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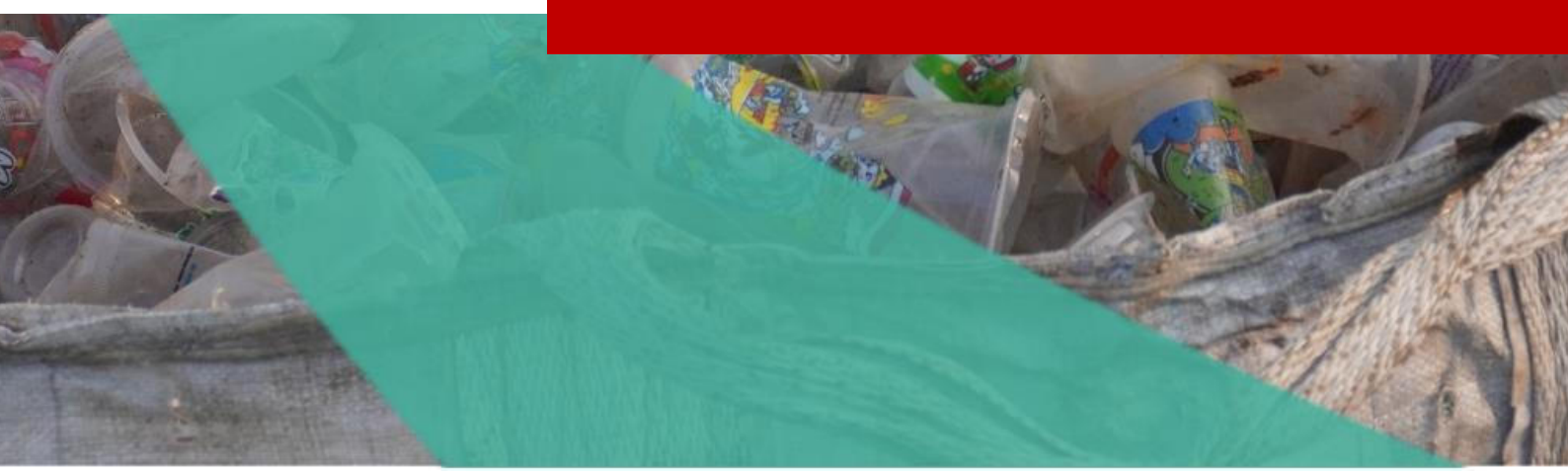
Identification, Categorization, and Codification of Plastic and Paper Packaging Waste

3RproMar
(Reduce, Reuse, Recycle to Protect the Marine Environment and Coral Reefs)

2025



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Acronym

Acronym	Bahasa Indonesia	English/ Others	Description
BN	*Bening Natura*		One of the market terms for plastic packaging properties with a transparent clear colour.
BM	*Biru Muda*		One of the market terms for plastic packaging properties with a transparent light blue colour.
B3	*Bahan Berbahaya dan Beracun*		Materials that, due to their nature, concentration, or quantity, can directly or indirectly cause pollution, environmental damage, or pose a risk to the environment, human health, and the survival of other living beings.
EWC-Stat		European Waste Classification for Statistics	The statistical waste nomenclature in EU.
HDPE		High Density Polyethylene	A type of plastic packaging that ranges from hard to semi-flexible, resists chemicals and moisture, gas permeable, has a waxy surface, opaque, easily coloured, processed, and shaped, and softens at a temperature of 75°C.
HVS		*Hout Virj Schrijfpapier*	HVS paper is a high-quality writing paper available in various sizes and weight.
LDPE		Low Density Polyethylene	A type of plastic packaging that is easy to process, durable, flexible, waterproof, has a waxy surface, semi-opaque, and softens at a temperature of 70^{0}C.
LoW		The European List of Wastes	The waste classification in the EU for administrative purposes, i.e. for permitting and supervision in the field of waste generation and management.
PCR		Post Consumption Recycling	Plastic waste generated from household consumption and similar activities, including waste from employees or

Acronym	Bahasa Indonesia	English/ Others	Description
			visitors in commercial, business, public spaces, or industries. Examples include food containers, beverage bottles, jerrycans, sachets, trash bags, sacks, straws, and more.
PDU	*Pusat Daur Ulang*		Waste management facilities established to enhance the management of organic and inorganic waste at its source, aiming to decrease the volume of waste that needs to be processed at the landfill.
PE		Polyethylene	The family of HDPE and LDPE.
PET		Polyethylene terephthalate	A type of plastic packaging that is transparent, durable, resistant to solvents, impermeable to gas and water, and softens at 80^0 C.
PP		Polypropylene	A type of plastic packaging that is rigid yet flexible, durable, has a waxy texture, is translucent but not clear, resistant to chemicals, heat, and oil, and softens at 140^0 C.
TPS	*Tempat Penampungan Sampah*		A temporary storage area for waste before it is transported to the landfill.
TPST	*Tempat Pengolahan Sampah Terpadu*		A facility where waste collection, sorting, reuse, recycling, processing, and final disposal are conducted.
TPS 3R	*Tempat Pengolahan Sampah* Reduce-Reuse-Recycle		A waste management site that focuses on the principles of reducing, reusing, and recycling waste.
PS		Polystyrene	A type of plastic packaging that is transparent like glass or opaque, rigid, brittle, sensitive to fat and solvents, and easy to mold. It softens at a temperature of 95^0 C.

Acronym	Bahasa Indonesia	English/ Others	Description
PVC		Polyvinyl Chloride	A type of plastic packaging that is durable, rigid, can be transparent, is vulnerable to certain solvents, and softens at 80^0 C.
UBC		Used Beverage Carton	A type of paper packaging, commonly used for packaging drinks. The composition of beverage carton packaging consists of 75% paper fibre and 25% polyethylene and aluminium (PolyAl).

