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# Glass Recycling Analysis and Roadmap For Vietnam





## Executive Summary

This study investigates the glass waste pathway in Vietnam. We conducted 24 in-depth interviews and surveyed 216 respondents along the waste value chain. We developed a stakeholder map showing the pathway of glass waste. The study reveals that solid wastes, especially glass bottles, are typically not segregated at source. Non-colored glass bottles and containers are mainly collected by private or public waste collectors and sold to scrap businesses for their additional income. While some whiskey and wine bottles are collected for personal use or decoration, stakeholders like individual scrap pickers and purchasers show limited interest in collecting household-generated glass waste. This hesitancy stems from various factors, including the small quantities of glass waste, limited demand for colored and broken glass, challenges associated with transporting and storing glass waste, and the low economic incentives.

Individual scrap pickers, purchasers, and waste workers, despite their contributions, earn limited income from glass waste compared to other recyclable materials like papers, plastics, and aluminum. These groups are often considered the most vulnerable, facing poverty, limited education, and a lack of skills. Addressing this income inequality is important to promote fairness and sustainability within the glass waste ecosystem.

In Vietnam, the glass production industry is predominantly comprised of small-scale enterprises, which primarily show interest in non-colored glass cullet sourced from domestic waste. The gate price for cullet at these glass producers typically ranges between 2,250 and 2,500 VND per kilogram. However, the demand for domestically recycled glass cullet is both unstable and relatively low.

In contrast, the price for imported glass cullet can be slightly less expensive, as evidenced by prices over 1,800 VND in 2019 and around 2,100 VND in 2020. Consequently, larger-scale glass manufacturers may opt to import glass cullet from overseas due to these pricing dynamics.

Adopting EPR regulations presents varied challenges for both FDI firms and local enterprises. While numerous larger firms have already initiated their own collection pilots, smaller firms still need to prepare adequately for EPR policies. Producers along the value chain might require a timeframe of about three and six months, to evaluate the feasibility of different EPR options, particularly considering the limited infrastructure and a general lack of readiness. In this scenario, there is an opportunity for collaboration with the industry to test, pilot, and expand various models. These efforts are designed to determine the most effective approaches in Vietnam and to contribute towards achieving the Ministry of Natural Resources and Environment's (MONRE) glass recycling goals.

Moreover, to improve glass waste management in Vietnam, a range of legal, market-based, and behavioral instruments should be employed. These measures consist of promoting waste segregation at its source, facilitating economically feasible initiatives, encouraging eco-friendly packaging design, integrating Extended Producer Responsibility (EPR) and Corporate Social Responsibility (CSR) programs, and ensuring transparent and efficient use of environmental funds and EPR fees. Implementation of these measures is intended to stimulate waste collection, enhance recycling infrastructure, and provide support for marginalized groups within the glass waste ecosystem.

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# Table of Abbreviations

CSR	Corporate Social Responsibility
EPR	Extended Producer Responsibility
HCMC	Ho Chi Minh City
HDPE	High-density polyethylene
HN	Ha Noi
MONRE	Ministry of Natural Resources and Environment
MSW	Municipal Solid Waste
PET	Polyethylene terephthalate
PP	Polypropylene
URENCO	Urban Environment Company



ABSOLUT  
VODKA  
PRODUCT OF BELGIUM  
SEBASTIAAN  
GRAND CRU

GB Whisky  
GOLDEN BLUE  
Premium Whisky

Đông Trùng Hạ Thảo  
Rừng Hươu L

Đông Trùng Hạ Thảo  
Rừng Hươu L



# 1. Introduction



Glass recycling is an urgent issue that has gained increasing attention in recent years, while presenting substantial economic opportunities. Glass is a unique material that can be recycled infinitely without losing any of its properties. This makes it an ideal candidate for a circular economy, where materials are reused, and waste is minimized<sup>1</sup>. However, despite its potential, glass recycling rates vary widely depending on geographic location, many countries still do not recycle as much glass as they could. For example, the US glass-recycling rate has hovered around 33% for many years, while in Europe and some states in the US with bottle deposit laws, average glass-recycling rates are closer to 70%<sup>2</sup>.

Recycling glass has enormous environmental benefits, if the US were to achieve a 50% glass-recycling rate, it would divert millions of tons of material from landfills annually while reducing greenhouse gas emissions by about 1.4 million metric tons<sup>3</sup>. The private sector and public also benefit from glass recycling, manufacturers would have lower costs because making new glass from cullet (the high-quality crushed material derived from postconsumer glass) is economical and energy efficient. This also can be generalized for the global glass recycling industry, especially in developing countries where the opportunity cost is generally lower.

In Viet Nam, the solid waste generation has significantly increased by 10 to 16% every year, and Ho Chi Minh City (HCMC) is the largest generator<sup>4</sup>. The main component of municipal solid waste is organic waste, accounting for 67%; and the waste from glass accounts for 4% of total municipal solid waste by weight<sup>5</sup>.

According to the 2022 Beverage Packaging Recycling Rate and Recycling Cost Report by Eunomia, glass containers from the beverage market make up 11% of the total units and a substantial 62% of the total weight (Figure 1-1). Beverage packaging represents about 20% of all packaging waste generated in Vietnam, but the current collection rate is quite low and varies by material type. While aluminum cans have a high recycling rate of over 70% due to their higher economic value, plastic bottles (PET, HDPE, PP) show lower overall recycling rates, ranging from 32% to 45%. However, the recycling rate for glass bottles is the lowest, estimated at only 15% according to Eunomia.

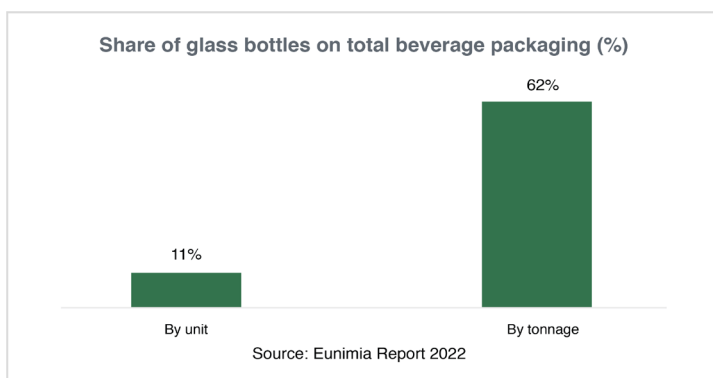
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<sup>1</sup> Glass Recycling Facts - Glass Packaging Institute - <https://www.gpi.org/glass-recycling-facts> Accessed 5/28/2023.

<sup>2</sup> The Glass Packaging Institute Sets Plan to Raise the US Recycling Rate - <https://www.gpi.org/news/a-circular-future-for-glass>.

<sup>3</sup> Glass is the hidden gem in a carbon-neutral future - <https://www.nature.com/articles/d41586-021-02992-8> Accessed 5/26/2023.

Nevertheless, Vietnam is actively pursuing enhancements in collection and recycling efforts, in part by introducing an Extended Producer Responsibility (EPR) program. Under this scheme, producers may bear the expenses associated with collection, transportation, sorting, and recycling. As regulations from the Ministry of Natural Resources and



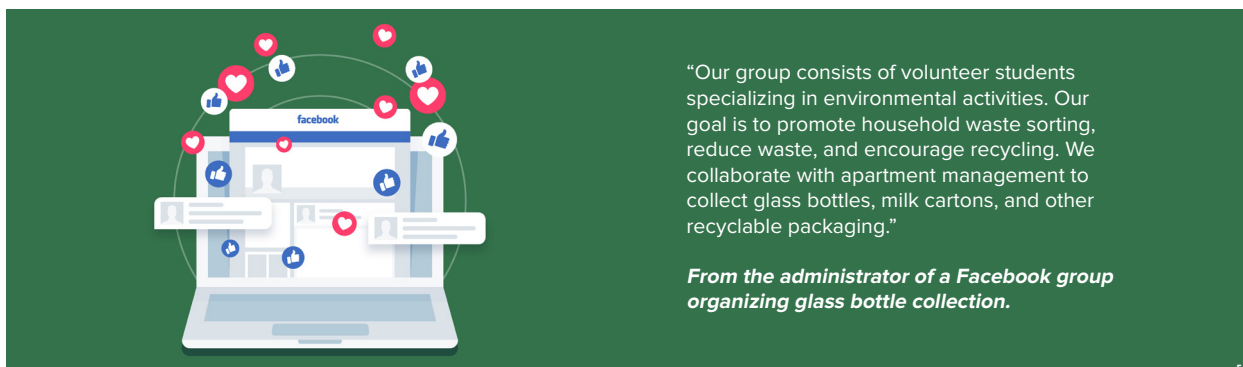
**Figure 1-1:**  
Share of glass bottles on total beverage packaging (%)

Environment (MONRE) in Vietnam regarding EPR are being swiftly adapted, it's crucial for producers and importers to have a clear understanding of the current practices and obstacles in bottle collection and recycling. This knowledge will help them fulfill their responsibilities effectively.

The scope of this research includes multiple dimensions of glass waste sorting, collecting,

purchasing, and recycling processes. It involves creating a detailed profile of the stakeholders engaged in the glass recycling ecosystem, including their roles and affiliations. The study aims to identify and assess the existing collection modes for glass waste and map out the entire pathway of glass waste, from its generation to disposal, in Hanoi (HN) and HCMC. We investigate the economic dynamics of key stakeholders involved in the glass collection, with the goal of uncovering challenges and gaps in the glass recycling system. Finally, this research demonstrates the development of a set of policies designed to address these identified gaps and promote effective, sustainable glass recycling while considering the perspectives and barriers faced by stakeholders throughout the value chain.

