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Expectations and constraints of plastic packaging waste recyclers under the future EPR scheme in Vietnam

Results from an online social survey



Abbreviations

EPR: Extended Producer Responsibility

LEP: Law of Environmental protection

MONRE: Ministry of Natural Resources and Environment

PE: Polyethylene; LDPE: Low Density Polyethylene; HDPE: High Density Polyethylene;

PET: Polyethylene terephthalate

PP: Polypropylene

PRO: Producer Responsibility Organization

PS: Polystyrene

PVC: PolyVinyl Chloride

RC: Recyclables Collectors

VND: Vietnam Dong, Vietnamese currency

WC: Waste Collectors

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I) Introduction

A) Pilot project brief description

The pilot project '**Enhancing plastic packaging collection, sorting and recycling**' is implemented by IRD in Vietnam. 'Rethinking Plastics' is implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and Expertise France.

The pilot project aims to increase the collection, sorting and recycling of plastic packaging in Ho Chi Minh City, Vietnam, to reduce its environmental leakage. To reach this objective, it works on determining how much and what kind of plastic is collected, how and by whom it is transferred and processed or when it is leaked into the environment. Finally, it assesses if and how the plastic waste is recycled and what would be needed to enhance recycling. In addition, the project investigates how segregation at household level can be improved. A better cooperation between all stakeholders will enhance the understanding of the plastic value chain and related data. Involved stakeholders therefore include producers and consumers, as well as collectors, businesses, transporters of packaging and recyclers. With these data and experiences, the pilot project can contribute knowledge about suitable options for a legal framework for Extended Producer Responsibility EPR for packaging, which is currently being developed by the Ministry of Natural Resources and Environment in Vietnam.

Originally, the pilot project also aimed to integrate new packaging, i.e. not yet-collected, to the value chain in the context of the EPR implementation in Vietnam in order to draw recommendations on their integration. Those not-yet collected packaging are for example the multilayers or the single use plastic packaging made of PS. Because of the covid-19 situation, this activity could not be conducted as planned. The project team therefore focused on a deeper understanding of the constraints that the implementation of the EPR decree may impose on them and the needs of Vietnamese recyclers to address these constraints.

B) EPR scheme in Vietnam: Law of Environmental Protection

In Vietnam, a **Law of Environmental Protection (LEP)** was approved in 2020 and the **Decree No. 08/2022/ND-CP** issued on 10 January 2022, details the articles of the Law on Environmental Protection on waste management in chapters 5 and 6. According to this regulation, manufacturers and importers of products and packages (Table 1) in order to conduct commercial activities in the Vietnamese market **must undertake the responsibility to recycle such products and packages** according to the required recycling rates and specifications. Manufacturers and importers that choose the form of recycling may organize the recycling in the following forms (LEP Article 54, Point a, Clause 2):

- a) carry out the recycling by themselves;
- b) hire a recycling unit to carry out the recycling;
- c) fully authorize a third party (Producer Responsibility Organization or PRO) to organize the recycling.

Manufacturers or importers that choose to make financial contribution to the Vietnam Environmental Protection Fund to support the recycling of products and packages are not required to carry out these forms of recycling (LEP Article 54, Point b, Clause 2). In that case, the EPR Vietnam Office selects and signs a contract with a recycling unit in the form approved

by the National EPR Council to recycle for manufacturers and importers. The Vietnam Environmental Protection Fund is responsible for paying the recycling costs under the contract signed with the recycling unit.

The compulsory recycling rate of each type of product or package is determined based on the life-cycle, the disposal rate and the recycling rate of each type of product or package; on national recycling targets, environmental protection requirements, and socio-economic context. The compulsory recycling rate is defined as the ratio of the minimum volume of products and packaging that shall be recycled in accordance with the mandatory recycling specifications to the total volume of manufactured products and packaging that are put on the market and imported in a year (Decree No. 08/2022/ND-CP).

The recycling must have appropriate environmental permits. Manufacturers and importers that carry out the recycling by themselves as well as the recycling units hired by the manufacturers or importers to carry out the recycling have to comply with these requirements. A PRO must meet specific conditions, too.

The report on recycling results of the manufacturer, importer or PRO, submitted to the EPR National Portal Office, must be certified by the audit firm in accordance with the law on independent audit.








Table 1: Extraction of plastic packaging products from the Appendix XXII list of products and packaging which must be recycled with recycling rate and recycling recruitments (Attached to Decree No. 08/2022/ND-CP).

