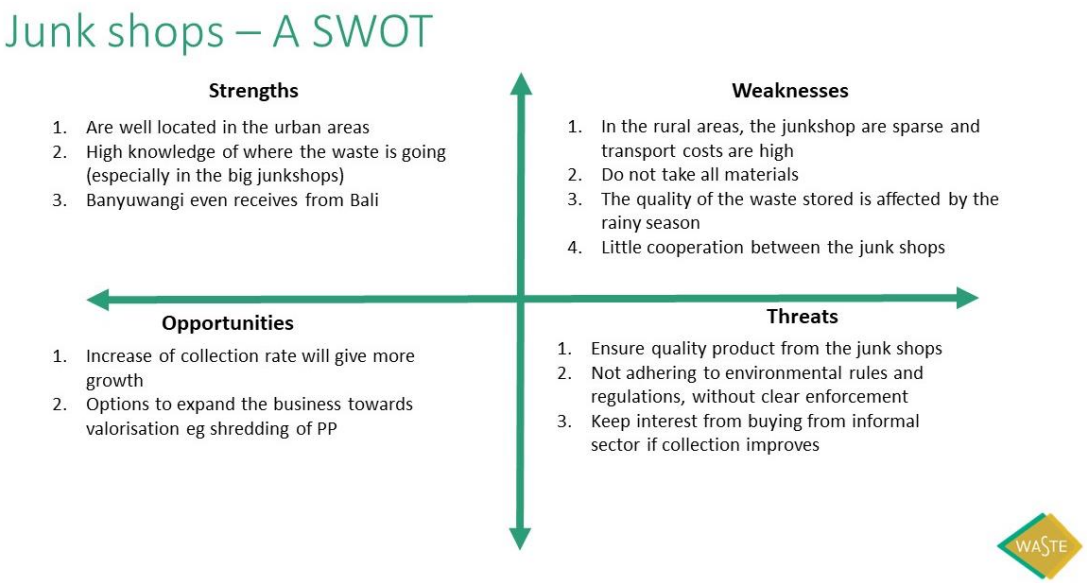
In practice, they function as a junkshop by using an advanced app on a smart phone for the buying and selling of the sorted materials. In addition, the business supports the informal sector by offering business loans for improvement of their enterprises.

The higher price they can offer the waste pickers is based on the fact that they pool the waste pickers, improve sorting by the waste pickers and most importantly they make use of carbon and plastic credits funded by some donors.

5.4.2. SWOT junkshops

The SWOT of the junkshops and the SWOT of the informal sector are interesting because both include businesses where IKEA SE could intervene without direct approval from the Banyuwangi Regency. At the same time, improving of the junkshops and stimulating the informal sector can help the Regency achieve the goals they have set for their ISWM plan. The junkshops show an interest in growing and have the capacity to do so. What support is needed for this needs to be further investigated.

[20] Buang Disini link: https://buangdisini.com/



5.5. NGO

Non-governmental organisations (NGOs) are set up as not-for-profit and operate independently of any government, typically they are a group institution with a social mission. The actual activity of an NGO can vary. This section will discuss Emvitrust and the Indonesian Solid Waste Association (InSWA) who are both NGOs but carry out very different activities.

5.5.1. Emvitrust – Ecoranger

An NGO that actively works in SWM is difficult to place in the list of stakeholders. This is because they are usually funded by a donor and environmental ideas are often the reason for their existence, instead of being driven by profit, resulting in their work being project based. As such they can be unfair competition with the businesses working in the same niche. This is also the case with Emvitrust-Ecoranger, which is active in the coastal area of Banyuwangi Regency, Pulau Merah and one of their waste collectors was also interviewed by the research team. Emvitrust is funded by the Coca Cola Foundation[21] and Greeneration Foundation[22].

Emvitrust's goal is to empower communities to handle waste properly and independently. This is put into action by providing waste collection to 300 households and several hotels and conducting waste sorting and organic waste processing using the black soldier fly and a biodigester. The sorted valuable waste is then sold to junkshops while the low-value plastics is melted and moulded into eco-bricks. Despite all these activities Emvitrust has trouble making a profit. Scaling up and becoming independent from the funding from donors proves to be complicated as the market for the products they make from the recovered waste is not evident.

Awareness raising within the community is another pillar of their activities, and they actively try to involve the local government more in lobbying for the implementation of Extended Producer Responsibility (EPR).

It is difficult to make a SWOT analysis for a stakeholder like this. Their role is to do tests of possibilities, but at the same time they compete with the private sector and make a living from the waste collection

[21] Coca Cola Foundation link: https://www.coca-colacompany.com/social/coca-cola-foundation

[22] Greeneration Foundation link: https://greeneration.org/en/

and selling of their products. It will be interesting to see if the pilots they run, have enough potential to upscale and start businesses with.

Photo 9. Emvitrust: Area for waste separation and sorting to sell to the next part of the chain

5.5.2. InSWA

InSWA[23] is an NGO which is not part of the actual waste chain in Banyuwangi but does play a crucial role in the future of the SWM system in Banyuwangi. This is due to them being the executing partner of the CLOCC project for which they were responsible for the solid waste assessment of the Banyuwangi Regency and involved in developing the ISWM plan for the Regency as facilitator.