The report is structured as follows. Section 2 describes approaches and methodologies employed in this study. Section 3 maps out stakeholders involved in the pathway of glass waste from its sources, collection, transportation, disposal to final destinations. Section 4 analyzes economic dynamics of key glass waste collecting stakeholders. Public awareness toward the extended producer responsibility (EPR) associated with glass waste is synthesized in Section 5. Section 6 summarizes key findings and policy recommendations.



<sup>4</sup> National Environmental Status Report 2016-2020 from MONRE

<sup>5</sup> Beverage packaging in Vietnam Recycling rate & recycling cost 2022 from Eunomia.



“My café has plenty of space, making it convenient for people to bring their glass bottles here. When we have enough, I’ll text the collection team to come and pick them up. I do this because I believe in the environmental significance of this activity, I don’t receive any financial support for the collection.”

*From the café owner in Binh Tan District.*

## **2. Methodology**

In this study, we combined primary and secondary data sources to investigate the current state of glass waste management, including sorting, collecting, purchasing, transporting, and recycling, as well as the roles of stakeholders involved in the value chain. For secondary data, we reviewed official documents from the Ministry of Natural Resources and Environment (MONRE), including laws and decrees relevant to environmental protection and waste management, as well as reports from independent consultants on topics like recycling rates and industry trends.

In terms of qualitative research, we conducted in-depth interviews with a diverse group of stakeholders. Specifically, we interviewed the following stakeholders:

A wine and spirit importer	01
A local wine producer/ A local beer producer / A local fish sauce producer	04
A supermarket	01
A restaurant/ A bar:	07
A public service provider	02
A policymaker	01
A local glass producer	03
Private service provider	03
Scrap (glass) business owners	02

These interviews were tailored to each stakeholder, focusing on their specific experiences and perspectives on waste management practices, challenges in glass bottle recycling, and awareness of Extended Producer Responsibility (EPR).

Our quantitative research comprised extensive fieldwork in Ho Chi Minh City (HCMC) and Hanoi (HN), where we conducted face-to-face surveys with 216 respondents across various districts. These respondents represented different stakeholder groups, and the surveys were conducted using the Survey Solutions platform by the World Bank, which facilitated effective quality control. The details of the quality control and data collection procedure are presented in table 2.1.

**Table 2.1: Sample structure**

Stakeholders	HCMC	Ha Noi	Total
Retailers	10	6	16
Restaurants/Bars/Pubs	5	7	12
Households (end users)	20	33	53
Private waste workers (Thu gom rác dân lập)	17	20	37
Individual scrap purchasers (Thu mua ve chai)	29	12	41
Individual scrap pickers (Nhat ve chai)	25	15	40
Scrap business owners (Vua ve chai)	9	8	17



“I sell products in glass bottles, and I notice that after customers finish the products, they often discard the empty bottles into the environment. So, I encourage them to return the bottles. Additionally, I support collecting other glass bottles.”

*From the food store owner in Binh Thanh District.*

“I don't buy glass bottles because scrap business owners don't buy glass.”

*From a scrap purchaser.*





# **3. Stakeholder Mapping**

## 3.1. Recyclable material stakeholders' profile

In Vietnam, the existing waste streams, as well as the collection and disposal methods, engage a range of stakeholders spanning both the formal and informal sectors. Typically, domestic household waste is not source-separated, resulting in the mingling of recyclable materials, including tradeable ones, with organic waste and other impurities. The waste collection system is typical. In large cities, such as HCMC and HN, there are companies and specific groups that deal with keeping the city clean (like Urban Environment Company – URENCO).

For glass bottle wastes collection and recycling activities, it involves a wide range of stakeholders such as: public/private waste collection workers, scrap collectors, scrap purchasers, scrap business owners.



**Pic. 3 1 Private waste workers in HCMC**

### Private waste workers (Người thu gom rác dân lập)

Private waste collectors are self-employed individuals formed into groups to collect, aggregate and transport waste from households. Their source of income is from the collection and transportation of mixed wastes. Along with their collecting waste job, they actively sift through the mixed waste in the carts or trucks to pick out recyclable materials for extra personal income. In HCMC, this group collects approximately 60% of the generated Municipal Solid Waste (MSW)<sup>6</sup> (Pic. 3-1).

In 2022, HCMC is successful formalized this group into co-operatives/legal business entities (95% of informal waste collection groups become co-operatives/ legal business entities). Although this group receive salary for their waste collection services, they receive very limited other benefit supports such as health insurance, social insurance.

### Public waste workers (Người thu gom rác công lập)

These people are formal workers who are employed by environmental companies (district/utility service companies and urban environmental companies). Similar to private waste workers, main income of this group come from collection and transportation of mixed waste. They also separate wastes to pick up recyclable materials for extra income. The main

difference of this public waste workers from private waste workers is that the public waste workers are receiving full benefit package (salary, health insurance, social insurance, etc). In HCMC, this group collects approximately 40% of the generated MSW<sup>7</sup> (Pic. 3-2), primarily focusing on collecting waste from main streets and office areas.



**Pic. 3-2: A public waste worker in HCMC**

<sup>6,7</sup> National Environmental Status Report 2019 from MONRE

### Individual scrap pickers (Người móc bọc, người nhặt ve chai)

Individual scrap pickers are informal sector, who collect recyclable materials from trash bins, dumpsites or landfills and have no input cost. The scrap pickers then sell the recycled materials to scrap business owners for a small profit. These pickers are often referred to as scavengers, material pickers or itinerant waste pickers. They do not belong to any company/group, have no health/social insurance, and have a very limited education. Many of them are women, middle-aged, and working in hazardous conditions (Pic. 3-3).



Pic. 3-3: An individual scrap picker in HN

### Individual scrap purchasers (người thu mua ve chai)



Pic. 3-4: An individual scrap purchaser in HCMC

Individual scrap purchasers are self-employed individuals who purchase recyclable materials from households, construction sites, restaurants, etc. This group use bicycles, small pushcarts or motorbikes to cover a larger area and buy more recycled materials. They also build relationships with restaurants/bars/stores to ensure a steady supply of recyclable materials. They sell recyclable materials to scrap business owners as their primary source of income. They focus on purchasing scrap from households, rather than picking up recyclables from the street, trash bins, or landfill. Many of them are women, middle-aged and no insurance coverage (Pic. 3-4).

### Scrap business owners (vựa ve chai)



Pic. 3-5: A scrap business in HCMC

Scrap business owners who own a shop where they purchase, store, and minimally process recycled wastes collected from individual scrap purchasers/waste collectors/scrap collectors. These shops can vary in size but are often small facilities, run by families, which make a small profit by selling the recycled waste directly to the craft villages, or recycling firm (Pic. 3-5).



“In the past, we did collect used glass bottles for reuse. However, later on, the cost of buying new glass bottles became cheaper when Vietnam started having glass bottle manufacturing companies. Reusing glass bottles involves multiple processing steps: removing labels, soaking in chemicals, thorough cleaning, multiple rinses, and drying. Furthermore, it’s challenging to control the quality of bottles after processing, and there’s a risk of microbial contamination if the processing isn’t done correctly.”

*From the fish sauce manufacturing company.*

## 3.2 Glass waste pathway

Currently, the recycling and reusing of glass waste, i.e., glass bottles and containers in Viet Nam face several challenges. Despite the significant demand from glass manufacturing businesses for recycled glass as a raw material, the infrastructure for collecting and recycling glass bottles is underdeveloped. There is a lack of widespread collection systems for glass waste, leading to many of them being discarded or improperly disposed of in the environment.

Vietnam has not yet implemented a comprehensive system of classified or separated waste bins for citizens to sort waste at the source. Currently, only a few places, such as supermarkets and schools, use categorized bins, but waste sorting practices and recycling remain low. Most households dispose of used glass bottles, such as those for alcohol, fish sauce, beverages, and cosmetics, in the general waste bin.



Although the recycling rate for materials like papers, aluminum, and plastic is relatively low due to limited source sorting by households, economic incentives make the collection and sale of these materials attractive to low-income laborers (scrap purchasers/ scrap collectors/ waste collectors). This workforce plays a significant role in collecting and sorting recyclable waste, contributing to the recycling of papers, aluminum, plastic, and other materials. However, glass waste, i.e., colored glass and broken bottles, despite being recyclable, do not receive as much attention from waste collectors. According to our survey data, only 6% of scrap business owners buy glass waste. This low demand from scrap business owners doesn't motivate individual scrap collectors and waste workers to gather and sell glass waste (only 5% scrap purchasers buy glass waste; 8% of waste workers and scrap pickers collect glass waste).

The map below illustrates various routes for used glass bottles. Under Viet Nam’s current waste management system, the majority of these bottles ultimately find their way to landfills. To provide more detail, let’s describe each route individually.