Product catalog, Packaging	Required recycling rate for first 3 years	Mandatory recycling (Minimum 40% recovery by weight of product, packaging to be recycled according to the required recycling rate) Selected recycling solution:
A.1. Paper packaging		
A.2. Metal packaging		
A.3. Plastic packaging		
A.3.1. Rigid PET packaging	22%	1. Producing recycled plastic beads used as production materials for industries. 2. Manufacture of other products (including PE fibers). 3. Chemical production (including oil).
A.3.2. Hard HDPE, LDPE, PP, PS packaging	15%	1. Producing recycled plastic beads as production materials for industries. 2. Manufacture of other products (including PE and PP fibers). 3. Chemical production (including oil).
A.3.3. Rigid EPS packaging	10%	1. Producing recycled plastic beads as production materials for industries. 2. Manufacture of other products. 3. Chemical production (including oil).
A.3.4. Rigid PVC packaging	10%	1. Producing recycled plastic beads as production materials for industries. 2. Manufacture of other products. 3. Chemical production (including oil).
A.3.5. Other hard plastic packaging	10%	1. Producing recycled plastic beads as production materials for industries. 2. Manufacture of other products. 3. Chemical production (including oil).
A.3.6. Soft material single packaging	10%	1. Producing recycled plastic beads as production materials for industries. 2. Manufacture of other products. 3. Chemical production (including oil).
A.3.7. Soft multi-material packaging	10%	1. Producing recycled plastic beads as production materials for industries. 2. Manufacture of other products. 3. Chemical production (including oil).
A.4. Glass packaging		

C) Overview of plastic recycling activity in Vietnam

Plastics are usually classified according to their heating properties, i.e. thermosets or thermoplastics (Nguyễn Thị Truyền and al., 2022) or to their resin identification code, i.e, 1: PET; 2: HDPE; 3: PVC; 4: LDPE; 5: PP; 6: PS and 7: others. Their ability to be recycled vary between **polymers: PET, HDPE and PS are considered as commonly recycled; PP, PVC, LDPE are considered as sometimes recycled** and the others as difficult to recycle (Nguyễn Thị Truyền and al., 2022).

Table 2: Resin identification code of main plastic (table adapted from molygran.com)

						
PET Polyethylene terephthalate	HDPE High-density polyethylene	PVC Polyvinyl chloride	LDPE Low density polyethylene	PP Polypropylene	PS Polystyrene	OTHER Other types of plastics

In Vietnam, mechanical recycling is the main recycling line observed. Mechanical recycling, based on plastic waste grinding, washing, separation, drying, re-granulating and compounding, is the simplest and most common method used to recycle PE, PET and PP. Detailed information on the technology and equipment required to perform mechanical recycling are fully described in the Handbook for Recyclers (Nguyễn Thị Truyền and al., 2022).

D) Post-consumer plastic packaging value chain: definition of terms

Actors in the **post-consumer plastic packaging value chain** are the waste generators, collectors, aggregators, transporters, and processors/recyclers. This post-consumer value chain definition is inspired by the one of [GA Circular](#) established for PET value chain in SEAsia (GA Circular, 2019) and by the observation of Hanoi Architectural University during their consultancy project with Expertise France Nguyễn Thái Huyền and al. (*to be published in 2022*). For the purpose of this activity, the definitions are specified accordingly as 'post-consumers plastic packaging value chain', but it can also be defined more generally for all recyclable materials.

- The **waste generators** are defined as the generators of the plastic packaging products; they can be individuals as households or collective as schools, offices, restaurants, goods stores, hotels and residential buildings. By definition, they consume products with plastic packaging and throw the packaging away, some of them sorting the waste, others without. Their interest is to get rid of the waste easily.
- The **collectors** are defined as **waste collectors (WC)** and **recyclables collectors (RC)**; the WC correspond to the *người thu gom* from the public companies (e.g. Citenco), from the private companies, or from the cooperatives both registered or unregistered. The RC are individuals, the *người thu mua*, named in HCMC *ve chai*. The WC collect the waste directly from waste generators and bring it to gathering sites and transfer stations for landfill or recycling (Kieu Le et al., 2016). RC collect and/or buy the waste directly from waste generators or at gathering sites and sell them to aggregators. RC seek to find/buy large quantities and easily recyclable material from waste

generators and to sell them at a good price to aggregators. Their constraints are spatial planning, the availability of the resources, the distance to travel to buy and sell the resources, their cooperation with waste generators and aggregators, and the recovery of these resources by the WC.