InSWA is a key figure in the planned changes in the SWM sector of Banyuwangi Regency, supporting the local government in the plans and involving the stakeholders within the waste chain. InSWA states that they want to work towards improving the whole waste chain. The linkages in the chain should be strengthened and expanded. Some principles from the ISWM, such as inclusivity and equity for everyone, imply that the informal sector will become an official part of the chain and all citizens will receive collection service one way or another. A consequence of the planned inclusivity can be that the TPS3R has to accept waste from the informal sector, giving both the opportunity to increase the recovery and recycling rate.

Regarding the recycling industry, InSWA also sees opportunities to expand the businesses by encouraging the buying of waste from Bali, knowing that the island has a good collection service on the island, but little waste treatment can be found. This opportunity can help the businesses in the Banyuwangi Regency by augmenting the amount of plastic waste that they can valorise and make ready for the recycling businesses.

One of the spearheads of the plans within InSWA is working with the various stakeholders locally and trying to become independent from national players. A platform to make this possible has been set up. Linking the stakeholders in the area to encourage working together. National support to get the ISWM plan implemented is realised through the participation of various associations such as:

- Indonesian Recycling Industry Association (ADUPI)
- Indonesia Waste Picker Association (IPI)

[23] INSWA: www.inswa.or.in

- PISCES, a hub set up by Brunel University (UK) that have a goal to increase the recycling rate and value chain of plastics at the village level (link: https://www.piscespartnership.org/)

With these associations, InSWA expects to realise the improvement of the SWM chain and work towards a circular economy.

As an important player in the whole SWM plan of Banyuwangi Regency a SWOT for InSWA is not relevant. It is, however, important to have InSWA on board when looking at possible interventions in the region, especially if the intervention not only concerns businesses but the overall waste management system with all the stakeholders.

5.6. Recycling businesses

The CLOCC solid waste assessment counts 20 recycling businesses in the Banyuwangi Regency. All small scale, and often working in the valorisation, varying from compacting to shredding and in some cases pelletizing of various types of plastics. Bigger businesses can be found primarily in Surabaya or Malang, but also in the other bigger cities of East Java.

The research team did not manage to make appointments for interviewing the recycling businesses, this will be interesting to take up in phase 2.

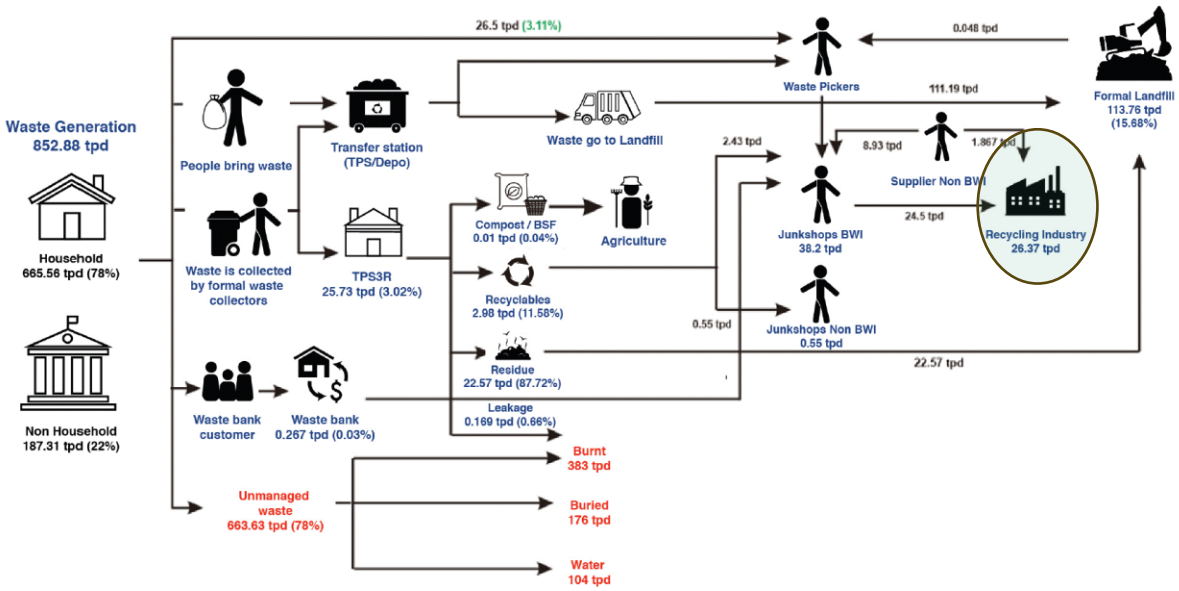


Figure 15. Position of recycling businesses highlighted in blue in the mass balance

Most of the recovered plastics from Banyuwangi Regency go to Surabaya, where they are either bought and used by recycling companies or, for PET there are two PET recycling companies in East Java (Pasuruan and Jombang). PET might also find its way abroad to China or India, who are big buyers of this type of plastic. This should be taken up in the next phase as well.

As mentioned previously, it proved difficult to organise appointments with the big recycling businesses, this may be due to the mapping stage being too early to catch their interest. However, some observations have been offered by Instellar and Waste4Change, two companies in Jakarta who deal with the businesses. In addition, two start-ups in Java, also gave input.

The information gathered here does not have a direct relationship with the Banyuwangi Regency, but we assume that for businesses the situation will not differ very much. The information on the larger and already established plastic producers is really missing and needs some more investigation.

5.6.1. Waste4Change

Waste4Change, Jakarta, can be categorised as a social enterprise. They already work for, and with IKEA Indonesia, working on children's education around waste, and have a contract to collect the waste from their stores. The company is active in collection, sorting, washing and baling, resulting in them being directly active in the service and value chain of the SWM. In addition, they do research, give awareness training and work as a waste management consultancy for businesses and experts on EPR.