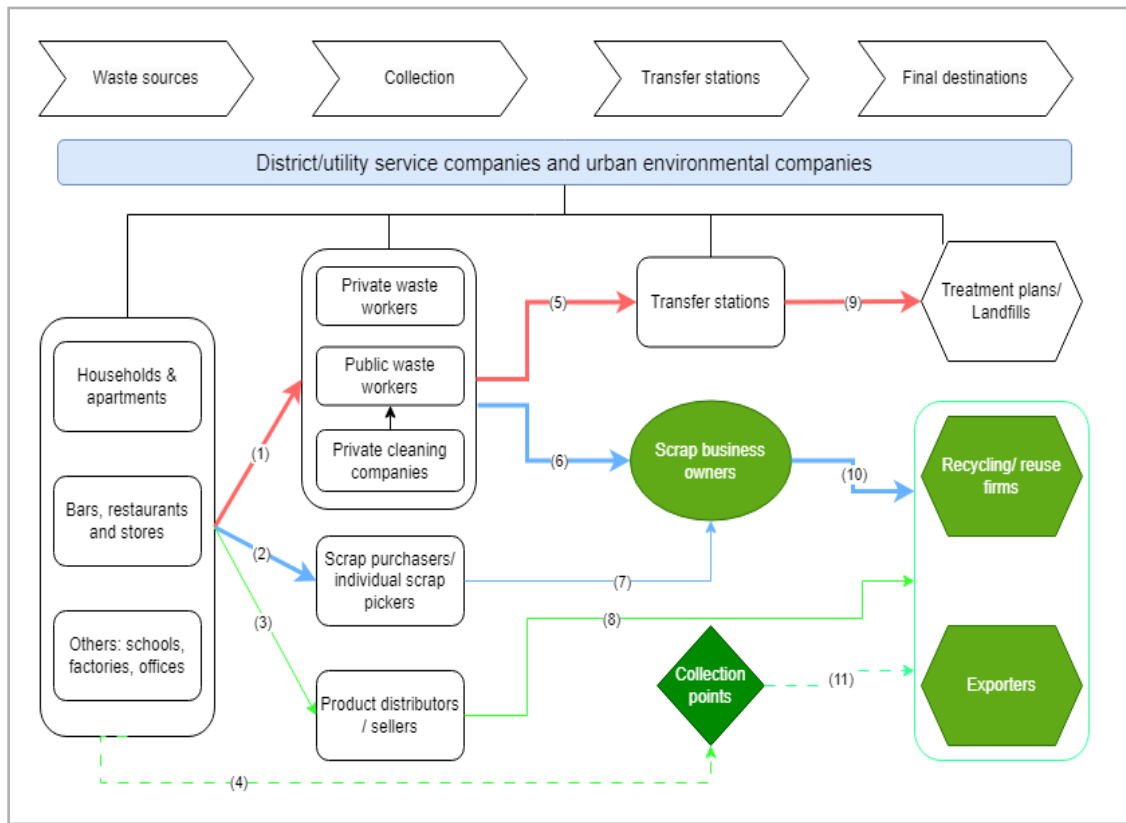


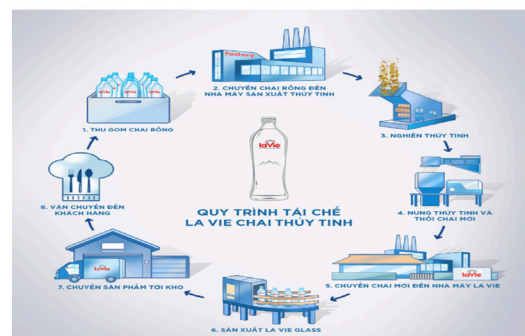
Figure 3-1: Glass waste pathway

**Route 1-5-9:** This is the main/significant pathway for used glass bottles. Since the very low economic incentives, glass bottles do not tend to be collected as plastic bottles and aluminum cans by informal sector workers. At the transfer station stage in this route, there is little/ no separation of recyclable waste and colored and broken glass waste was treated as non-recyclable waste.

**Route 1-6-10:** Some of the more valuable recyclable material (mostly clear glass bottles) is removed by the waste workers at the collection stage and they are delivered to scrap business owners and then to recycling/reuse firms or exporters.

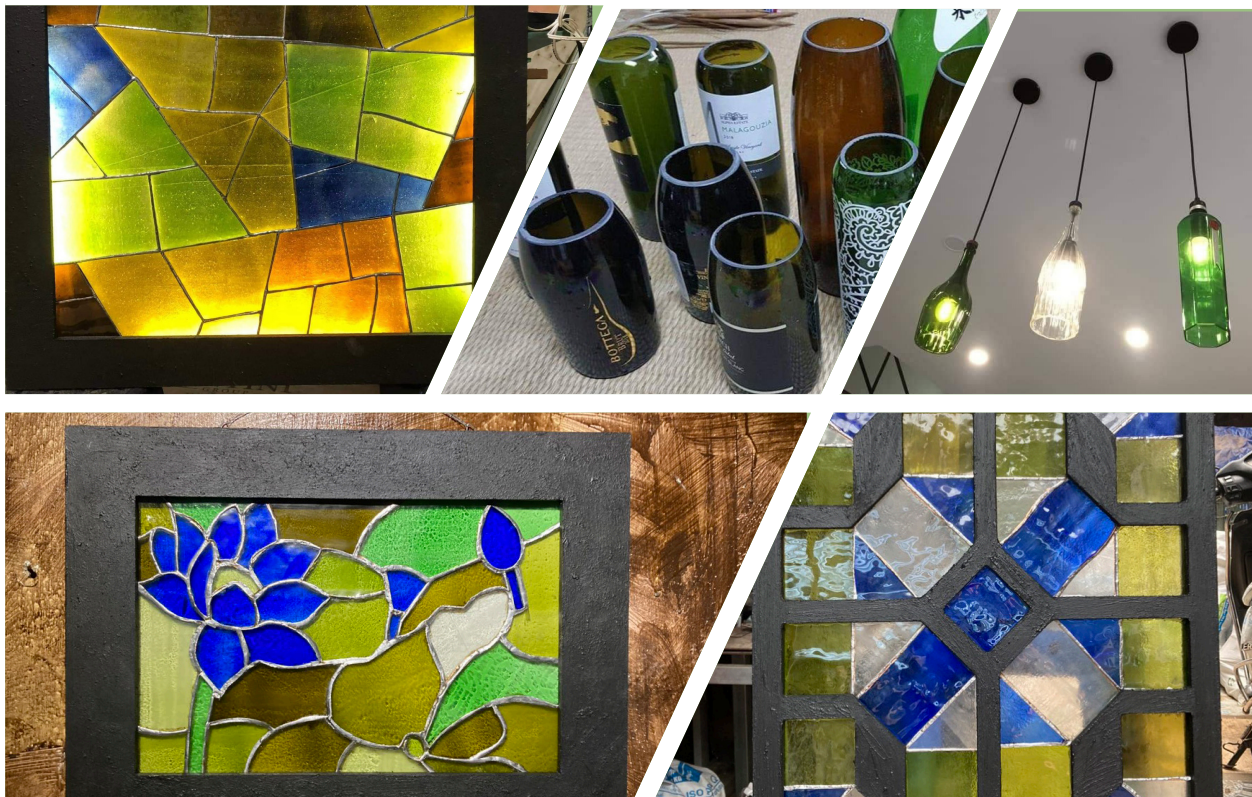
**Route 2-7-10:** Because individuals can make money from selling recyclables, some households store and sort their used packages (like cans, plastic bottles, and papers) to sell to scrap buyers and eventually to scrap business owners. However, this practice is nearly insignificant for glass bottles because the financial rewards for recycling them are much lower.

**Route 3-8:** Only a few local companies where packaging costs are a significant part of the total cost, and having established distribution and transportation systems, practice deposit refund systems (some local beer and soft drink companies) (Pic. 3-6).



Pic. 3-6: Lavie glass bottle recycling process (source: lavie.com.vn)

**Route 4-11:** We also observed that glass bottle collection activities take place in some community/ social media groups. In this route, individuals, who are environmentally conscious, gather a sufficient quantity of used glass bottles and bring them to designated collection points (retailers/ cafe shops, etc) or reuse/recycled firms can come directly to household to get clean used glass bottles. While there is a sense of environmental awareness, storing used bottles and jars at home can pose hygiene challenges for households. The purpose of reuse/ recycled firms can be varied. It can be from small glass producers or family handicraft producers who reuse glass packaging for artistic products and interior decoration (Pic. 3-7). We also observed reuse of glass bottles of wine (especially imported wine) for fake products (Pic. 3-8). Also, there is number of cullets and scrap of glass exported by Viet Nam .These materials for export originate from various sources, including scrap business owners, collection points, and product distributors responsible for the sale of wine and beer, who subsequently receive the empty containers by deposit refund systems.



**Pic. 3-7: Some handmade products from glass**



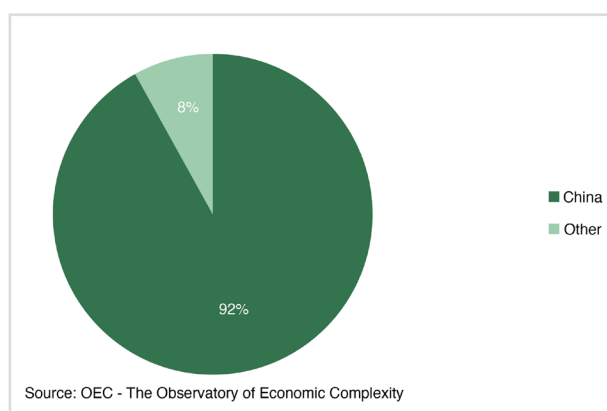
**Pic. 3-8: Reuse of glass bottles of wine (especially imported wine) for fake products.**



**Figure 3-2: Exported value in Vietnam, 2018-2022 (Source: ITC and UN COMTRADE)**

### 3.3 Challenges in the glass bottle collecting and recycling

**Limited economic benefits:** The cost of some new glass bottles imported from China is relatively low, ranging from about 2,000 to 4,000 VND . In contrast, investing in glass bottle collecting/recycling infrastructure, transportation, and the removal of contaminants incurs significant expenses, making glass bottle recycling economically unattractive (Figure 3-3).