Chapter 1 | Introduction

1.1 Background

Indonesia's plastic demand is fulfilled through domestic virgin plastic production, imported virgin plastic, and the plastic recycling industry. The recycling sector has an installed capacity of 2.6 million tons, supported by 227 large industries. With national plastic consumption reaching approximately 22.5 kg per capita per year, or around 7 million tons (Ministry of Industry, 2022), there is significant potential for plastic waste recycling as a source of raw materials.

Indonesia's paper demand is met through domestic production of both non-recycled and recycled paper. The paper recycling industry has an installed capacity of 12 million tons, supported by 59 large industries (Ministry of Industry, 2022). With national paper consumption reaching approximately 32 kg per capita per year, or around 8 million tons in 2022, there is significant potential for utilizing recycled paper waste as raw material, reducing reliance on imported paper scrap.

Plastic and paper packaging waste serve as valuable raw materials for domestic recycling industries, helping to meet industrial demand while reducing reliance on imported plastic and paper waste and promoting a circular economy. However, challenges arise in obtaining consistent and reliable data to estimate the availability of these recycled materials. One key issue is the variation in terminology used in the field for recycled waste. Establishing clear and standardized terms, definitions, and categorizations is essential to ensure mutual understanding among data suppliers and users.

1.2 Objectives of The Study

This study aims to establish categories and codes for various types of packaging waste, along with clear and accessible terms and definitions. These standardized classifications will enable data suppliers and users to develop a reliable database on the availability of recycled raw materials.

1.3 Methodology

This research employs a combination of methods, including literature reviews, discussions and interviews, analysis and classification of categories and codes, category/code validation exercises, and the development of standard operating procedures (SOPs).

1. Literature study
   Collecting terminology or names for different types of waste used by waste collectors, aggregators, and recyclers particularly those in the recycling chain, based on existing literature and previous studies.
2. Discussion/interview
   Conducting discussions and interviews with stakeholders in the recycling chain to gain insights into the terminology and processes involved in converting waste into recycled raw materials.

3. Analysis and Compilation of Categories/Codes
   Developing packaging waste categories and codes based on findings from studies and insights gathered from interviews and discussions.
4. Category/Code Testing
   Implementation of categories and codes for existing data and analysis of the outcomes.
5. Development of standard operating procedures.
   Formulate standard operating procedures for applying categories and codes to recycled plastic and paper packaging waste based on:
   a. Data source
   b. Data supplier
   c. Data collector
   d. Method, etc.

Chapter 2 | References for Waste Classification and Coding

For reference, waste has been classified and codified in two main systems: the EWC-Stat Waste Categories, which are used in Europe, and the HS Code, commonly applied as an import-export classification for goods, including scrap waste.

2.1 EWC-Stat Waste Categories

The EWC-Stat Waste Categories play a crucial role in ensuring comparable and reliable data on waste generation and treatment by providing clear definitions and a standardized waste classification system within the EU. A guidance document was provided to assist statistical data producers in correctly applying the EWC-Stat nomenclature and help data users accurately interpret and utilize the information. Since the 2010 reference year, waste generation and treatment data was categorized into 51 EWC-Stat categories, an increase from 48 categories used until 2008.

The European List of Wastes (LoW) is the EU's official waste classification system used for administrative purposes, such as permitting and oversight in waste generation and management. It categorizes 839 types of waste, organized into 20 chapters primarily based on their source, such as the economic sector or production process. Each waste type is assigned a unique six-digit code. Waste categorization is based on:

1. Physical/chemical characteristics/properties
2. Main sources (technical process, industrial branches)
3. Information on potentially hazardous contents

If a specific waste has to be classified, the following steps have to be taken:

1. Identify the field of activity to which the waste producer belongs.
2. Identify the source of the waste.
3. Identify the waste category which best characterises the waste. The specific is always to be identified over the general.
4. Containers must be empty to be classified as packaging waste.

In practice, most of the countries collect their data according to the List of Waste and convert it subsequently into the required EWC-Stat-categories. The direct use of the EWC-Stat for data collection is applied only by a few countries. Where countries use the EWC-Stat for data collection, the guidance document is of particular help to clarify which wastes are covered by the defined reporting categories.