- **Gathering points/Transfer stations:** Gathering points refer to temporary storage points for all types of waste after collecting domestic solid waste from waste generators or street cleaning. Gathering points are located on the road and on the grounds of large waste generators (e.g. markets, apartment buildings, parks). Transfer stations refer to temporarily domestic solid waste gathering and storage for trans-shipment onto vehicles and for transport to waste treatment facilities. They can have the capacity to either only serve the needs of one district, in that case they have specific operation time and are handled by the City People Committee, or to serve inter-district needs, in this case they operate continuously and are handled by DONRE (decision No. 09/2021/QĐ-UBND).
- The **aggregators** (i.e., *cơ sở phế liệu*) are the informal or formally registered businesses involved in buying materials from collectors, aggregating high quantities of plastic packaging and selling it to processors and/or recycling factories. Their size may vary from 20m² to more than 2,400m². In the framework of the COMPOSE's project (March 2020), 723 aggregators were identified in HCMC, 180 companies being registered in the Yellow Pages as buying and selling recycled materials. The aggregators need to keep and improve an inflow and outflow of recyclable material in their warehouse. They select the recyclable materials in which they are interested depending on the financial benefits they can make from the sale of the resources. They depend on the volume of material flowing in from the RCs. Further challenges are the storage of the resources and the selling price and volume going out to recyclers/processors, meaning the adaptation of their interior space and their ability to be flexible and integrate new actors into their network of processors/recyclers (e.g. public, private or informal).
- The **transporters** are individuals who transport the plastic packaging from the aggregators to the processors/recyclers, either punctually among other materials or permanently by buying the plastic packaging from the aggregators and selling them to the processors/recyclers. Their main effort is to be maintained in the value chain and increase their income. Their constraints are the volume of resources to transport and the distance to travel to the processors/recyclers.
- The **processors/recyclers** are informal or formally registered businesses engaged in the process of converting the recovered plastic packaging into flakes. **Processors** either export this material or sell it to a local recycler. The **recycler** is an informal or formally registered business engaged in the process of converting the flakes into usable applications. The finished product is either exported or sold locally. They are interested in getting constant quality and fluxes of resources at a low price, to sell the recycled products and thus to keep or increase their income.

Furthermore, in the survey, the term **plastic packaging products-for-recycling** was used instead of the term plastic packaging waste. The recyclers do not see the products-for-recycling as waste, as they are transformed and recycled into other products. The waste

corresponds rather to plastic products that cannot be recycled. Therefore, in this survey we followed the recycler's terminology and defined the plastic packaging products-for-recycling as any plastic packaging waste collected for recycling purpose.

E) Objectives of the social survey

In this context, the analysis offers relevant information as recyclers will have a key role in Vietnam's future EPR system, either as part of a PRO, a private recycling unit or a self-recycling unit, or as part of the recycling unit operating for the Vietnamese Environmental Protection Fund.

The social survey has been conceived to:

- **Better understand** the operations of Vietnamese Recyclers and their **needs** related to the EPR decree
- Evidence the **gaps and constraints** faced by recyclers due to the EPR implementation.

The present report highlights the replies of the surveyed recyclers and puts them in the context of the EPR scheme implementation in Vietnam.

II) Methodology: online survey

The survey was conducted using the online tool Survey Monkey (<https://fr.surveymonkey.com/>). The survey was opened from **July 2021 to September 2021**, under a reference link shared with the participants. The link was private.

The questions asked were both open and closed questions, including multiple choice question and the answers were not mandatory.

The survey was sent to a list of 206 recyclers, called participants. The list of participants was established using the Yellow Page (registered as plastic recyclers) and using a list of recyclers established by a previous report that GA Circular conducted in Vietnam. The surveyor sent first the link and the objective of the survey by email. Then, the team contacted each participant privately by email and by phone to explain in more details the pilot project and the objectives of the online survey.