While they state that the Waste4Change business model is currently sustainable, it is clear that additional fundraising is needed to keep their business running and implement pilot projects. Being a waste collector for profit, their main clients are businesses and high-income households (the most interesting clients as they can pay for the service and business waste in big quantities). The owner of Waste4Change also mentioned that they were trying to add lower-income households to their service area, but this has proven to be financially unsustainable and needs support from the government within the solid waste management planning.

5.6.2. Social enterprise: Duitin

Duitin is a young company in Jakarta that has received business support from the Instellar programme. It is a company that is not directly in the waste chain itself but aims to improve the waste chain with the help of a mobile waste recycling application. In this case, the opportunities start with the households, who contact the IWB by smartphone when they have materials they want to sell. The IWB can optimise their route for buying materials and do the sorting at home before bringing it to the junkshops.

Duitin also has several pilots that are linked with SWM and, as a result, have introduced containers that can be reused for household detergents.
There is also a pilot project on waste collection by bicycle and using their app they have set up a collection system for used diapers.

Duitin hopes to support the IWBs and waste pickers and is planning to set up a Material Recovery Facility (MRF) and expand their activities in other geographical areas. Still, becoming profitable proves to be difficult and consolidating the contacts with the informal sector is complicated as Duitin is also seen as competitor.

5.6.3. Conditions for recycling businesses

A proper SWOT cannot be made for the recycling businesses as most of the collected information was indirect, via the interviews with the other stakeholders. However, based on the researchers' knowledge of the plastic sector, the following list of prerequisites for recycled plastics can be seen as standard.
For a recycling business to be interested in buying used and valorised plastics in the form of crumbs or flake the following conditions apply:

- The used plastics need to be of good quality meaning:
  - Well sorted on type, colour and generation
  - Clean and dry

    - Flakes and granules all of the same size and well defined shape
- There must be a constant supply available
- It is preferably cheaper than the virgin plastics.

The market for end products isn't significantly impacted by using recycled plastics in the manufacturing process. Products can match the quality of those made solely from virgin plastics.

6. Findings and options for interventions

This chapter offers the most relevant findings from the research team related to the solid and plastic waste sector in Indonesia and related to social businesses within this sector. Based on these findings, possible options for engagement are described, based on the existing programmes within WASTE, such as FINILOOP and TAS and other technical assistance WASTE offers towards accelerator programmes, supply chain management and value chain analyses.

6.1. Findings

The following section summarises the most relevant findings in relation to the SWM system in Banyuwangi Regency which we can assume is valid for many more areas in Indonesia, especially the larger islands that have industry and urbanised areas. We dare to make this assumption as the solid waste assessment of Banyuwangi shows little discrepancy from the national statistic figures. Still for every region it is recommended to analyse the solid waste management sector on a local level.

The findings are grouped alongside the governance of SWM and PWM, the lack of data and transparency in the sector, the needs for social enterprises to work in the existing system and opportunities for the recycling industry.

6.1.1. SWM and PWM governance

The legislation on national level gives clear guidance towards reduction of waste in general with an emphasis on plastic waste. To be able to set up a better working solid waste management system, the local government needs more support. Lacking is the capacity within the environmental agency who have this role, appropriate infrastructure and finance to follow up policy and plans.

EPR is mentioned in the various national policies e.g. Ministry of Environment and Forestry Regulation 75/2019, these state that producers have to reduce up to 30% of all types of waste by 2029, not only plastics. EPR initiatives have not been found in Banyuwangi Regency itself, but looking at EPR activities on Bali it is clear that such initiatives need to be looked into carefully. Reports show that using EPR does not automatically improve the recycling rates. It is important to ensure that the system installed benefits the whole chain and does not stay higher up in the chain, as seems to happen in most cases. To ensure this, capable implementation, transparency and follow up is essential to ensure that the informal sector can contribute towards increasing recycling targets.[24]

Another challenge identified in the national SWM governance is that the informal sector is not recognised and therefore has little opportunity to be integrated in formal SWM systems. To be able to be inclusive regarding the informal sector is it necessary for the government to recognise and acknowledge the role of the informal sector in the solid waste sector. Then the government needs to be able to enable this by enforcing the correct and inclusive implementation of the EPR. If this necessary enabling environment is not present it is complicated to start and improve social enterprises within the SWM and PWM system in Indonesia.

6.1.2. SWM and PWM data and data usage/lack of traceability and transparency

While in Banyuwangi Regency the research team has been able to lean heavily on the solid waste assessment of the CLOCC project, such data are rarely available in most areas in Indonesia. Knowing

[24] Gaia, Break Free from Plastics, 2023, Smoke and Mirrors The Realities of Plastic Credits and Offsetting Link: https://www.breakfreefromplastic.org/smoke-and-mirrors/

about the quantities of generated waste and the waste flow is essential when looking into improvement of this sector. Quantities and types of solid waste generated are vital to decide upon interventions. Additionally, specific data for businesses such as calculating whether a business can be viable needs knowledge of the plastic industry, the market and the incurring costs for transport and the like. Lack of data on plastic waste also makes it difficult to track and trace the waste to ensure fair supply to the recycling industry and finally the brand owners.