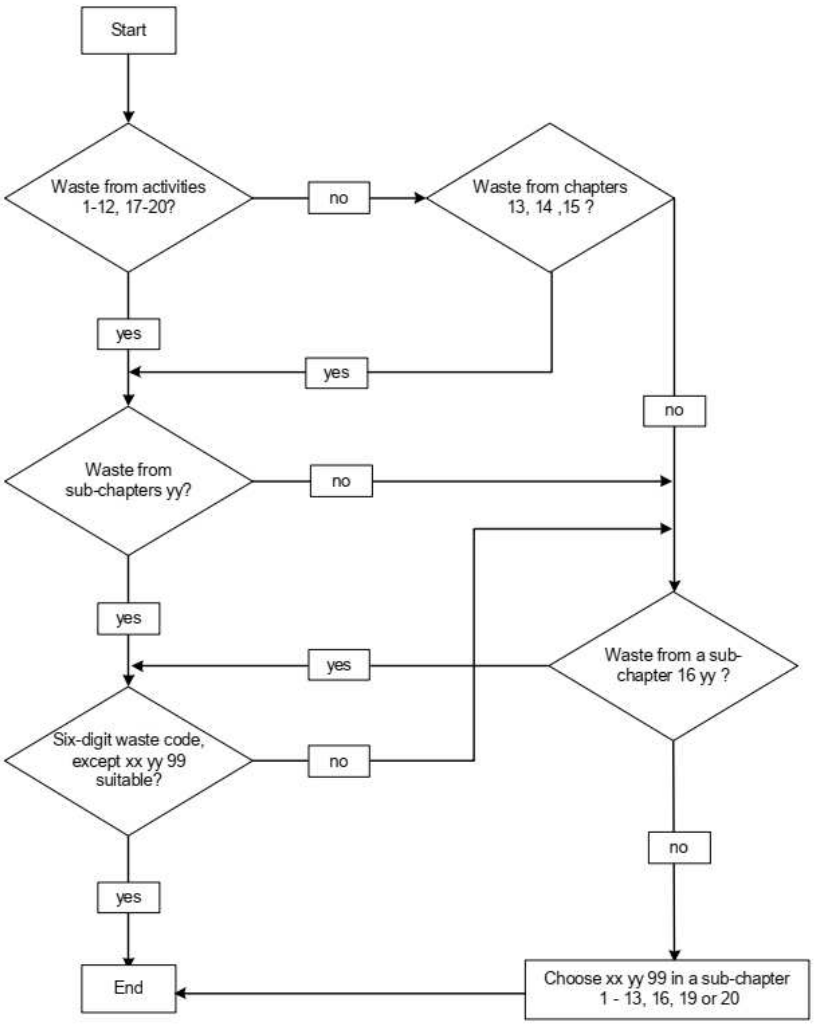


Figure 1 Schematic Flow Chart on The Correct Assignment of Wastes to LoW Codes

Table 1 Example of The Implementation of EWC-Stat Waste Categories in UK

	Waste Status	Plastic	Metal	Paper and Cardboard
Clean packaging	Non-hazardous	15-01-02	15-01-04	15-01-01
Other clean material, unmixed excluding packaging	Non-hazardous	20-01-39	20-01-40	20-01-01
Empty packaging contaminated of residues of hazardous substances, e.g. paint cans	Hazardous	15-01-10*	15-01-10*	15-01-10*

*Asterisk at the end of the code means the waste is hazardous

2.2 HS Code

The Harmonized System (HS) is a systematically structured goods classification list designed to facilitate tariffs, trade transactions, transportation, and statistical reporting, improving upon previous classification systems. In Indonesia, goods classification follows the Harmonized System and is outlined in the Indonesian Import Duty Tariff Book (BTBMI/*Buku Tarif Bea Masuk Indonesia*).

This international product classification system ensures that all countries have a shared understanding of imported and exported goods. It also helps Customs, as a government authority, monitor the movement of goods entering and leaving Indonesia. In Indonesia, the HS code is regulated under the Minister of Trade Regulation No. 25 of 2022 about Import Policies and Regulations.

The HS code classifies goods using numerical codes that provide a structured description of each item. Its numbering system is divided into 8 digits. Under the Indonesian regulation, the HS code classification for paper and plastic materials consists of 4 to 8-digit numbers. Paper is categorized into 21 groups based on size, shape, material, and intended use, while plastic falls under a single category based on material. However, HS code is not specifically designed for waste, making them challenging to simplify into a straightforward coding system, even though they already categorize goods within a relevant context in Indonesia.

Table 2 Example of HS Code of Plastic

Pos Tarif/HS	Uraian Barang
3915.20.10	-- Dari produk seluler yang tidak kaku
3915.20.90	-- Lain-lain
3915.30	- Dari polimer vinil klorida:
3915.30.10	-- Dari produk seluler yang tidak kaku
3915.30.90	-- Lain-lain
3915.90	- Dari plastik lainnya :
3915.90.10	-- Dari poli(etilena tereftalat)
3915.90.20	-- Dari polipropilena
3915.90.30	-- Dari polikarbonat
3915.90.40	-- Dari polivinil asetal
3915.90.50	-- Dari resin fenolik; dari amino resin; dari protein dikeraskan; dari turunan kimia karet alam
3915.90.90	-- Lain-lain

Table 3 Example of HS Code of Paper

ex 4804.49.10	--- Kertas dan karton dari jenis yang digunakan untuk pembuatan kemasan makanan	Berasal dari kayu
ex 4804.49.90	--- Lain-lain	Berasal dari kayu
	- Kertas kraft dan kertas karton lainnya dengan berat 225 g/m² atau lebih:	
4804.51	-- Tidak dikelantang:	
ex 4804.51.10	--- Kertas kraft insulator electrical grade;	Berasal dari kayu
ex 4804.51.20	--- Pressboard dengan berat 600 g/m² atau lebih	Berasal dari kayu
ex 4804.29.10	--- Dari jenis yang digunakan untuk pembuatan kantong semen	Berasal dari kayu

Chapter 3 | Recycling of Plastic and Paper Packaging Waste

3.1 Recycling Process of Plastic and Paper Packaging Waste

The recycling process is typically divided into three stages: collection, aggregation, and recycling. At the collection stage, the key actors include TPST/informal collectors, TPS3R/TPS/PDU, waste banks, and waste pickers. During the collection stage, the initial sorting of PCR waste is performed. Waste pickers collect waste directly from its source, depending on their specific needs (such as plastic, paper, etc.). The sorted waste is then sold to aggregators, where it undergoes further sorting, cleaning, and compacting. Then, the sorted plastic is sold to recyclers, who process it into shredded material or pellets.