Among the 206 participants, 18 participants replied to the online survey. This **low response rate, i.e. 9%**, is due to the covid-19 pandemic context and the types of surveyor targeted. From July to October 2021, Vietnam was threatened by the 4th covid-19 wave and most provinces were under the Directive 16 or Directive 15, stipulating self-isolation, restrictions of social activities allowing the opening of essential businesses only. The contacted participants were highly impacted by the covid-19 situation: they were closed or did not wish to respond to the questionnaire because of the high vulnerability of their status. Also, recyclers are stakeholders whose activities are discreet, because of their status, often informal, and because of the object of their activity, the waste, which is often hidden. It is thus not easy to interview this category of stakeholders, and even online. Therefore, the level of interpretation of the data achieved was general and adapted to this low response rate. Scenarios or in deep interpretation could not be performed.

All raw data were collected **anonymously** and are kept **confidential**. They were only used in the context of this pilot project and will not be communicated.

III) Expectations and constraints of recyclers in plastic packaging waste management under an EPR scheme: results and discussions

A) General information on the surveyed recyclers

The 18 surveyed recycling plants are located in six provinces of Vietnam (Figure1): Ho Chi Minh City, Long An, Hung Yen, Dong Nai, Hai Phong and Nam Dinh.

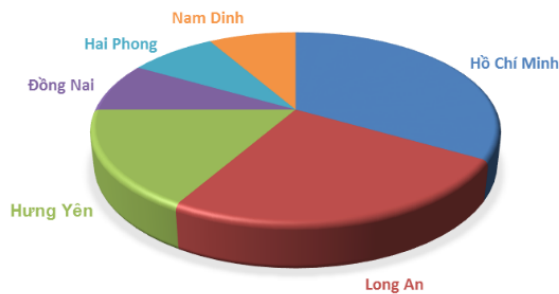


Figure 1: Provinces of operation of surveyed Recyclers

The Recyclers were registered under a **registration license** for plastic production plants (65%) or plastic recycling and production plants (35%).

Most of them are exclusively recycling plastic (87%). Their recycling capacities vary between 30 tons and 60,000 tons per year.

The plastic-for-recycling imported by the recyclers originates from various countries: **Vietnam, USA, Asia, Europe and others** (Figure 2a). In Vietnam, the plastic-for-recycling, also called household plastic, originates mainly from Ho Chi Minh City, Long An, and Binh Duong (Figure 2b).

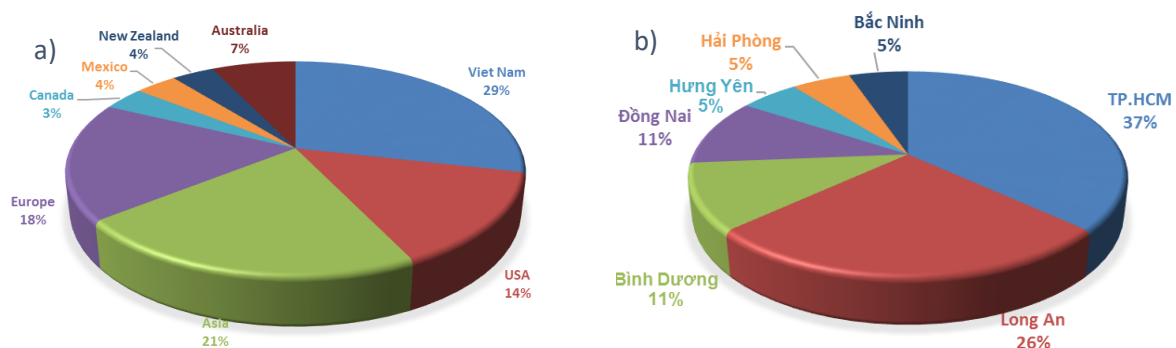


Figure 2: a) Countries and b) Vietnamese provinces of origin of imported plastic-for-recycling by the surveyed recyclers.

B) Suppliers and categories of plastic packaging products-for-recycling

This section aims to characterize the suppliers of plastic-for-recycling and how the recyclers are categorizing the plastics for recycling. Note: In Vietnam, at national, provincial and district level, plastics are supposed to be sorted at source by law (decision No. 09/2021/QD-UBND), and collected in the bin for 'Reusable and Recyclable Waste'.

1. Who supplies plastic packaging products for recycling to the recyclers on the Vietnamese market?

In the domestic market, the recyclers are purchasing the plastic packaging products-for-recycling mainly from **aggregators**, from **their own internal collection system**, and from the **collectors directly** (Figure 3). Few of them are purchasing it from domestic waste companies and processors. However, none of them purchased the plastic-for-recycling from public or private waste transfer stations or directly from transporters.