**Figure 3-3. Percentage of import glass bottles in Vietnam (2021)**

**Pic. 3-9 Used glass bottles mixed with other waste**

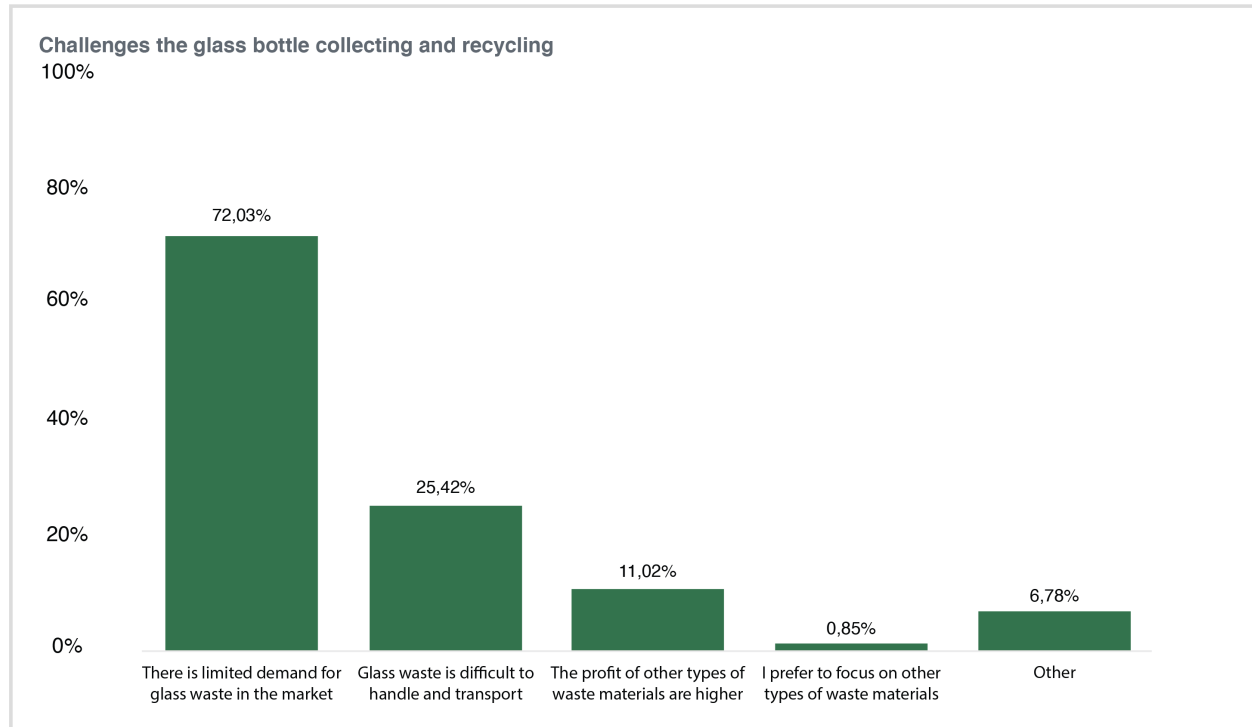
**Limited collecting infrastructure:** In some countries, with the availability of necessary facilities glass bottle collecting is carried out in two different ways: co-mingled collections (where glass bottles are collected together with other types of packaging) and separate collections (where glass bottles are collected separately from other packaging). The collecting method significantly affects the recycling rate. For example, in the UK and the US, the co-mingled system results in less cullet being returned for recycling compared to the separate collection method used in Germany and France. The reason is that glass recycling from co-mingled collections requires more processing, such as color sorting and removal of contaminants, which increases the cost. In Viet Nam, where there is currently limited glass collecting infrastructure, most colored and broken glass waste ends up in landfills.

**Difficulty in sorting non-glass substances and contaminants:** When glass packaging is sent to a recycling facility, substances and contaminants need to be removed. Some substances with magnetic properties can be removed using magnets, but aluminum, a non-magnetic metal, needs to be manually separated by workers. This manual process takes time and labor.

**Challenges in sorting glass by color:** Glass packaging of different colors needs to be sorted to match various production technologies. For example, white glass fragments are recycled into white glass packaging, and the same goes for other colors. This sorting process is labor-intensive with high costs. Additionally, other types of ceramic packaging, such as pottery and porcelain, can be easily confused with glass and need to be sorted separately (Pic. 3 9). This complicates the glass recycling process and reduces the glass recycling rate.



**Transportation and storage difficulties:** The transportation of heavy and bulky glass bottles is costly, and there is a risk of danger to laborers' health and safety. Almost all inner-city businesses, i.e., bars and shops do not have enough capacities to store glass wastes.



**Figure 3-4 Challenges in the glass bottle collecting and recycling among all stakeholders.**



[12]

# 4.

## Economic Analysis of Glass Collection

### 4.1 Cost of glass waste recycling

- Vietnamese own glass producers are mostly small-scale enterprises. They are interested in non-color glass cullet, sourced from domestic glass waste.
- The glass producer gate price of cullet ranges between 2,250 and 2,500 VND per kilogram. The demand for domestically recycled glass cullet is unstable and relatively insignificant.
- The price of imported glass cullet may be slightly lower than the price of domestically recycled glass cullet. For example, it was over 1,800 in 2019 and about 2,100 in 2020.
- Large scale glass manufacturers may prefer to import glass cullet from oversea.

We provide an estimate of the current cost breakdowns of glass waste recycling in Vietnam, based on interviews with different stakeholders. We focus on the main route (1-6-11-13 in Figure 3-1), where the most glass waste is collected and recycled.

Waste workers and scrap purchasers typically collect glass for free or buy it at a rate of 500 VND per kilogram. They then sort and sell it to the scrap business for 500 to 1,000 VND per kilogram, depending on the quality of the glass. The scrap business reclassifies, cleans, and crushes the glass into a cullet at a fixed cost of 800 to 1,100 VND per kilogram, depending on the quantity. The scrap business has a daily capacity to collect between 1 to 2 tons of clear glass waste. Finally, the scrap business packages and transports the cullet to glass producers for an estimated cost of 350 to 500 VND per kilogram, depending on the daily cullet production volume. Glass producers pay between 2,250 and 2,500 VND per kilogram for the cullet, depending on the quantity and quality.



**Table 4.1 Estimated cost breakdowns of glass waste recycling.**

Stakeholders	Waste workers/ scrap purchasers	Small scrap business owner	Big scrap business owners – Cullet Suppliers		Final cost to doorstep of glass recyclers/ producers
Activities	Collection at source	Collection (1-6)	Aggregation, sorting, and cleaning (6-11)	Transportation (6-11)	
(VND/ kilogram)	0-500	500-1,000	800-1,100	350-550	2,250-2,500

The price of glass cullet, which is produced from glass waste collected, washed, classified, and crushed by stakeholders along the main channel (1 – 6 – 11 – 13, as shown in Figure 3-1), closely aligns with the price of imported cullet. The estimated factory gate price of this cullet falls between 2,250 and 2,500 VND per kilogram. In contrast, the price of imported glass cullet, primarily sourced from Japan, the United States, and China, was approximately 2,100 VND per kilogram in 2020, while it stood at about 1,800 VND per kilogram in 2019. Consequently, the local market for cullet largely caters to small-scale glass producers who prefer non-color glass cullet. The demand for this input depends on the final products produced by the domestic producers with limited market share. That is, the demand for glass cullet sourced from domestic glass waste is also limited and unstable. On the other hand, larger glass manufacturers typically opt for substantial imports with stable supplies from other countries. For instance, in 2019, Vietnam imported over 108,000 metric tons of glass cullet valued at more than US \$8.578 million. Nevertheless, this import figure declined significantly in 2020 to around 28,000 metric tons due to the impact of the Covid-19 pandemic.

## 4.2 Economic dynamics of key stakeholders involved in the glass collection

- Income of two groups: scrap purchasers and individual scrap pickers heavily reliant on scrap collecting and trading; however, the income generated from recyclable waste is not high enough compared to the living standard in HCMC and Ha Noi. These groups represent the most vulnerable segment within the value chain for collecting and recycling glass waste.
- Private waste workers receive the better economic conditions; since this group are supported by environmental companies and co-operatives.
- Scrap business owners have significantly higher incomes compared to other stakeholders in the collection stage because they often buy and sell scrap in large quantities.

### *Economic dynamics of private waste workers*

Among stakeholders in the collection stage, private waste workers are the group with the best economic conditions. Private waste workers have a relatively high income compared to the other stakeholders, except scrap business owners (Figure 4-1). On average, private waste workers earn approximately 6.7 million VND per month. In HCMC, their income can even reach an average of 8.1 million VND per month, which is higher than their counterparts in HN, who earn an average of 5.6 million VND per month. Regardless of that difference, this income is sufficient to cover the cost of living in these two major cities.