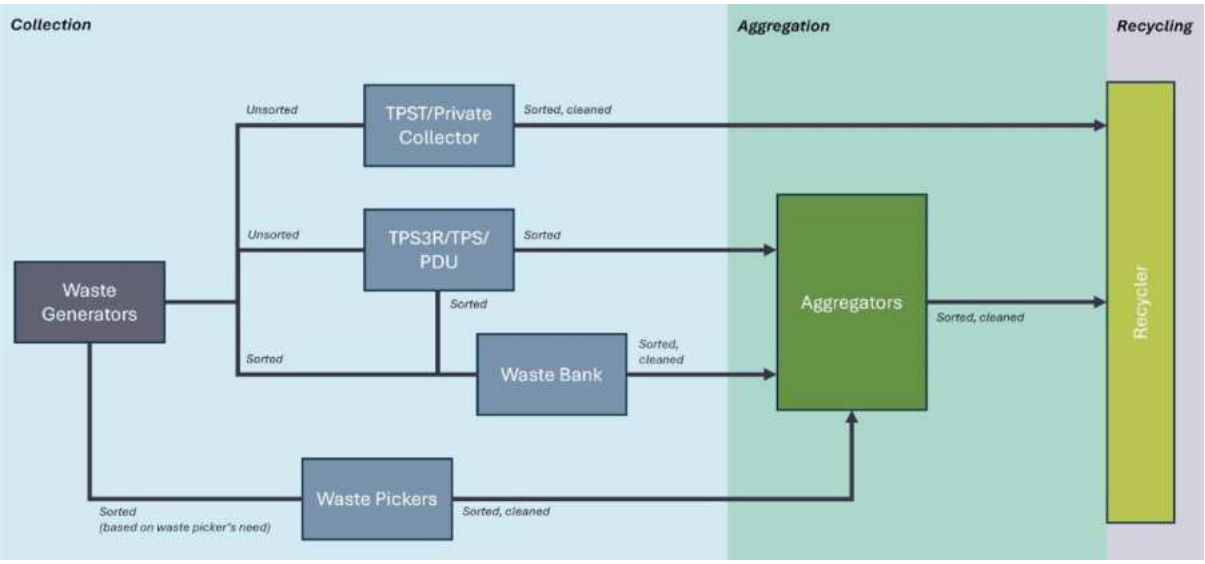


Figure 2 Recycling Process of Plastic and Paper Packaging Waste

The common practice by collectors is where recyclables are sorted at different levels or often called *gabruk*. The levelling is resulting in that high loss rate, combining impurities content, wrong type of materials collected, etc. Therefore, interpreting the tonnage of plastic across supply chain needs clarity of input or output of each actor. In plastic and paper packaging waste sorting, there are four levels of sorting: (1) mixed recyclable organic and recyclable inorganic (*gabruk*); (2) mixes of inorganic recyclable such as plastic, metal, paper, glass, and rubber (*gabruk*); (3) mixed of PET, PP, PE, rigid, and flexible altogether for plastic (*gabruk*) and mixed of HVS, cardboard, duplex, carton, UBC, and other types of recyclable paper altogether for paper (*gabruk*); (4) PET, PE, PP, PE film, PP film, and other types for plastic and HVS, cardboard, duplex, carton, UBC, and other types for paper.

3.2 Recycling of Plastic Packaging

The plastic packaging recycling process includes collection, aggregation, and sorting; crushing; pelletizing; conversion; and the production of the final recycled product. This sequence serves as the foundation for codification, ensuring that the assigned code from the initial stage aligns with the classification of plastic types through to the final recycled product.

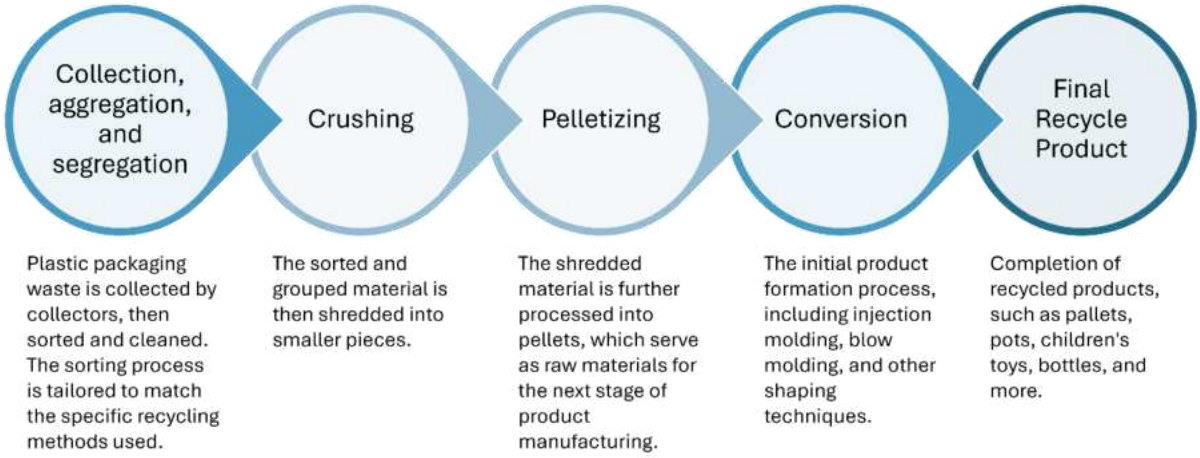


Figure 3 Recycling of Plastic Packaging

For plastic packaging, form, and properties play a crucial role in sorting at the collector level, as they directly impact the recycling process. Even if plastics are of the same type, differences in shape and properties typically result in separate grouping and processing.

Table 4 Type, Form, and Properties of Plastic Packaging

Plastic Type	Form	Properties
PET	Bottle *Botol*	Transparent clear/BN/natural clear - non-screen printing *Bening transparan/BN/bening natura - non sablon*  
PET	Bottle *Botol*	Transparent colour/BM/light blue/green - non-screen printing *Bening warna/BM/biru muda/hijau - non sablon*

Plastic Type	Form	Properties
		

3.3 Recycling of Paper Packaging

The recycling process for paper packaging includes collection, re-pulping, pelletizing, conversion, and the production of final recycled products. This process serves as the foundation for codification, ensuring that the assigned codes from the initial stage align with the classification of paper types through to the final recycled product. In paper packaging recycling, the type of paper is the primary factor considered. The packaging form or attributes (such as colour) are not significant, as they do not impact the recycling process.