6.1.3. Social enterprises need parallel enabling environment support

Social enterprises often are set up by entrepreneurs who are new in the SWM sector, thus lacking linkages with the other actors. The sector especially the informal sector tends to be wary of newcomers and perceive them as competition, this was also mentioned in the interview with the social enterprise Duitin. Building up a relationship with the informal sector, being IWBs, waste pickers or small junk shop needs time and patience. Ideas to improve collection and collection methods often result in taking over part of the clients of the existing actors, thus pushing them out of work and marginalise them even more. The support of social enterprises without parallel ecosystem support or strengthening the enabling environment has significant risks of failing. On the other hand, social entrepreneurs are generally motivated people who can be valuable in pilot projects as, for example, they often experiment with new techniques and use low value recyclables.

6.1.4. Recycling industry/more options for low grade plastics needed

The recycling industry in Indonesia provides income to millions of people but is heavily dependent on a mostly informal supply chain. For plastics the value chains of PET and other hard plastics are well developed. The IWBs and waste pickers currently only pick the most profitable plastics, such as PET and PP. For other plastics such as low grade or multi layered there is no market at all. The low value of the waste fraction means that it either ends up at the disposal site, but more probably ends up in the environment, continuing to contribute to the ocean plastic pollution.

It would be worthwhile and interesting to work towards new products using low grade plastics. This will really contribute toward reduction of plastic waste ending up in the environment. This needs research and piloting, looking for products that can be used locally as the profit margins are expected to be very low. Some options would be to look into plastic beams for construction purposes, or buoys for the fishing boats.

6.2. Opportunities for engagement

Considering that the whole plastic waste value chain needs to be improved to ensure a better recovery of recyclables and to ensure inclusive, transparent and circular supply chains on the long run, we recommend starting with a FINILOOP programme or consider working with similar programmes. FINILOOP is a WASTE programme that executes specific actions to develop the enabling environment for enterprises in the plastic waste sector and to support them to start, professionalize and scale.

Next to supporting a FINILOOP programme, IKEA SEs interventions can support supply chain programmes or accelerator programmes such as Interstellar in which WASTE can provide specific technical assistance on solid and plastic waste. These three options will be described in the following sections.

6.2.1. FINILOOP

FINILOOP - **F**inancial **In**clusion and **I**mproved **L**ivelihoods **O**ut **o**f **P**lastics, strives to support more inclusive and circular waste management processes to increase the recovery rate and reduce the

leakage of plastics. In addition, it explores options to link informal and formal waste management more strategically as part of a circular economy approach. It uses the ISWM approach when looking at the SWM system in cities and the Diamond[25] multi-stakeholder approach in the implementation of the programme.
In general, FINILOOP's objectives are:

- Contribute to the improvement of sustainable waste management systems
- Improve livelihoods of informal waste workers
- Professionalise and scale the plastic waste management sector
- Create cleaner communities through awareness raising and behaviour change

Currently, the FINILOOP project is active in India only. However, the aim is to extend to other countries and scale up this initiative, linking cities to exchange experiences in their combat against plastic pollution.

The first year of FINILOOP activities in India established a robust foundation for sustainable solid and plastic waste management systems. It showed the importance of building trust and confidence, especially within the informal waste worker community and to mobilise all actors in the plastic waste value chain. One component focuses on the establishment and growth of startups in the specific cities together with working on the enabling environment they need in these cities. For Indonesia, based on the experience of FINILOOP in India, we would recommend the following FINILOOP components tailored to the actual situation after a thorough assessment of the selected cities:

Component 1: Local government support in (plastic) waste collection and sorting leading to more diverted plastic waste.

- Identifying the support niches within Banyuwangi ISWM plan for IKEA SE involvement which probably means a focus on informal business support.
- Evaluate and consider merging or streamlining Waste Banks, and TPS3R concepts and practices, as despite their potential, few functions according to expectation. Functioning of these facilities is necessary to get hold of the recyclables. Government involvement in this discussion will be crucial as they are responsible of these facilities.
- Clarity (possibly synergy or merging) between the private (informal) actors (waste pickers, junkshops, Waste Banks) and formal actors (collectors, TPSs, TPS3R, landfill), for each to know their role and responsibility.
- In order to benefit from the work done by the informal sector, recognizing and facilitating its role are crucial in any ISWM plan.

Component 2: Informal sector support leading to improved livelihoods of informal sector workers.

- Simple interventions, such as finance for improved equipment, roofing, and other immediate needs. In former projects, like CLOCC, waste pickers could immediately improve their income and position through these relatively small support gestures. This financial support could be further developed into more formalized loan programmes by MFIs.
- Organisation of informal entrepreneurs in 'associations' that can offer/facilitate:
    - Health checks and insurance. The programme can also provide preventive health measurements, information about professional health hazards and child labor issues.
    - Leasing more expensive equipment and vehicles, as lending may put an informal waste worker in vulnerable situation.
    - Access to microfinance institutions (MFIs), if needed, through providing guarantees.
    - Basic business and market training (by Instellar/WASTE).

[25] Diamond approach: https://www.waste.nl/approach/

- Waste price stabilisation funding. Such a fund would allow individual participants to save when income from sales is good and retrieve during times when waste market prices are low.

Component 3: Private sector support and access to finance leading to a higher recycling rates.

- Evaluate and consider merging or streamlining bigger junkshops.
- Further evaluate existing recycling businesses and analyse needs for support and capacity building.
- Access to micro-finance institutions (MFIs) with government support/guarantee.
- Advice should focus on developing a business model for the facilities. This may mean rationalizing based on the location and size of the facilities will be necessary.
- Reaching out to local banks and MFIs to discuss the options and conditions for lending to (informal) waste entrepreneurs.
- Establish an accelerator programme targeted at the gaps in the PWM system, for example to recycle low grade plastics into products.