The income of private waste workers primarily comes from two main sources: providing waste collection services and selling scrap/recyclable materials. The main source of income from providing waste collection services, averaging 5.7 million VND per month (Figure 4-4). The income from trading scrap only accounts for 16% of their total income (Figure 4-2). Specifically, they earn an average of 1 million VND per month from collecting and selling scrap (Figure 4 3). In HCMC, this monthly average income is 1.6 million VND, significantly higher than in HN, which is only around 0.6 million VND.

### *Economic dynamics of scrap purchasers*

On average, they earn approximately 3.4 million VND per month from various sources (Figure 4-1). In HCMC, their average monthly income is 2.9 million VND, which is relatively lower than their counterparts in HN. Compared to the cost of living in HCMC and HN, the income of this group will pose challenges in covering living expenses.

Our survey data indicates that trading scrap is the main income source of scrap purchasers, averaging about 2.4 million VND per month and accounting for approximately 72% of their total income (Figure 4-2, Figure 4-3). Interestingly, the level of dependence on income from trading scrap for this group in HCMC is significantly higher compared to their counterparts in HN. In HCMC, income from trading scrap on average represents about 89% of the total income for scrap purchasers, whereas in HN, this figure is only 45%. This significant difference indicates that scrap purchasers in HN try to diversify their livelihoods by seeking unstable and seasonal jobs such as household helpers and

temporary servers/cleaners. Our data indicates that 92% of scrap purchasers in HN have income from various sources, while this number in HCMC is only 17% (Figure 4-5). The other sources of income of this group in HN and HCMC are around 2.5 million VND and 0.3 million VND respectively (Figure 4-4).

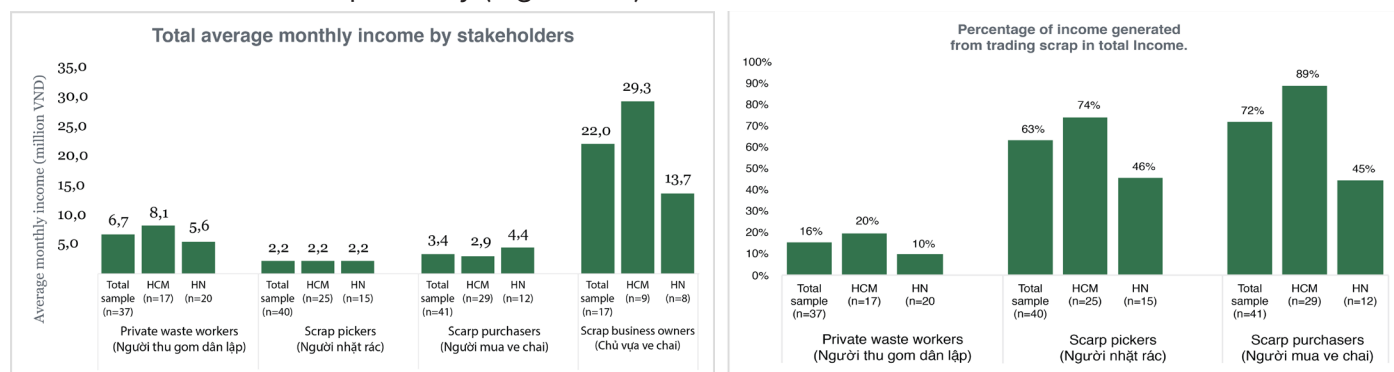


Figure 4-1: Total average monthly income by stakeholders.

Figure 4-2: Percentage of income generated from trading scrap in total income.

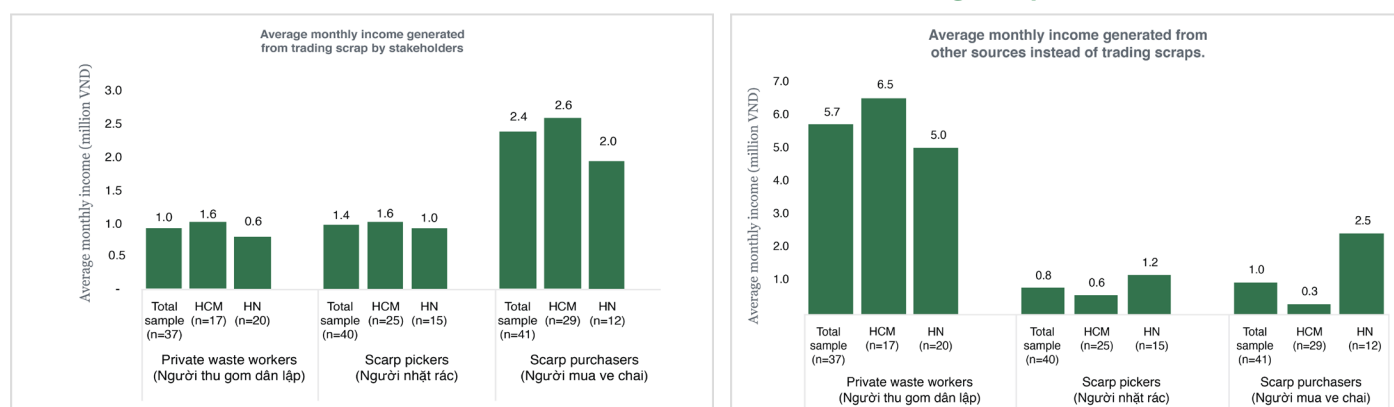


Figure 4-3: Average monthly income generated from trading scrap by stakeholders.

Figure 4-4: Average monthly income generated from other sources instead of trading scraps.

### Economic dynamics of individual scrap pickers

On average, they only earn 2.2 million VND per month, and there is no significant difference between HCMC and HN (Figure 4-1). The income of this group of scrap pickers is even very close to the poverty threshold in Vietnam. Specifically, their average monthly income is 2.2 million VND, while urban poverty in Vietnam is defined as when the average per capita monthly income falls below 2 million VND.

The majority of the income of this group comes from searching for scrap wherever they can find it, often in garbage bags, on the streets, or in market areas, and then selling it to scrap purchasers or scrap business owners. Our data shows that this activity brings them an average of 1.4 million VND per month, accounting for approximately 63% of their total income (Figure 4-2, Figure 4-3). In HCMC, 74% of their total average monthly income (approximately 1.6 million VND) comes from collecting and selling scrap, while their counterparts in HN rely only on 46% of their income from this source (around 1 million VND). Furthermore, this group earns 0.8 million VND per month from other sources instead of trading scrap (Figure 4-4).

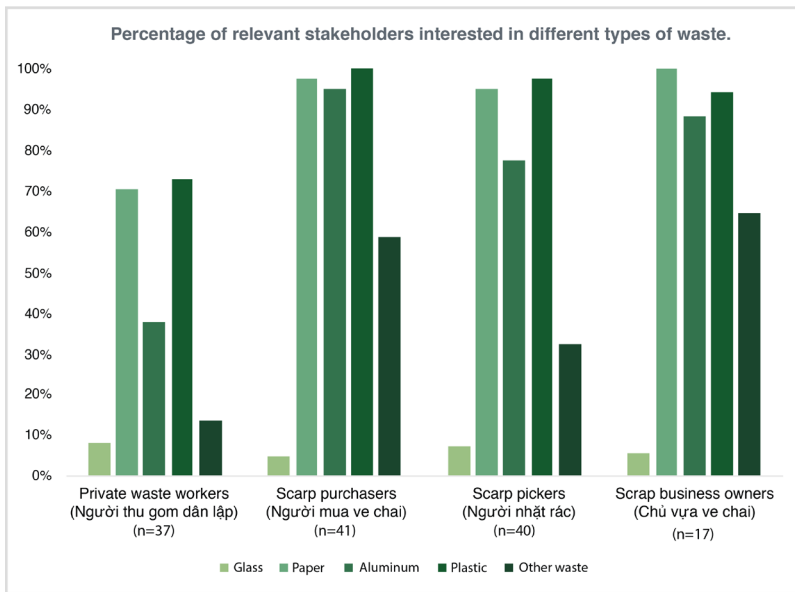
### Economic dynamics of scrap purchasers

Scrap business owners have significantly higher incomes compared to other stakeholders in the collection stage because they often buy and sell scrap in large quantities. An interesting point to note is that there is a significant difference in the average monthly income between HCMC and HN, with HCMC at 29.3 million VND compared to 13.7 million VND in HN, respectively.

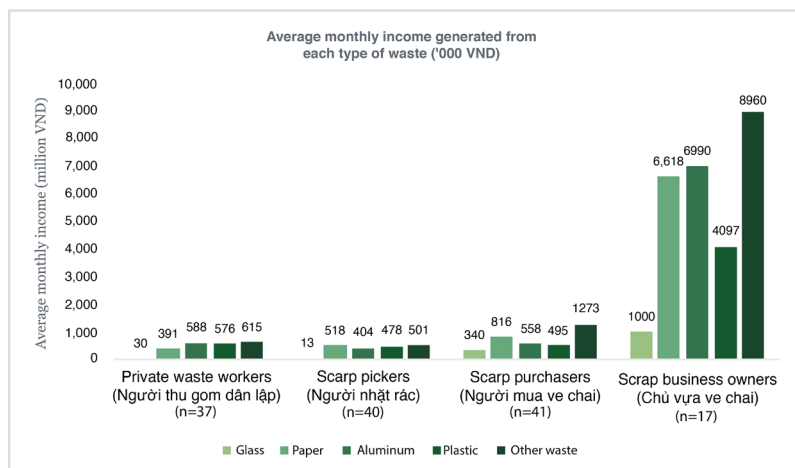
## 4.3 The economic value from different recyclable markets among key stakeholders

- A significant lack of interest in glass waste
- Income generated from glass waste is very low

In the collection stage, a significant lack of interest has been observed among stakeholders regarding glass waste whereas other types of waste receive a lot of attention (Figure 4-6). The low market demand is one of the main reasons why glass waste is not likely to be traded for income. Our survey data reveals that paper and plastics are the two favorite types of recyclable waste among stakeholders, followed by aluminum. Also, The income generated from glass waste is very low compared to other waste types (Figure 4-7).