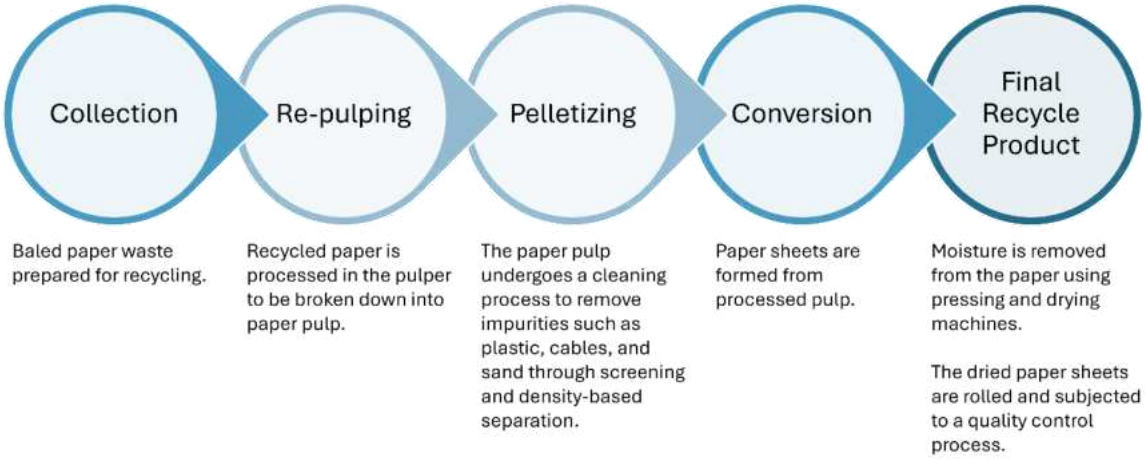


Figure 4 Recycling of Paper Packaging

Table 5 Type, Form, and Properties of Paper Packaging

Paper Type	Form	Properties
HVS/white/ computer paper *HVS/putih/kertas komputer*	-	White *Putih*  

Paper Type	Form	Properties
Cardboard *Kardus*	-	Brown, corrugated *Cokelat, memiliki lapisan bergerigi*  

Table 6 Raw Materials and Products from Recycled Paper

Raw Materials	Recycling Product
HVS paper/white paper/computer paper *Kertas HVS/kertas putih/kertas komputer*	1. HVS paper *Kertas HVS* 2. Newspaper *Kertas koran* 3. Tissue *Kertas tisu*
Newspaper/magazine paper *Kertas koran/majalah* Mixed *Campur/boncos*	1. Newspaper/magazine paper *Kertas koran/majalah* 2. Tissue *Kertas tisu*
Cardboard *Kardus*	1. Ivory 2. Duplex 3. Carton *Karton* 4. Kraft paper *Kertas kraft*
UBC	1. Paper fibres are recycled into products such as cardboard, ivory, duplex, and kraft paper. 2. Plastic is utilized in the production of items like pallets.

Chapter 4 | Recommendation for Categorization and Codification of Plastic and Paper Packaging Waste

4.1 Categorization and Codification

The proposed categorization and codification system includes six-digit codes: (1) data source; (2) packaging waste type; (3) material; (4) form; (5) properties; and (6) potential hazard. The code includes both numeric and alphabetic elements.

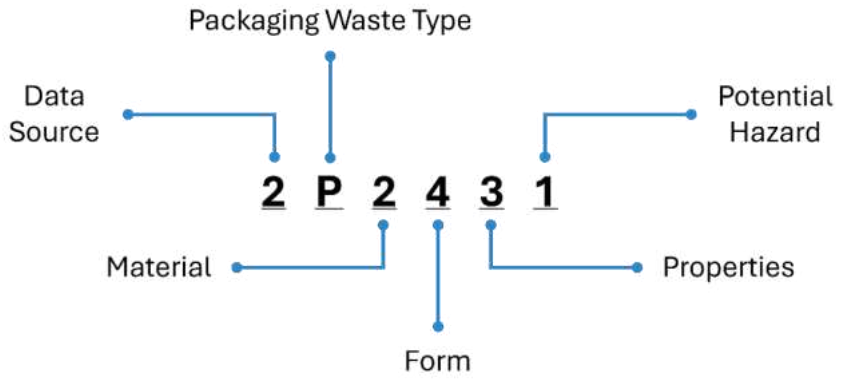


Figure 5 The Six Digits of Plastic and Paper Packaging Waste Codification

The "data source" as the first code reveals the location where the packaging waste is weighed and sorted. This information is essential for ensuring the data's validity and verifiability. In practice, it is often observed that the tonnage recorded by the collector tends to be higher than that of the aggregator and recycler, as the impurity levels are generally lower at the collector stage.

Table 7 Codification of Data Source

Category	Code	Description
Data Source	1	Central waste bank *Bank sampah induk*
	2	Waste bank unit *Bank sampah unit*
	3	TPS3R/TPST/TPS/PDU/other waste management facility *TPS3R/TPST/TPS/PDU/fasilitas pengolahan sampah lainnya*
	4	Aggregator *Lapak*
	5	Waste management start-up *Aplikasi/start-up pengelolaan sampah*
	9	Others

The "packaging waste type" as the second code specifies the category of packaging waste, such as plastic or paper. For each type, further details will be provided regarding the material, form, and properties.

Table 8 Codification of Packaging Waste Type

Category	Code	Description
Waste Type	P	Plastic *Plastic*
	K	Paper *Kertas*

The "material" as the third code offers details about the composition of plastic or paper packaging waste. For plastic packaging waste, the material is categorized into seven codes based on the standard plastic types: PET, HDPE, LDPE, PP, PS, PVC, and others (non-multilayer), with additional codes for plastic containing multiple materials (multilayer) and unsorted materials (mixed/residue).