Component 4: Community support leading to cleaner communities and households practicing separation at source.

- Awareness creation about separation at source and cleanup events with community involvement.

The above 4 components together can ensure the reaching of the 4 objectives of FINILOOP. Only working on, for instance, component 3 without component 1 will result in enterprises with a lot of capacity, but no increased recyclables available.

6.2.2. Supply chain management programmes

Another option for engagement of IKEA SE would be to start a supply chain management programme within their plastic waste procurement of IKEA Supply. Supply chain management programmes are needed to improve the functioning of the recycling sector and to address the most pressing social and environmental issues. At the same time transparency and traceability need to be secured by implementing the right certification mechanisms.

Such a programme will address issues by providing trainings to waste pickers, provide access to health and safety, the development of a Code of Conducts for the involved companies (junkshops), improving the level of cooperation amongst waste pickers, legalizing the work of waste pickers, and other customized interventions. The programme will also strengthen the reputation in the sector and towards the general public and end-customer. Verified transparency is key which can be achieved by involving experienced partners such as Waste2Wear[26] which have done similar programmes in Vietnam.

WASTE together with Aidenvironment were contracted by FMO to design and implement a supply chain CSR programme for the PET recycling branch of Namasindo PLAS in Indonesia in 2020. See annex 4 for a factsheet on this project.

6.2.3. Support accelerator programmes

IKEA SE funded programmes in Indonesia support accelerator programmes such as the Interstellar accelerator. This is a two-year accelerator programme to improve the lives of marginalised and excluded people in Indonesia by strengthening the work of 10 social enterprises and supporting them

[26] Waste2Wear: https://waste2wear.com/verified-transparency/

with their business scale-up plans. Instellar's knowledge of solid waste is limited, but with their support to the start-ups they have some interesting insights that we would like to mention here.

- The start-ups are rarely linked to the existing waste system, causing difficulties in finding clients, or they are seen as competition.
- There is a definite interest with start-ups to work in the environmental/solid waste sector.
- One problem for the start-ups is getting well-sorted waste from the generators, i.e., the households.
- To facilitate start-ups, there should be more blended finance opportunities
- Many start-ups are in the pilot phase, functioning more as incubators, for instance looking for solutions for plastic waste.

Supporting accelerators programmes that target plastic waste need an ecosystem support in parallel, targeting the whole plastic value chain sector and its stakeholders in order to come to a sustainable change and a successful bussiness. Programmes such as FINILOOP foresee in this.

7. Options for Phase 2

This report is the result of a quick mapping of East Java, with focus on the Banyuwangi Regency. This was set up as Phase 1 of a 2-step research. Based on this outcome and the decision of the validation meeting that will take place; a decision will be made for phase 2.

Phase 1 has looked mainly at the existing solid waste management system of an area and the stakeholders in the system, especially the businesses, formal and informal, that work in the valorisation of the plastic waste. The actual businesses that buy the valorised plastics have not been interviewed yet. The second phase will have to focus on these industries and a further follow up with more in-depth research and analysis for the design and development of a (social) entrepreneurship support programme, varying from training, coaching and facilitation to access to finance (including a potential role for TAS or FINILOOP).

The research shows the importance of the informal sector (IWBs and waste pickers and smaller junkshops who jointly are responsible for 12% (5,694 tonnes per year) of the generated plastic waste coming out of the waste stream. The municipal waste collection is responsible for 17% (17.31 TPY), see Figure 8 for more details.

Improving the working capacity of these small businesses can result in even more plastics being recycled and less plastics ending up in the environment. The importance of the informal sector in the plastic waste sector also makes it important to take them into account when working with social enterprises that wish to work in the plastic waste sector. Phase 2 can look more in detail which actions can take place to support the improvement of the informal sector.

The additional research in phase 2 will:

1. Suggest potential interventions concerning initiatives and the needed enabling environment, such as:
   - Cooperation with existing plastics recycling initiatives.
   - Support to MSMEs.
   - Investments in more mature social enterprises (like Take-a-Stake).
   - Systems changing interventions.
2. Identify how IKEA SE can support waste entrepreneurs and SMEs in the sector as part of the Instellar accelerator.
3. Depending on the findings and in consultations with the relevant IKEA business organisations it may also include an Assessment of how IKEA could reuse the local (plastic) waste or other identified recycled materials in its supply chain.

Proposed methodology in the context of field visits

1. Additional visits to private sector stakeholders accompanied by local facilitators who have a relationship with those enterprises - to understand their business models and identify potential areas where they would like to see an increase or development of demand for certain materials, potential IKEA SE and WASTE activities, and opportunities for engagement/partnerships, (5-10 Focus Group Discussions).
2. Additional consultations with the waste pickers, ensuring, a more elaborate insight in their opportunities and needs.
3. Additional interviews with SWM officials of the Banyuwangy regency authorities and Banyuwangi communities to expand the understanding of the challenges, barriers and opportunities in improved SWM and plastic waste recycling (3-5 FGDs). Find synergy.

4. Preliminary contacts of and organisations such as InSWA who are working on plans and implementation of the Integrated Sustainable Waste Management in the region.
5. Final assessment report focused on IKEA SE programming recommendations.

Based on the two phases of this research, IKEA SE will be able to develop a set of criteria for social entrepreneurs who want to set up their business around plastic waste in such a way that:

- The whole existing SWM system can improve.
- The informal sector is not excluded.
- The plastic value chain improves and becomes more consistent, bot in quality as in quantity.
- The low value plastics are included in the value chain thus not end up in the environment.