**Figure 3-4:** Percentage of relevant stakeholders interested in different types of waste.



**Figure 4-7:** Average monthly income generated from each type of waste ('000 VND)



“I support the use of glass bottles (reuse) for bottled water, soft drinks, and beer because these products have high consumption. Especially during parties or at the office, there are often many empty bottles, and you can return them to distributors, supermarkets, or convenience stores (places where you purchase the products). For products used less frequently, like fish sauce (at least 1 month per bottle), wine, etc., there should be policies encouraging people to take them to collection points.”

***From a household.***

# 5.

## **Readiness of glass-packaged producers and public awareness in response to EPR**

- Large FDI firms demonstrate great awareness and proactive engagement with EPR initiatives.
- Small and local enterprises, particularly those with annual revenues below 100 billion VND, exhibit a hesitancy towards adopting EPR practices.
- Most individuals agree on the importance of recycling glass waste.
- Environmental benefits are the most important motivation for supporting glass waste collection and recycling.
- Retailers and Supermarket chains conducting glass recycling are also rewards.
- Consumers are willing to contribute small costs to support environmental initiatives such as EPR policies.



## 5.1. Readiness of glass-packaged producers

In Vietnam, the handling of Extended Producer Responsibility (EPR) in the context of glass bottle recycling presents a varied landscape across different types of enterprises. Currently, many companies find it most feasible to contribute to the Environmental Fund as their primary means of complying with EPR. However, this approach, while optimal for the moment, falls short of being a comprehensive solution to the recycling challenge. It doesn't actively encourage waste reduction or recycling practices.

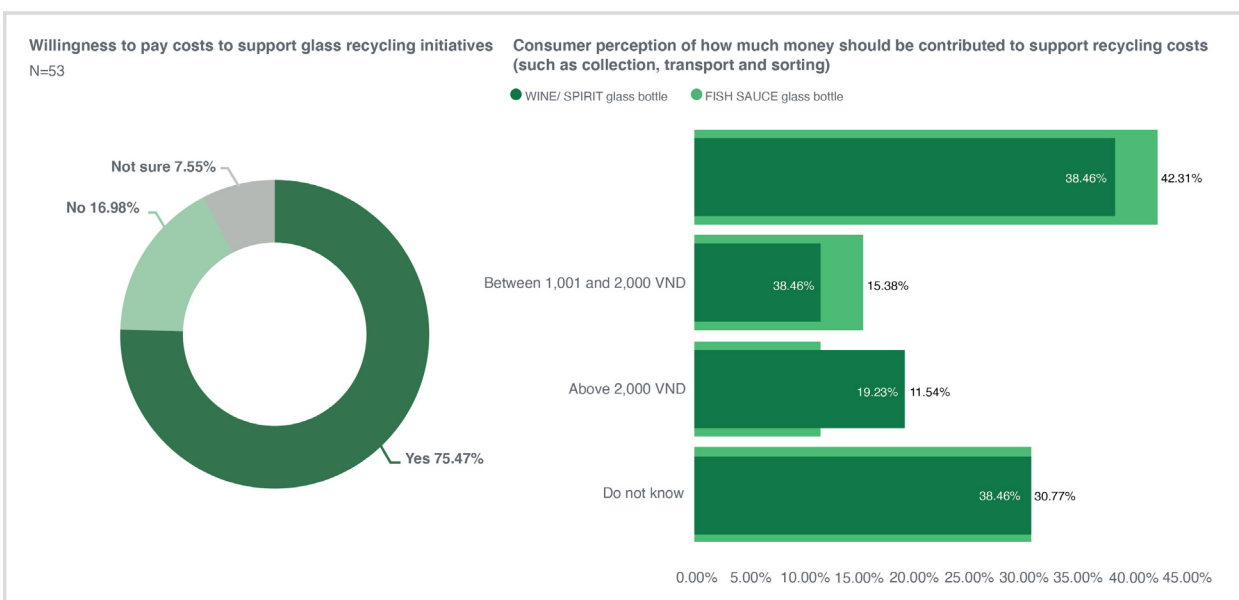
The readiness of a glass collection and recycling infrastructure is another significant hurdle. The cost and complexity of establishing an independent system for collection and recycling are prohibitively high for most businesses, creating a bottleneck in the EPR process. This challenge is even more pronounced for imported firms, which often lack access to local resources and infrastructure, making compliance with EPR regulations more challenging.

Larger firms, particularly those with foreign direct investment (FDI) and import operations, are generally more aware of their EPR responsibilities. They have started to engage in pilot projects, showcasing a growing commitment to environmental stewardship. These initiatives, however, are not yet widespread and lack uniformity in their approach and impact.

On the other hand, small and local enterprises in Vietnam often lack a full understanding of EPR. Their preparedness to effectively implement EPR practices is limited, primarily due to resource constraints and a lack of comprehensive awareness programs. This gap in awareness and resources underscores the need for more supportive policies and educational efforts to ensure that EPR is implemented effectively across all levels of the business sector in Vietnam.

## 5.2. Stakeholders' awareness and policy perception

More than 75% of household consumers are willing to contribute small costs to support environmental initiatives such as the EPR policy. For the specific amount they are willing to contribute per product, most households are willing to contribute a cost of less than 1,000 VND for a recycling standard bottle (Figure 5.1). However, when the contribution is higher (over 2,000 VND), consumers are more likely to accept it for wine bottles than for fish sauce bottles. This can be explained by the fact that wine bottles are typically more expensive than fish sauce bottles, so consumers are willing to pay more for a higher-quality bottle.



## 5.3. Public awareness and motivation in supporting glass recycling perception



Most household consumers are aware that glass products can be reused or recycled (Figure 5-2). Environmental benefits stand out as the primary motivator for supporting glass waste collection and recycling initiatives. Retailers and supermarket chains also engage in glass recycling programs, often driven by incentives and rewards. Additionally, consumers are generally willing to contribute modest costs to support environmentally beneficial initiatives, such as extended producer responsibility (EPR) policies.

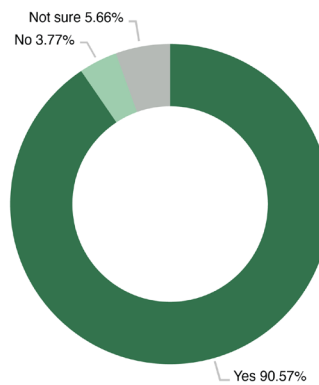


Figure 5-2: Awareness of the importance of recycling glass in general (N=53)

### Reasons motivate stakeholders in support of glass recycling

N(Households)=53 | N (Retailers/ Restaurants, Bars)=28 | N(Waste workers / Scrap purchasers)=54

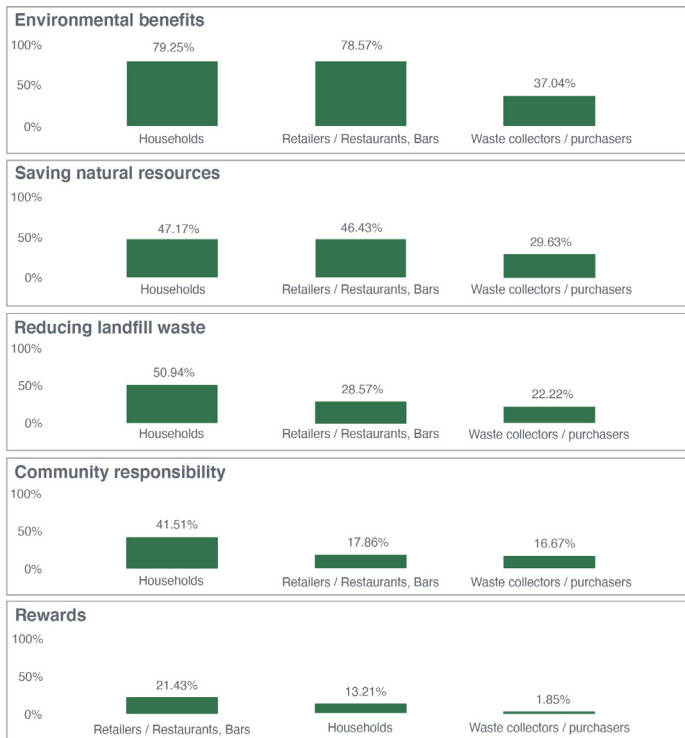
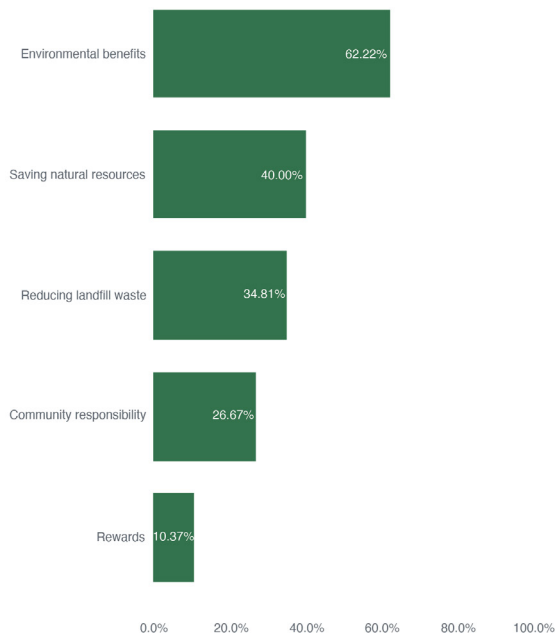



Figure 5-3: Reasons motivate stakeholders in support of glass recycling.