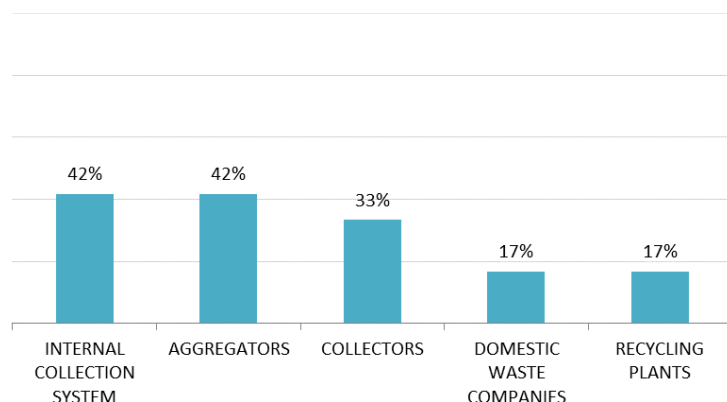


Figure 3: Suppliers of plastic packaging products-for-recycling of the surveyed recyclers in percentage.

It is interesting to note that the recyclers rely on **several sources** to purchase their plastic packaging products-for-recycling and that most of those sources involve the **informal recycling sector**: the aggregators and the recyclable collectors.



EPR scheme implementation

In Vietnam's future EPR scheme, **public or private waste transfer stations** will play a key role for the collection and sorting of waste as well as its transfer to a recycling plant.

The **absence of public or private waste transfer stations as supplier of plastic packaging products-for-recycling** mentioned by the surveyed recyclers may be a **constraint** for the EPR implementation. In fact, aggregators are informal or formally registered businesses and do not necessarily have an **accounting system**. On the other hand, public or private waste transfer stations are part of the domestic solid waste managed by the City or province: public or private waste transfer stations are obliged by law to **report** on the volume, route and type of waste transiting in the transfer station (decision No. 09/2021/QD-UBND).

2. What categories for plastic packaging products-for-recycling do the recyclers use?

The plastic-for-recycling purchased by the recyclers can be categorised by:

- **Polymer:** LDPE, HDPE, PP, PET, PVC, PS, multilayer, others
- **Format:** Bottle, film, jars, trays, boxes, crates, drums, etc.
- **Content:** Food and beverages, detergents, cosmetics, shampoos and conditioners, pharmaceuticals and cosmetics, etc.
- **Application:** Single-use bags, cling films, wrapping films, food containers, etc.

The survey (Figure 4) showed that 93% of the recycling plants are using the **category of polymer**, which makes sense as the ability to recycle plastics depends on the polymer characteristics. Some are also categorising the plastics by their **application** (i.e. 27%), especially when the plant focuses on recycling films.

However, the sorting by polymer is not easy, as automatic sorting equipment are not used by recyclers in Vietnam, and the sorting is manual by vision and touch. The sorting by polymer can thus have a low efficiency and requires a sorting by application, easier to perform.

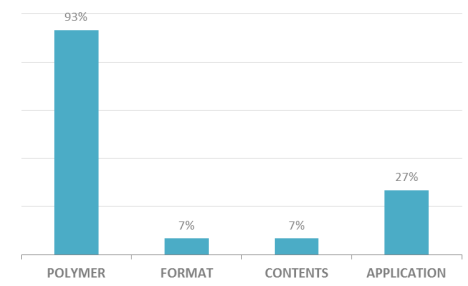


Figure 4: Categories of plastic packaging products-for-recycling used by the surveyed recyclers in percentage.



EPR scheme implementation

Defining clear categories for plastic packaging products-for-recycling is crucial as the financial system of EPR depends on the **ability to collect and recycle** the plastic products by category. The **recyclability** of a plastic type depends on its polymer (Nguyễn Thị Truyền and al., 2022) and some are easier to recycle than others. Therefore, the recyclers have a higher benefit **to categorize the plastic packaging products-for-recycling by polymer**, rather than by format, content or application.

In the **Decree No. 08/2022/ND-CP** the **products-for-recycling are categorized by types of polymers** by separating the hard to the soft ones, the easy-to-recycle to the difficult-to-recycle ones, and the single-layer to the multi-layers. This classification respects the needs of recyclers. The decree implies then to develop in the future a **systematic sorting** by types of polymers, the manual sorting being too imprecise.