ANNEX 1 OVERVIEW OF POLICIES ON SWM

Overview of existing and planned policies on SWM

Regulation	Title
Act 18/2008	Solid waste management
Government Regulation 81/2012	Household and household-like waste management
Presidential Decree 97/2017	National policy strategy for solid waste management (household and household-like waste)
Presidential Decree 83/2018	National action plan to combat marine debris 2018-2025
Presidential Decree 18/2020	National mid-term development plan 2020-2024
Ministry of Environment and Forestry Regulation 10/2018	Guidelines for regional policy strategy for SWM (household and household-like waste management)
Ministry of Environment and Forestry Regulation 75/2019	Waste reduction roadmap by producer 2020-2029 à EPR
Ministry of Environment and Forestry Regulation 14/2021	Waste management through Waste Bank

The regulations listed in the table above include all regulations available within the national and provincial level regarding waste management. The following section provide a brief explanation of the different acts and decrees relevant to waste management in Indonesia. There is, no new waste management policy approval in progress at the moment.

Act 18/2008 – Solid Waste Management

Undang-Undang (UU) Republik Indonesia or Act number 18/2008, primarily regulates the national waste management activities, which consist of waste reduction and waste handling. The activities scope includes household waste, industrial waste, commercial waste, public facility waste, other facility waste and specific waste.

The goal of this regulation is for residential, commercial, and industrial areas along with public and social facility to fulfil a requirement of having a waste sorting facility by 2009. It is also stated that incentives will be given to producers that use biodegradable materials for waste reduction.

This regulation also regulates non-technical aspect related to waste management activities, such as roles and responsibilities of local government, permits for waste management activities/businesses, financing and compensation, and partnerships. For financial aspect, all government levels, from central to local, should contribute financing the sector.

This also includes EPR as can be read in in article 15 of the law, it is stated that manufacturers are responsible for the disposal of packaging and products that are difficult or impossible to compost.

This regulation is further continued with Government Regulation (Peraturan Pemerintah) 81/2012 on household waste management and Presidential Decree (Peraturan Presiden) 27/2020 on managing specific types of waste.

Government Regulation 81/2012 – Household and Household-like Waste Management

Peraturan Pemerintah (PP) or Government Regulation number 81/2012 regulates household waste and household-like waste's management, as a derivative regulation of Act 18/2008.

This regulation is considered a strategic policy for waste reduction and handling target in a certain time period. Regional governments are required to develop a 10-year masterplan that includes waste reduction, recycling, reuse, sorting, collection, transportation, treatment, final disposal, and funding/finance. The acknowledged waste treatment methods under this regulation includes waste compaction, composting, material recovery and waste-to-energy.

Presidential Decree 97/2017 – National Policy Strategy for SWM or Jakstranas

Presidential Decree 97/2017 was published to provide national policy strategy for solid waste management, which includes waste reduction and waste handling. This regulation has a national target to reduce solid waste by 30% and increase collection rate to 70% by 2025. To achieve those targets, this regulation provides national strategic, such as:

- Standard Operating Procedure development to reduce waste
- Increasing coordination between central and regional/local government
- Budget providence to support the programme
- Increasing capacity (resources)
- Database development
- Community involvement
- Implementation and development of the incentive and disincentive programme
- Implementing Corporate Social Responsibility (CSRs)
- Implementation and development of investment, operational and maintenance scheme
- Technology and legal implementation

Presidential Decree 83/2018 – National Action Plan to Combat Marine Debris 2018-2025

Presidential Decree 83/2018 was published by the Acting President to regulate marine debris management. One of the set targets of this regulation is to reduce plastic waste entering the ocean up to 70% by 2025 (including from land-based sources). The following programmes are implemented to help achieve the set target:

- National movement to raise stakeholders' awareness
    - Design and implementation of a Comprehensive National Marine Debris Monitoring Framework
    - Roll out a National Public Awareness and Household Behavioural Change Campaign
- Waste management from land, waste management in coastal and sea
    - Investment necessary to develop green port
    - Enforcement of International Convention for the Prevention of Pollution from Ships 73/78 at all Indonesian ports
    - Collaboration with Ministry of Marine Affairs and Fisheries to address ghost nets and discarded fishing gear
- Reduce accumulated coastal and marine pollution
    - Assessment and promotion of relevant and cost-effective technologies to properly remove and dispose coastal and marine debris
    - Education campaigns on HSE impact of marine debris
- Reduce plastic production and usage

    - Private sector engagement and responsibility in addressing marine debris challenges (cradle to cradle approach)
- Financing mechanism
- Strengthening institution, law enforcement, research and development

The implementation of this national action plan is led by the Coordinating Ministry of Maritime Affairs and Investment (Kemenko Marves) but is led by the Ministry of Environment and Forestry (KLHK) for the day-to-day operations. This national action plan is expected to achieve the best outcome when integrated with the Midterm Regional Development Plan (RPJMD).