“When collect waste from households, I also separate clear, intact glass bottles to sell to the scrap business owners at a rate of 1,000 VND per kilogram. I don’t collect broken glass or colored bottles. Our income comes directly from the waste collection fee that households give to us, and we share 10% of it with the co-operative. Every year, the co-operative provides me with work uniform, 400,000 VND, and some small gifts.”

*From a private waste workers.*

# 6.

## Conclusion and Recommendations

### 6.1. Key findings regarding to glass bottles collection and recycling

#### Current waste collection practices

- Solid wastes such as glass bottles generally are not segregated at sources. Some whisky and wine bottles are collected by individuals for personal use, i.e., decoration or collection purposes.
- Glass waste from sources (i.e., households, restaurants and bars) is mostly collected by waste workers.
- Colored and broken glass waste ended up at landfills, although some amount of this type of glass was collected to make construction material.
- Glass wastes has very limited economic incentives in comparison to other recyclable ones, i.e., papers, plastics, and aluminum.

#### Current workforces

- Among waste stakeholders, individual scrap pickers and purchasers make very little income in general, and they are considered as the most vulnerable groups i.e., poverty, limited education background and unskilled individuals.
- Stakeholders such as individual scrap pickers and purchasers are not interested in collecting and buying glass waste generated by households.
- Private and public waste workers may segregate non-color and whole glass bottles and containers and other valuable items, i.e., papers and aluminum for sale to earn some additional income.
- Scrap business owners should play a leading role in building the collection system, given their large-scale operations and ability to generate demand for glass waste. They can circulate this information to other stakeholders in the entire glass waste collection chain

#### Cost breakdown and demand for glass cullet

- Vietnamese own glass producers are mostly small-scale enterprises. They are interested in non-color glass cullet, sourced from domestic glass waste.

- The glass producer gate price of cullet ranges between 2,250 and 2,500 VND per kilogram. The demand for domestically recycled glass cullet is unstable and relatively insignificant.
- The price of imported glass cullet may be slightly lower than the price of domestically recycled glass cullet. For example, it was over 1,800 in 2019 and about 2,100 in 2020.
- Large scale glass manufacturers may prefer to import glass cullet from oversea.

### Challenges for building glass waste collection

- One of the significant factors hindering the development of glass waste collection and recycling models is related to the consumer preferences of the Vietnamese population. In this context, consumers tend to favor plastic packaging products over glass. This results in a limited generation of glass waste, while recycling and collection systems can only be profitable when there is enough glass waste available.
- Low economic incentives compared to other wastes.
- For the demand side of recyclable glass, glass producers demand clean and non-colored glass waste for recycling. However, sorting, collecting, transporting, and washing glass waste may be costly.
- The scarcity of third-party service providers in glass waste collection.

### Readiness of glass-packaged producers and public awareness in response to EPR

- Large FDI firms demonstrate great awareness and proactive engagement with EPR initiatives.
- Small and local enterprises, particularly those with annual revenues below 100 billion VND, exhibit a hesitancy towards adopting EPR practices.
- Public awareness of sustainable glass waste management policies is high.
- A EPR fee imposed by the government on a bottle of wine could be borne by the consumers as the demand for wine in Vietnam may be inelastic.

### The use of the environmental fund must be transparent and efficient.

- Glass-packaged producers and stakeholders along the value chain, as contributors to the environmental fund, are emphasizing their interest in ensuring that government authorities promote effectiveness, transparency, and trust in the allocation and utilization of this fund. Their focus is on seeing their contributions leveraged in a manner that guarantees tangible environmental benefits.
- Glass-packaged producers call for clear, comprehensive reporting on the fund's management, including specifics on interest earned, allocation, and resource use. Additionally, they are interested in the strategic application of EPR contributions, advocating for economically viable initiatives that enhance waste infrastructure and promote source waste segregation, along with the implementation of reward systems for outstanding recycling practices. This approach is aimed at optimizing the impact of their contributions towards sustainable and efficient waste management and trust-building.

## 6.2. Policy recommendations for government

This section outlines a framework for policymakers to develop and implement effective glass waste recycling policies. The framework emphasizes the importance of identifying target groups and acknowledging that policies may have differential impacts on various stakeholders (Figure 6.1). Subsequently, it highlights the need to mobilize inputs and resources from relevant stakeholders. Specific strategies and policies, referred to as interventions, are then recommended for implementation by both the government and different stakeholders. These interventions are expected to lead to measurable outputs.

Ultimately, the long-term goal is to achieve outcomes that benefit all stakeholders and society.

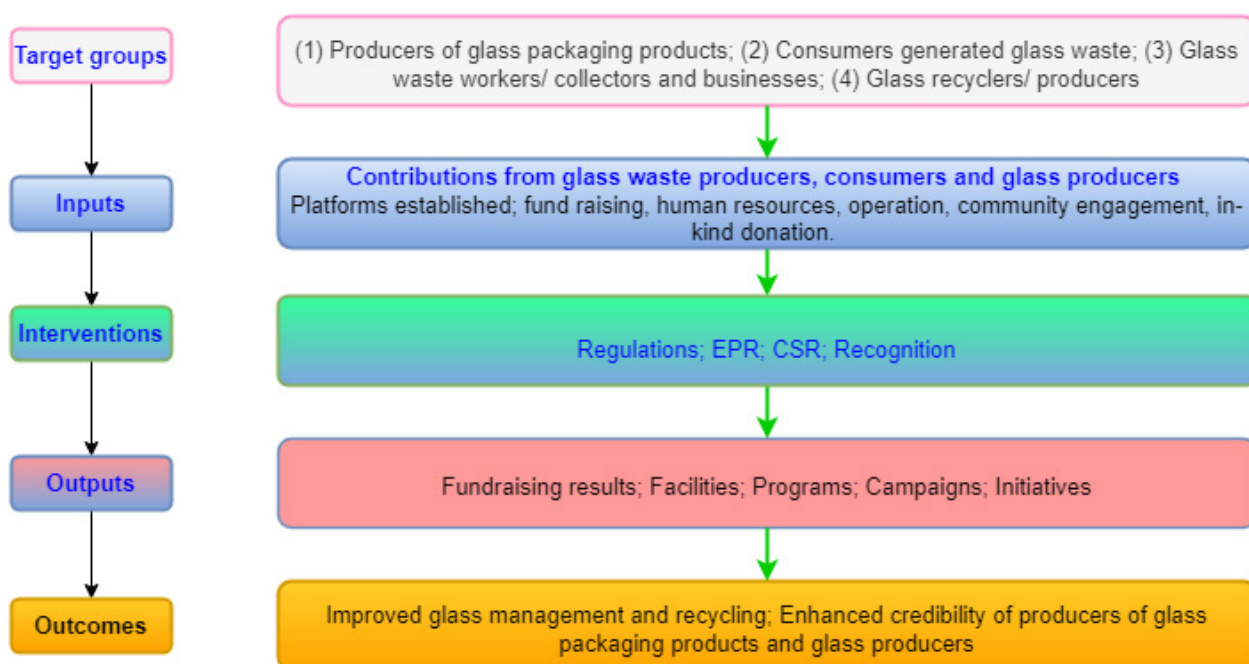


Figure 6.1 Policy interventions for glass waste recycling

### 6.2.1. Legal instruments

- Allowing the glass-packaged producers to test the different EPR options as different firms or groups of firms may favor different EPR options. This may require necessitate a timeframe of approximately three to six months.
- Recognizing and regulating a required threshold of recycled material inputs for some products, i.e., bottles.
- Developing policies that promote eco-friendly design packaging, i.e., eco-friendly labelling, making bottles easy to collect, prioritizing non-colored glass bottles. The government should also set eco-friendly packaging standards. Over time, when making adjustments to EPR regulations, it is important to incorporate these eco-friendly packaging indicators.
- Creating opportunities and platforms for producers or producer alliances that choose to contribute to recycling costs via EPR, integrating the use of the environmental fund

with their CSR programs to support vulnerable groups such as individual waste pickers and waste workers to enhance work safety and well-being.

- Enhancing law enforcement pertaining to waste offences, a continuous enforcement mechanism can be implemented through a targeted reporting system, such as a hotline or mobile app, enabling active participation from local residents.
- Policies should also demonstrate that reuse of packaging materials should be preferred to recycling as recycling with outdated technology may create other environmental issues, i.e., air pollution or water use.
- The EPR options, including self-collection (i.e., the deposit-refund system), third party collection and paying a recycling cost, as drafted are viable.