Table 9 Codification of Plastic Material

Category	Code	Description
Material	1	PET
	2	HDPE
	3	LDPE
	4	PP
	5	PS
	6	PVC
	7	Others, non-multilayer *Lainnya, non multilapis*
	8	Multilayer *Multilapis*
	0	Mixed/residue *Campur/gabruk/residu*

For paper packaging waste, the material is categorized into seven codes derived from field observations and literature reviews, including HVS, cardboard, duplex, cement bag, UBC, non-UBC multilayer paper, and additional codes for other materials and unsorted paper (mixed/residue).

Table 10 Codification of Paper Material

Category	Code	Description
Material	1	HVS *Kertas HVS*
	2	Cardboard *Kardus*
	3	Duplex
	4	Carton *Karton*
	5	Cement bag *Kantung semen*
	6	UBC
	7	Non-UBC multilayer *Multilapis non UBC*
	8	Others
	0	Mixed/residue *Campur/gabruk/residu*

"Form," as the fourth code, is an important category, particularly when recycling plastic packaging waste. For paper packaging waste, form is not a primary factor; however, to maintain consistency in the coding and database, it must still be included in the paper packaging waste code.

Table 11 Codification of Plastic Form

Category	Code	Description
Form	1	Bottle *Botol*
	2	Glass *Gelas*
	3	Gallon *Galon*
	4	Jerry can
	5	Other rigid *Kerasan lainnya*
	6	Plastic bag *Kantongan*
	7	Sack *Karung*
	8	Pouch
	9	Other film *Daunan lainnya*
	0	Mixed/ unidentified /residue *Campur/gabruk/tak terdefinisi/residu*

Table 12 Codification of Paper Form

Category	Code	Description
Form	0	Mixed/ unidentified /residue *Campur/gabruk/tak terdefinisi/residu*

The fifth code, "properties," offers information on the condition of the packaging waste, such as colour, print/screen printing, and other characteristics. This attribute is crucial because recyclers and aggregators take aspects like colour when processing the material to create the final product.

Table 13 Codification of Plastic Properties

Category	Code	Description
Properties	1	Clear transparent (BN) - non-screen printing *Bening (BN/bening natura) - non sablon*
	2	Transparent colour (BM/light blue; blue; green) - non-screen printing *Warna bening (BM/biru muda; biru; hijau) - non sablon*
	3	Bold colour (black/white/green/blue/red/etc.) - non-screen printing *Warna pekat (hitam/putih/hijau/biru/merah/dll) - non sablon*
	4	Clear transparent (BN) - screen printing *Bening (BN/bening natura) - sablon*
	5	Transparent colour (BM/light blue; blue; green) - screen printing *Warna bening (BM; biru muda; biru; hijau) - sablon*
	6	Bold colour (black/white/green/blue/red/etc.) - screen printing *Warna pekat (hitam/putih/hijau/biru/merah/dll) - sablon*
	7	Metallized *Metalis*
	8	Residue/degradable *Residu/terurai*
	0	Mixed *Campur/gabruk*

Table 14 Codification of Paper Properties

Category	Code	Description
Properties	8	Residue/degradable *Residu/terurai*
	0	Mixed/unidentified *Campur/gabruk/tak terdefinisi*

"Potential hazard" as the sixth code indicates any potential risks associated with the packaging waste. For instance, plastic bucket that was previously used for wall paint may carry a potential hazard (B3).

Table 15 Codification of Potential Hazard

Category	Code	Description
Potential hazard	1	No potential hazard *Non B3*
	2	Potential hazard *Potensi B3*
	3	Unknown/mixed *Tidak tahu/campur/gabruk*

4.2 Application of The Categorization and Codification

The categorization and codification framework was initially created using Microsoft Excel, which included categorization-codification details, a tonnage data input form, a general codification directory, and a material codification directory. An example of a code application for a solid white HDPE plastic jerry can is shown in the image below.

	Option	Kode
Sumber data	Bank sampah unit	2
Jenis sampah	Plastik	P
Material	HDPE	2
Bentuk	Jerry can	4
Properties	Warna pekat (hitam/putih/hijau/biru/merah/dll) - non sablon	3
Non-B3/B3	Non-B3	1
		2P2431

Figure 6 The Application of Codification

4.2.1 Tonnage Data Input Form

In practice, the data input form plays a crucial role in summarizing the tonnage of plastic and paper packaging waste recycling from each actor source. This allows for the tracking of the tonnage of similar types of waste produced by each actor, thereby aiding in the compilation of a waste database and ensuring more accurate results.

Form Input Data

Informasi pengisi data

Nama :

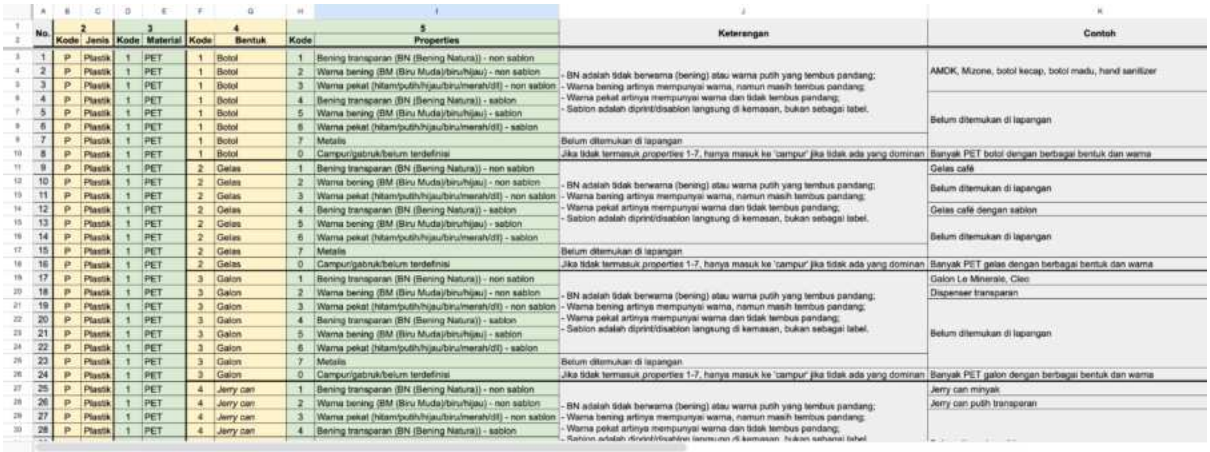
Nama unit :

No.	Tanggal	Kode	Tonase (kg)	Keterangan
1				
2				
3				
4				
5				
...				