Other ministries that are involved in this action plan includes Ministry of Industry, Ministry of Marine Affairs and Fisheries, Ministry of Communication and Information, Ministry of Education and Culture, Ministry of Public Works and Housing, Ministry of Finance, Ministry of Transportation, Ministry of Tourism, National Development Planning Agency, Ministry of Health, Ministry of Research and Technology, Coast Guards, Ministry of Home Affairs, and Ministry of Foreign Affairs
Presidential Decree 18/2020 is a national mid-term development plan (RPJMN) for 2020-2024. This regulation targets the waste reduction by 20% and waste collection rate increase to 80% by 2024. The difference between this regulation with Presidential Decree 97/2017 is the scope of solid waste reduced and handled. In this regulation, the scope is merely urban area of city/regency. In this regulation, it is also stated that waste management is included as basic services and one of the minimum service standards. Therefore, waste management is important to be provided.

The RPJMN 2020-2024 identifies some relevant issues, which explains as follows:

- The low application of the principle of waste reduction
- Limited waste reduction infrastructure, such as Integrated Waste Management Sites (TPST) and Reuse, Reduce, Recycle Waste Management Sites (TPS 3R)
- Lack of waste trucks and geographical challenges in cities
- The budget allocation remains limited
- The institutional function of regulators and basic service operators in the regions is still limited in both quantity and capacity
- Lack of integration of inter-sectoral planning

To achieve the determined targets and tackle those relevant issues, there are some policies and directions mentioned in the RPJMN 2020-2024, which are presented as follows:

- Increasing institutional capacity
- Increasing the commitment of regional leaders
- Developing infrastructure and services based on local characteristics and needs
- Encouraging behaviour change of the people
- Developing cooperation and funding

Ministry of Environment and Forestry Regulation 10/2018

This regulation is a derivative regulation of Presidential Decree 97/2017 to provide technical guidelines for local government in planning and implementing regional policy strategy for solid waste management. The local government have to provide the regional policy strategy and report it once a year. This regulation provides stages of strategic policy development, which includes:

- Identify the potential of waste generation
- Data collection, mainly on volume of waste that is reduced, processed by Waste Bank, recycling centre/facilities, and treatment facilities, and processed at final disposal)
- Calculate the mass balance
- Determine strategy and target of waste reduction and handling

This regulation has also encouraged to strengthen the commitment of executive and legislative in providing the budget, conduct public participation, building a commitment with businesses in implementing producer responsibility in order to reduce waste, and develop information system.

Ministry of Environment and Forestry Regulation 75/2019

This regulation is a roadmap for waste reduction by producer in 2020-2029, via EPR system Producers have to reduce waste up to 30% by 2029, as their responsibility to their product. Type of waste reduced are product or packaging, which contains plastic, paper, can, and glass. Besides, for specific plastic waste, such as straw, Styrofoam, and single-used plastics will be prohibited to use per 1 January 2030.

The producers that should contribute to the waste reduction are consumer goods, personal care and F&B (Food and Beverages) industry, restaurant, cafe, hotel, retail, shopping centre, modern retail, and public market. They must provide drop-point for take-back system and can cooperate with registered Waste Bank, recycling centre or TPS 3R (transfer station with 3R activities).

Ministry of Environment and Forestry Regulation 14/2021

This regulation regulates waste management through Waste Bank. There are two types of Waste Bank stated in this regulation, which are unit Waste Bank (in village/sub-district level) and central Waste Bank (in city/regency level). This regulation also mentions about the partnership between Waste Bank operator with related stakeholders, such as recycling businesses/facilities/centres and producers. Local government facilitates the partnership between Waste Bank and recycling businesses/facilities/centres or producers by:

- Ensuring the marketing of sorted waste to recycling businesses/facilities
- Ensuring the sorted waste availability
- Ensuring the promising price

Besides, this regulation also states about the incentive mechanism, which can be implemented through awards, good performance publication, financial support, or training provision.

ANNEX 2 LIST AND CALENDAR OF INTERVIEWEES

List of interviewees in Banyuwangy Regency
Period 21 May 2023 – 29 May 200232

INTERVIEWEE	DATE	LOCATION
Waste Pickers	21 May 2023	Karangbendo Landfill, Rogojampi District, Banyuwangi Regency
Itinerant Waste Buyers	21 May 2023 23 May 2023	Banyuwangi Regency: • Wringinputih Village, Muncar District • Tamansari Village, Licin District • Kebondalem Village, Bangorejo District
Small Junkshops	21 May 2023	Banyuwangi Regency: • Bakungan Village, Glagah District • Kampung Ujung, Kepatihan Urban Village, Banyuwangi District
Big Junkshops	22 May 2023	Banyuwangi Regency: • Pancoran Kulon Urban Village -Rogojampi District • Pengantigan Urban Village - Rogojampi District
Waste Banks	22 May 2023	Central Waste Bank Banyuwangi and Dara Aisah Unit Waste Bank
Environmental Agency of Banyuwangi Regency	22 May 2023	Central Waste Bank Banyuwangi
Outside Banyuwangi Regency		
NGO – Emvitrust	23 May 2023	Waste Management Center - Pancer Sub-Village, Sumberagung Village, Pesanggaran District
Instellar	24 May 2023	Instellar Office Jakarta
InSWA – Indonesia Solid Waste Association	19 May 2023	Online – Ms. Teams
IPI – Indonesian Waste Pickers Association	25 May 2023	Online – Google Meet
Company – Duitin	25 May 2023	Online – Google Meet
Company – BuangDisini	26 May 2023	Online – Google Meet
Company – Waste4Change	29 May 2023	Online – Ms. Teams

ANNEX 3 QUESTIONNAIRE

Following is an overview of the questions asked to the stakeholders in Banyuwangi Regency. Depending on the role of the stakeholders in the waste management system the questions were posed differently.