C) Information on plastic packaging products-for-recycling purchased by the recyclers

The recycling plants are purchasing their plastic packaging products-for-recycling from different sources, i.e. from aggregators, from their own internal collection system and directly from the collectors, as well as from different provinces and countries. It is important for them, to purchase plastic packaging in a **status** that allows treatment and does not imply additional pre-processing. Therefore, the **sorting and dirtiness** of purchased plastic packaging products-for-recycling by the recyclers were evaluated.

1. State of plastic packaging products-for-recycling purchased by recyclers: sorting and dirtiness

The plastic packaging products-for-recycling purchased by the recyclers from the different sources are mostly **sorted** using the same category as the recyclers, i.e. 67%. The recyclers declare that a minimum of 70% of the purchased plastic packaging products is **well-sorted to partially-well-sorted** when the categories are defined by application, format or polymer (Figure 5).

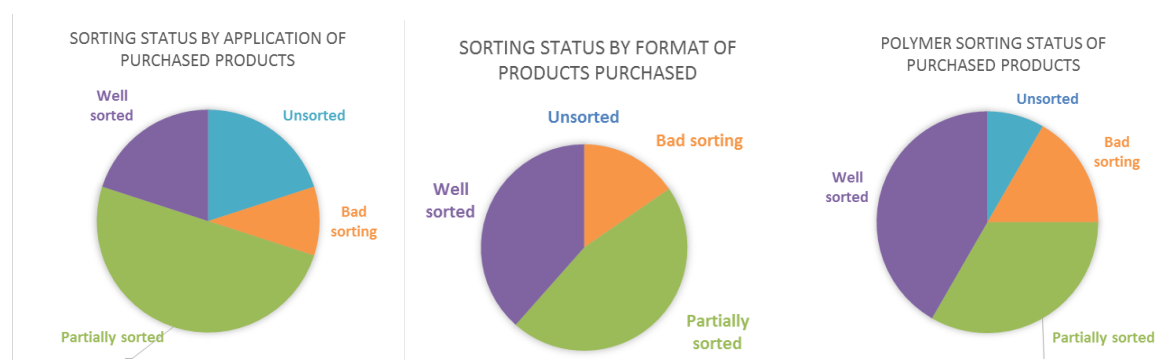


Figure 5: Sorting status of purchased plastic packaging products-for-recycling when categorized by application format and polymer.

The purchased plastic packaging products-for-recycling are **mostly clean**, 31% of the plants stated that the plastics are dirty. The **types of dirt** reported by the plants are: dust accounting for 90% of products, molds (30%), food product residues (20%) and labels (10%). No chemical or hazardous residues remaining on the products were reported.

2. Need to re-sort plastic packaging products purchased by recycling plants

As the sorting status and the dirtiness of the products do not systematically fit with the requirements of the recyclers, the recyclers **need to re-sort** the purchased plastic packaging products. Among the surveyed recyclers, **76% of them reported the need to often** (i.e. 46%) **or always** (i.e. 30%) **re-sort** the products purchased.

It is interesting to note that half of the recyclers declared **not to have the technical means** to re-sort the poorly-sorted plastics and have to ask their workers or external services to re-sort the plastics according to their recycling requirements.



EPR scheme implementation

In an EPR scheme, **sorting** is a key step.

To achieve the recycling goals defined by the EPR Vietnam Office, purchasing **well sorted and clean plastics is mandatory**. It is thus crucial that the collection and sorting of plastic waste performed under the domestic solid waste management or by the recyclable collectors and aggregators **fits with the requirements of the recyclers** and fits the list of **products packaging listed in the Appendix XXII of the Decree No. 08/2022/ND-CP** in terms of waste and plastic waste categories, definitions and sorting status.

3. Difficulties in the supply of plastic packaging products-for-recycling encountered by recyclers

The recyclers surveyed declared to **have difficulties to purchase** plastic packaging products-for-recycling that **fit their requirements in terms of sorting, cleanliness, quantity and price** (Figure 6).

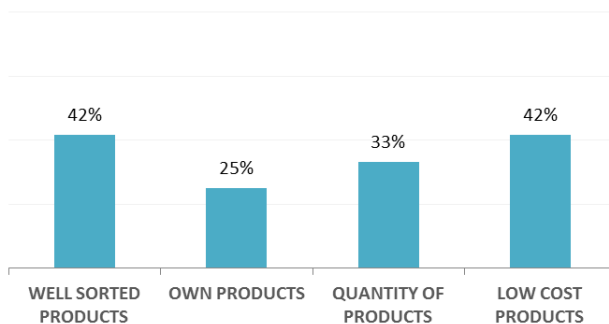


Figure 6: Percentage of surveyed recyclers that encountered difficulties to purchase well sorted and clean plastic packaging products-for-recycling in sufficient quantity and at a low price.