Figure 7 Tonnage Data Input Form

4.2.2 Directory of General Codification and Material Codification

The general codification directory offers details on potential codes, their descriptions, and field examples. On the other hand, the material codification directory contains information on examples for each type of plastic or paper packaging, along with images or photos.



No.	2		3		4		5		Keterangan	Contoh
	Kode	Jenis	Kode	Material	Kode	Bentuk	Kode	Properties		
1	P	Plastik	1	PET	1	Botol	1	Bening transparan (BN (Bening Natura)) - non sablon	- BN adalah tidak berwarna (bening) atau warna putih yang tembus pandang; - Warna bening artinya mempunyai warna, namun masih tembus pandang; - Warna pekat artinya mempunyai warna dan tidak tembus pandang; - Sablon adalah diprint/disablon langsung di kemasan, bukan sebagai label.	AMDK, Mizone, botol kecap, botol madu, hand sanitizer
2	P	Plastik	1	PET	1	Botol	2	Warna bening (BM (Biru Muda)/biru/hijau) - non sablon		
3	P	Plastik	1	PET	1	Botol	3	Warna pekat (hitam/putih/hijau/biru/merah/dll) - non sablon		
4	P	Plastik	1	PET	1	Botol	4	Bening transparan (BN (Bening Natura)) - sablon		Belum ditemukan di lapangan
5	P	Plastik	1	PET	1	Botol	5	Warna bening (BM (Biru Muda)/biru/hijau) - sablon		
6	P	Plastik	1	PET	1	Botol	6	Warna pekat (hitam/putih/hijau/biru/merah/dll) - sablon		
7	P	Plastik	1	PET	1	Botol	7	Metalis	Belum ditemukan di lapangan	
8	P	Plastik	1	PET	1	Botol	0	Campur/gabruk/belum terdefinisi	Jika tidak termasuk properties 1-7, hanya masuk ke 'campur' jika tidak ada yang dominan	Banyak PET botol dengan berbagai bentuk dan warna
9	P	Plastik	1	PET	2	Gelas	1	Bening transparan (BN (Bening Natura)) - non sablon	- BN adalah tidak berwarna (bening) atau warna putih yang tembus pandang; - Warna bening artinya mempunyai warna, namun masih tembus pandang; - Warna pekat artinya mempunyai warna dan tidak tembus pandang; - Sablon adalah diprint/disablon langsung di kemasan, bukan sebagai label.	Gelas café
10	P	Plastik	1	PET	2	Gelas	2	Warna bening (BM (Biru Muda)/biru/hijau) - non sablon		Belum ditemukan di lapangan
11	P	Plastik	1	PET	2	Gelas	3	Warna pekat (hitam/putih/hijau/biru/merah/dll) - non sablon		
12	P	Plastik	1	PET	2	Gelas	4	Bening transparan (BN (Bening Natura)) - sablon		Gelas café dengan sablon
13	P	Plastik	1	PET	2	Gelas	5	Warna bening (BM (Biru Muda)/biru/hijau) - sablon		
14	P	Plastik	1	PET	2	Gelas	6	Warna pekat (hitam/putih/hijau/biru/merah/dll) - sablon		Belum ditemukan di lapangan
15	P	Plastik	1	PET	2	Gelas	7	Metalis	Belum ditemukan di lapangan	
16	P	Plastik	1	PET	2	Gelas	0	Campur/gabruk/belum terdefinisi	Jika tidak termasuk properties 1-7, hanya masuk ke 'campur' jika tidak ada yang dominan	Banyak PET gelas dengan berbagai bentuk dan warna
17	P	Plastik	1	PET	3	Galon	1	Bening transparan (BN (Bening Natura)) - non sablon	- BN adalah tidak berwarna (bening) atau warna putih yang tembus pandang; - Warna bening artinya mempunyai warna, namun masih tembus pandang; - Warna pekat artinya mempunyai warna dan tidak tembus pandang; - Sablon adalah diprint/disablon langsung di kemasan, bukan sebagai label.	Galon Le Minerale, Cleo
18	P	Plastik	1	PET	3	Galon	2	Warna bening (BM (Biru Muda)/biru/hijau) - non sablon		Dispenser transparan
19	P	Plastik	1	PET	3	Galon	3	Warna pekat (hitam/putih/hijau/biru/merah/dll) - non sablon		
20	P	Plastik	1	PET	3	Galon	4	Bening transparan (BN (Bening Natura)) - sablon		Belum ditemukan di lapangan
21	P	Plastik	1	PET	3	Galon	5	Warna bening (BM (Biru Muda)/biru/hijau) - sablon		
22	P	Plastik	1	PET	3	Galon	6	Warna pekat (hitam/putih/hijau/biru/merah/dll) - sablon		
23	P	Plastik	1	PET	3	Galon	7	Metalis	Belum ditemukan di lapangan	
24	P	Plastik	1	PET	3	Galon	0	Campur/gabruk/belum terdefinisi	Jika tidak termasuk properties 1-7, hanya masuk ke 'campur' jika tidak ada yang dominan	Banyak PET galon dengan berbagai bentuk dan warna
25	P	Plastik	1	PET	4	Jerry can	1	Bening transparan (BN (Bening Natura)) - non sablon	- BN adalah tidak berwarna (bening) atau warna putih yang tembus pandang; - Warna bening artinya mempunyai warna, namun masih tembus pandang; - Warna pekat artinya mempunyai warna dan tidak tembus pandang;	Jerry can minyak
26	P	Plastik	1	PET	4	Jerry can	2	Warna bening (BM (Biru Muda)/biru/hijau) - non sablon		Jerry can putih transparan
27	P	Plastik	1	PET	4	Jerry can	3	Warna pekat (hitam/putih/hijau/biru/merah/dll) - non sablon		
28	P	Plastik	1	PET	4	Jerry can	4	Bening transparan (BN (Bening Natura)) - sablon		