1. Data collection questions
    a. Date of interview
    b. Location of interview
    c. Name, role, and contact info
2. General questions
    a. How much waste collected per day (kg/day) – average, max, min?
    b. When do you collect the waste most/least?
    c. What type of waste is collected the most? Is plastic waste collected the most? What types of plastic waste do you collect? What type of plastic waste is collected the most?
    d. Can you describe what is the recycling chain?
    e. Where do you sell the collected waste? Who do you sell the collected waste to?
    f. Do you know where that waste goes after you sell it (who are the bigger buyers/offtakers)?
    g. How do they pay you (how is the payment mechanism)?
    h. What do you think works and does not work in the recycling industries? Especially in the plastic waste sector
    i. What are the requirements of waste accepted by the offtakers?
    j. Is there any type of plastic that offtakers do not accept?
    k. What is the most profitable or most positive impact for you from conducting this activity (collecting waste)?
    l. May we know of your daily/periodic income? Or how what are the current prices per kg?
3. Waste pickers specific questions
    a. When do you start and finish collecting waste?
    b. Do you have any agreements with the some households?
    c. How do you determine which offtaker to sell to? Are there specific agreements made prior?
    d. Are you going always to the same buyers?
    e. How do you get the waste?
    f. Do you use any transport mechanisim? (bike, motorbike, etc)
4. Informal recyclers specific questions
    a. What do your operational hours look like?
    b. Where do you receive your supplies from?
    c. How many suppliers are there?
    d. How much can you earn (day/month/etc)?
    e. Approximately what is the buying and selling price? (how much do you have as a profit?)
    f. Where is the waste ending? Which type of fabrics?
    g. Is there any variation depending on the season?
    h. Which kind of material do you receive the most?
    i. What kind of state is it?
5. Waste banks specific questions
    a. Where do you receive your supplies from?
    b. How integrated are you into the formal sector?
    c. What are your general profit margin rate?

d. Is there any network with the others waste banks to exchange the data obtained?

Proposed interviewees for the above questions

a. Waste pickers
b. Small junkshops
c. Big junkshops
d. Waste banks
e. TPS & TPS3R
f. Governmental

Open interviews: Governmental stakeholders & NGOS

- Situation of solid waste management sector Banyuwangi
- Special interest on informal sector. Importance
- Key points of their plan (direction) /
- Obstacles in the plan what needs to be overcome? (institutional / financial /other aspects)
- Role of social enterprises?
- How they see the waste flow in particular the plastic flow. Strong points /weak points
- Opportunities to grow
- Business viability or need for additional money.

ANNEX 4 FACTSHEET NAMASINDO PROJECT

Recycling used plastic bottles improves the lives of waste pickers in Bali

By: Sophie van den Berg (WASTE), Novita Aisyah Malik (NAMASINDO Plas, Indonesia), Annemieke Beekmans (AIDENVIRONMENT)

When you think of Bali, you think of mystic places, beautiful rice terraces, white beaches and people adoring their Gods in typical Balinese temples. You don't think of plastic waste littered alongside the roads and migrants from Java making a living from picking and selling waste. Still, this is also the reality of Bali. The increased tourism on Bali has resulted in an increase of amounts of plastic waste generated on this beautiful island. And whether the used plastic water bottles are waste for many people, for others they provide a source of income.

Waste pickers are the first link in a complex chain of collecting, sorting and selling waste materials. Used bottles picked up from the streets and the beaches of Bali finally end up at the recycling company in Bandung, Java, Indonesia named Namasindo Plas.

PT Namasindo PLAS is a leading supplier of gallons, bottles, bottle pre-forms, screw caps and cups to the bottled water industry in Indonesia (business-to-business clients). PT Namasindo PLAS is also involved in PET recycling. The company has a Corporate Social Responsibility (CSR) program and seeks to improve working conditions and the livelihoods of the waste pickers who provide the waste plastic bottles for recycling.

Aidenvironment and WASTE were contracted by the development finance institutions DEG (Germany) and FMO (Netherlands) and the Indonesian company PT Namasindo PLAS Indonesia to design and implement a Supply Chain and CSR program for the PET recycling branch of the business.

As part of this CSR program WASTE conducted a Training of Trainers workshop on January 14-15, 2016 in Denpasar, Bali for an audience of middlemen, representatives of collection centers and Namasindo and trainers. The aim of the workshop was to give background knowledge about specific issues such as different types of plastic, sorting of waste materials and prevention of child labor. At the same time useful learning methods and educational tools were demonstrated that can be used by trainers to more effectively reach the audience of adult waste pickers during workshops.

The participants took a very active role in all sessions and many fruitful discussions took place. The positive feedback showed that they feel better equipped to train waste pickers with the aim to

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improve their living and working conditions and at the same time increase their productivity in the supply chain of Namasindo.

As part of the CSR program, the waste pickers are also equipped by other related training subject such as : Health & Safety, Basic Administration Management, Capacity Building, etc.

Besides these training activities, NAMASINDO also takes part in supporting health programs for waste pickers communities, one of the examples is providing free clinics and also free medications to the waste pickers, routine health checking and vaccines.

Namasindo has not only been supporting the waste pickers community in terms of supporting their supply chains activities but as general Namasindo has made a great contributions in supporting the government of Indonesia by improving the livelihoods and community of waste pickers in Bali, Indonesia.

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ANNEX 5 LIST OF LITERATURE USED

For the analysis of the Banyuwangi Regency the INSWA has given us permission to use the waste assessment done in 2022 of the region, under the CLOCC project.

Consulted literature with links and websites.

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