By **low-price products**, the recyclers mean plastic packaging products-for-recycling purchased in Vietnam, after the sorting and collection of the domestic waste by waste collectors and/or recyclable collectors. The quantity of low-cost product to purchase in the domestic market **is often not enough** for all the existing recyclers. The **imported plastic packaging products-for-recycling is more expensive but often better sorted, of better quality and cleaner** (from private interview with recycler).



EPR scheme implementation

The **difficulties** encountered by the recyclers to **purchase well sorted and clean** plastic packaging products-for-recycling in **sufficient quantity** and at a **low cost** is a **threat** for the EPR implementation in Vietnam. It evidences a **lack of treatment technology** on both sides, recyclers and suppliers. It also evidences the **poor connection between the recyclers and the operators**, which are sorting the recyclable waste, in terms of **network** and in terms of **adaptation to the needs** of the recyclers.

D) Destination markets of recycled plastic products

The recyclers surveyed are purchasing the plastic packaging products-for-recycling abroad and in Vietnam. They reported that their recycled products are dedicated mostly to the **high-quality domestic** and **export markets** requiring **standards, accounting and traceability**, rather than the domestic or export low-quality market.

E) Accounting and traceability

The **accounting** of purchased plastic packaging products and sold recycled products are **mandatory to assure the traceability** of the plastic. The implementation of an EPR scheme requires a **specific accounting and traceability system**. The questions in the survey were conceived to evaluate the current level of accounting and traceability of the recyclers and their needed adaptation to Vietnam's future EPR scheme.

1. Obligation of recyclers to receive *Red Invoice* from suppliers and declare sales activities

In Vietnam, **Red Invoice** is the nickname given to Vietnam's Value Added Tax (VAT) invoices, which are mandatory for commercial activities, depending on the legal status of the company.

56% of the surveyed recyclers reported that the issuance of a *Red Invoice* **by their suppliers is mandatory** for them, as their parent companies are subject to audits. 44% only need a *Red Invoice* occasionally. For 70% of them the **declaration of sales activities is mandatory**, for 30% of them only occasionally.

The surveyed recyclers declared that some of their suppliers **cannot issue** a *Red Invoice*. In fact, they declared to purchase the plastic packaging products-for-recycling from aggregators and recyclable collectors (section B) who belong to the so-called 'informal sector', meaning that their level of registration does not necessarily imply the payment of taxes and issuance of *Red Invoices*.

Some surveyed recyclers declared that the issuance of *Red Invoices* and the declaration of sales activities were also depending **on the requests of the client purchasing** the recycled products: some are requesting it, some do not want to have it.

It is important to note here the **capacity of adaptation** (and we could even say the obligation to adapt) of the recyclers **with both their suppliers and purchasers** for their accounting.



EPR scheme implementation

In the future EPR scheme, the recycling units, which are contracting with the Vietnam Environmental Protection Fund, with Authorized parties or which are hired or doing self-recycling (Article 76) **must report** to the EPR Portal and **must be auditable**. The participation

of non-registered stakeholders in the current system (i.e. unable to issue Red Invoice) will be then a key issue to assure the reporting and traceability of the volume recycled. Their integration or not to the EPR scheme should be debated before the EPR implementation in order to assure an auditable and traceable EPR.

2. Accounting register of recyclers

All the recyclers surveyed declared to have an **accounting register**, which can be a notebook or a software. The type of information registered is important to have a precise annual accounting and traceability of the purchased and sold products. The types of information and their respective percentage recorded by the surveyed recyclers can be found in Figure 7.

It is important to note that the information relative to the **volume of products** and the **financial transaction** are most of the time noted in the accounting register. The information relative to the **inner characteristics** of the purchased products appears secondary.