Figure 8 Directory of General Codification

No.	Gambar	Keterangan			
		4		5	
		Kode	Bentuk	Kode	Properties
1	 	1	Botol	1	Bening transparan (BN (Bening Natura)) - non sablon
2	 	1	Botol	2	Warna bening (BM (Biru Muda)/biru/hijau) - non sablon
3		1	Botol	3	Warna pekat (hitam/putih/hijau/biru/merah/dll) - non sablon
4	Belum ditemukan di lapangan	1	Botol	4	Bening transparan (BN (Bening Natura)) - sablon
5		1	Botol	5	Warna bening (BM (Biru Muda)/biru/hijau) - sablon
6		1	Botol	6	Warna pekat (hitam/putih/hijau/biru/merah/dll) - sablon
7		1	Botol	7	Metalis
8	Banyak PET botol dengan berbagai bentuk dan warna	1	Botol	0	Campur/gabruk/belum terdefinisi

Figure 9 Directory of Material Codification

4.3 Codification Process Flow

The codification process flow is divided into two phases: the transition period and the implementation period. Both phases follow a similar sequence of three processes: data supply, data entry, and compilation. In the transition period, data is gathered from actors by entering sorted waste data based on the system used in each unit, which is then manually entered by the Ministry of Environment team. This approach helps to enrich the database for categorization and codification.

In the implementation period, the categorization and codification system can be actively promoted and applied by each unit, allowing the Ministry of Environment team to focus solely on verifying the incoming data. The data compilation can then be processed based on factors such as time period, area, region, and other relevant criteria.

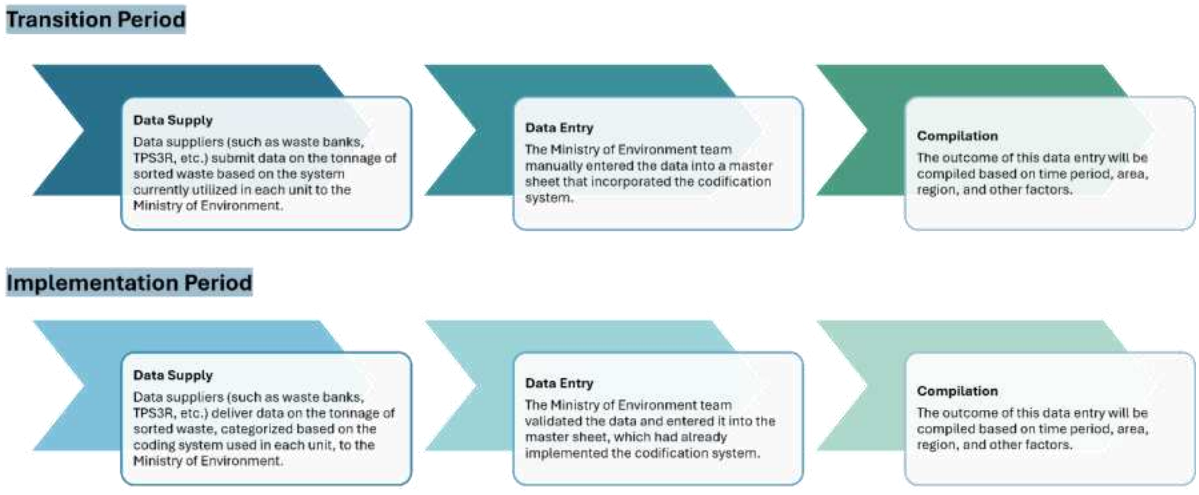


Figure 10 Codification Process Flow

Chapter 5 | Conclusion and Recommendations

5.1 Conclusion

The categorization and codification of plastic and paper packaging waste aim to establish clear categories and codes for each type of packaging waste. This includes defining standardized and easily understandable terms to facilitate use by both data suppliers and users, ultimately building a reliable database of recycled raw material availability. The developed coding system consists of six alphanumeric digits representing: (1) data source, (2) packaging waste type, (3) material, (4) form, (5) properties, and (6) potential hazard.

In practice, the codification process is divided into two phases: the transition period and the implementation period. Both phases include data supply, data entry, and compilation stages. During the transition period, the Ministry of Environment team handles data supply and entry to enhance the database and test the system. In the implementation phase, actors can independently input data using the codification system, which is then verified by the KLHK team. The compiled data can be analysed based on time period, area, region, and other relevant criteria.

5.2 Recommendations

The government, particularly the Ministry of Environment, can play a key role in standardizing terminology across the waste management actors, from waste collectors to recyclers, to ensure an accurate and comprehensive database. This effort should be supported by a bottom-up system that considers local languages used in different regions and among various actors. In the future, this codification system can also be integrated with existing data collection platforms such as SIMBA, SIPSN, Ministry of Public Work and Housing data, and others. Since the codification is designed for recycling and the value chain, socialization efforts will be essential for waste collectors, aggregators, and recyclers.

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