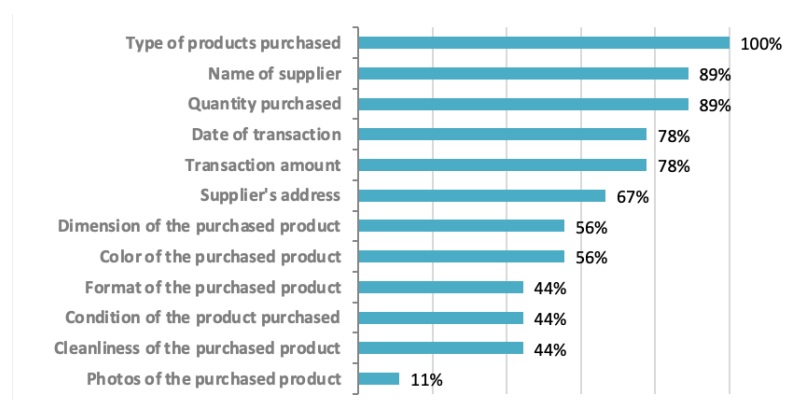


Figure 7: Information contained in the accounting register of the surveyed recyclers.



EPR scheme implementation

In the decree, the Article 80. Registration of recycling plans and reporting on recycling results defines the needs for the reporting on recycling activities. MONRE's minister will issue regulations on recycling plan, registration form and recycling result template report before January, 1st, 2024

F) Constraints on plant activities

The survey evidences different **constraints** exerted on the recycling activity of the plants. The **degree** of those constraints, in term of **stress induced** on the activity, was asked to the recyclers (Figure 8). The degrees of stress are: low stress, i.e. the constraint is manageable and does not affect the activity; medium stress, i.e. the constraint is sometimes difficult to

manage and may occasionally affect the activity; high stress, i.e. the constraint affects the activity of the recycling plant.

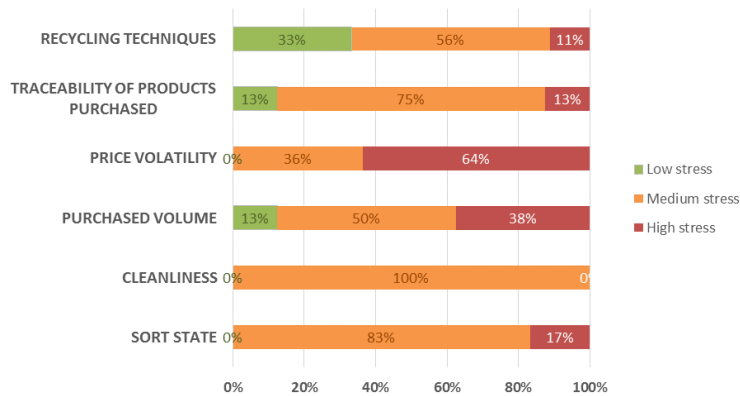


Figure 8: Degrees of stress of constraints exerted on the recyclers.

The constraints affecting the recyclers' activity the most are:

- **Price volatility:** in the informal waste collection system, the price of the recyclable waste has its own market and **fluctuates daily** according to the supply and demand
- **Purchased volume:** the quantity of purchased volume is often a critical issue as the quantities are most of the time **not sufficient** enough to achieve the recycling goals of the recyclers
- **Sorting state:** the **poor sorting state** induces extra costs to perform the recycling and decreases the quality and quantity of recycled products
- **Traceability:** the **absence of traceability** on some purchased products is limiting the access to high quality export markets and high-quality domestic markets, which requires accountancy and auditing.

Unexpectedly, the current recycling technology of recyclers who replied to the survey is not a priority constraint for their current activities.

Lessons learnt

This online social survey allowed to address some points on the plastic packaging recycling activity conducted by the recyclers. Despite the low rate of reply to the online survey, due to the covid-19 restrictions and the stress induced on recycling activity at that time, the survey allowed to **identify the current needs, constraints and limitations of the recyclers**. The better understanding of those needs, constraints and limitations is of high interest for the future EPR scheme implementation in Vietnam, since **recyclers will be a key stakeholder**. The identified needs, constraints and limitations regarding the supply and recycling are resumed here:

The suppliers of plastic packaging products-for-recycling:

- Are **diverse** and predominantly **from the recyclable waste system**
- Have a **poor traceability** in their accountancy
- Have **sorting categories** which can **differ from the recyclers' needs**
- Have **poor sorting** capacity
- Have **insufficient quantities** of plastic packaging products

The recycling of plastic packaging products:

- Is **poorly** impacted by the lack of **technology**
- Is impacted by the **price volatility**
- Is impacted by the **supply** of plastic packaging products-for-recycling
- Can **hardly fulfill the requirements** of high quality domestic and export markets

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