### 6.2.2. Market-based instruments

- Subsidizing glass recyclers and domestic glass producers to make sure that glass cullet sourced from domestic glass waste is cheaper than the imported cullet, i.e., a subsidy of 500 VND per kilogram of glass waste. The financial source may come from environmental taxes or the environment fund. This helps increase the price of recyclable glass waste to incentivize waste collecting and purchasing and scrab businesses.
- Building collection points for recyclable materials, i.e., glass bottles and glass waste. This helps achieve economies of scale, i.e., gathering large enough quantity of glass.
- Equipping necessary facilities, i.e., different bins for hazardous, recyclable materials, glass and organic waste, separate transportation means. This will help reduce collection and transportation costs.
- Promoting different collecting methods where feasible, i.e., co-mingled collections (where glass bottles are collected together with other types of packaging) and separate collections (where glass bottles are collected separately from other packaging).
- Attracting private sectors who are capable of waste collection, transportation, and recycling. This will ensure the efficiency and sustainability of waste management.

### 6.2.3. Behavioral instruments

- Implementing a system of green practice recognition by offering rewards serves as an incentive to encourage and improve recycling efforts among producers and retailers, i.e., green practice recognition.
- Running public education campaigns via different channels, i.e., social media, celebrities, and influencers. This can also involve producers as a win-win strategy, i.e., enhancing credibility.



### 6.3. Recommendations for glass-packaged producers

Glass-packaged producers may consider establishing a collection system focusing on their primary outlets, i.e., large bars, stores and restaurants in the first stages. This requires cooperative coordination among different members of the association.

In the later stages, to reduce the cost of collecting glass waste, glass-packaged producers should rely on the current ecosystem by incentivizing the waste workers and scrap purchasers who are already responsible for collecting other types of recyclables.

Glass-packaged producers should consider integrating cooperate social responsibility (CSR) projects and the use of the environmental fund to support waste workers who are known as marginalized groups. This serves multiple purposes, i.e., improving glass waste recycling and enhancing reputation among communities.

Glass-packaged firms may consider eco-friendly design packaging, i.e., eco-friendly labelling, making bottles easy to collect, non-colored glass bottles are prioritized. This helps reduce collection and transportation costs.

Glass-packaged producers may consider the following third parties (presented in Appendix A1) who are capable of providing the service. The most important factor to consider when selecting a third party to cooperate with to comply with EPR regulations is whether the third party can provide certification.



## References

- [1] Law No. 72/2020/QH14: Law on Environmental Protection, issued on November 17, 2020, by the National Assembly of Vietnam. This law serves as a fundamental reference point for environmental protection regulations within the country.
- [2] DECREE No. 08/2022/ND-CP on Elaboration of Several Articles of the Law on Environmental Protection, issued on January 10, 2022, by the Government of Vietnam. This decree provided elaborations on several Articles of the Law on Environmental Protection, offering specific guidelines and directives.
- [3] Draft Decision for Recycling Costs Determination: This document outlined proposed methods for determining recycling costs.
- [4] Draft Narration Document Proposing Recycling Cost Norms and Administrative Management Costs to Support Waste Treatment: This document presented a narrative detailing the proposed norms and administrative management costs intended to support waste treatment initiatives.
- [5] “National Environmental Status Report 2019” from MONRE
- [6] “Beverage packaging in Vietnam Recycling rate and recycling cost 2022” from Eunomia
- [7] “Vietnamese glass industry growth trends 2017” from Glassworldwide
- [8] “How circular is glass? A report on the circularity of single-use glass packaging, using Germany, France, the UK, and the USA as case studies” from Eunomia

# Appendix

## A1. Third-party service providers in glass waste collection

### A1.1 VECA

VECA is a clean tech company established in 2020 with the mission of solving waste pollution and digitizing the scrap market by technology, specifically VECA applications. VECA operates their business in 19 districts in HCM city only; currently has over 37,000 installed users and collects 7 tons of scrap/ month via mobile app. Veca has the potential to create an efficient recycling ecosystem and marketplace for recyclable materials, support EPR and PRO by providing market data and statistics on the recycling market, promote Information Education and Communication (IEC) programs, provide transparent and cost-effective transactions.

### A1.2 Ve chai chu hoa

Ve Chai Chu Hoa (VCCH), or Uncle Hoa Junk Shop, is a social enterprise in Ho Chi Minh City, Vietnam that collects and recycles recyclable waste. VCCH buys clear glass bottles for 500 VNĐ/kg, with a minimum order of 500kg. They offer collection, transportation, and storage services from collection points for 1,500 VNĐ/kg, or 60,000 VNĐ per day per collection point if the order is less than 40kg. They can produce the report aligned with EPR requirements.

### A1.3 PRO Vietnam

PRO Vietnam, or Packaging Recycling Organization Vietnam, is a coalition of leading FDI and Vietnamese companies that aims to promote a circular economic model through more accessible and sustainable packaging collection and recycling process. It was established in 2019 and has 21 members as of today.

Currently, PRO focuses on collecting PET, cartons, and can packaging. They take advantage of the existing waste management ecosystem to collect targeted packages by working with scrap business owners and recycling partners, investing in equipment and infrastructure, and subsidizing key actors in the supply chain.

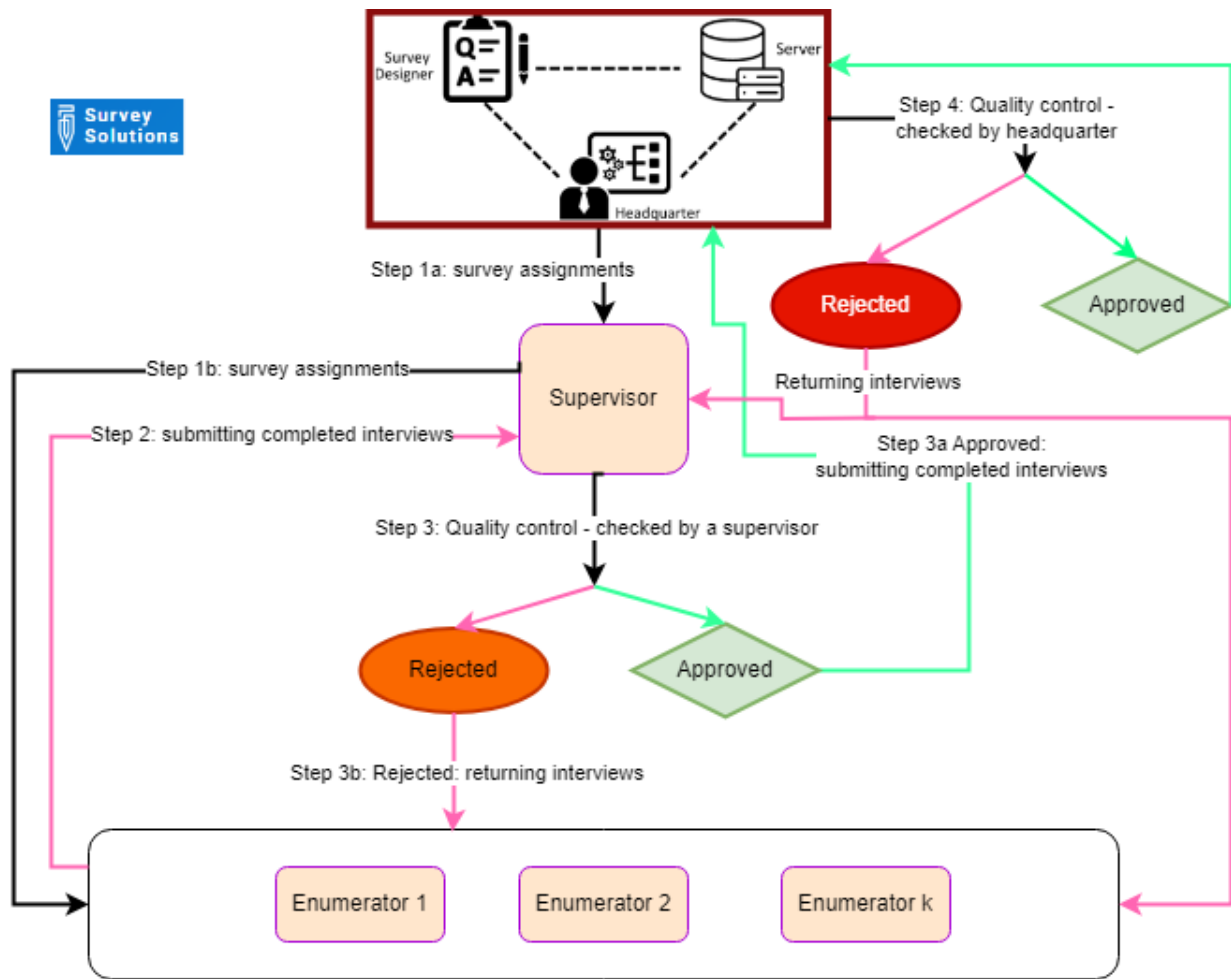
PRO issue certificates to their members in proportion to the total audited number of used packages collected, regardless of whether the used packages are from their members' products.

### A1.4 Vietnam Waste Recycling Association

Hiep Hoi Thai Che Chat Thai Viet Nam (Vietnam Waste Recycling Association) is a non-profit organization established in 2021 to promote and develop the waste recycling industry in Vietnam. The association has over 100 members, including domestic and foreign companies, research institutes, and universities. VWRA offers a variety of services and tasks, such as: Door-to-door waste collection, transportation, recycling and treatment (for non-recyclable waste).

VWRA can provide glass bottle collecting at national wide level and reasonable costs. They can produce reports aligned with EPR requirements.

## A2. Data collection procedure



A2. Quality control and data collection procedures



# Disclaimer

This report is prepared by EEPSEA and funded by APISWA.

EEPSEA has taken due care in the preparation of this report to ensure that all facts and analysis presented are as accurate as possible within the scope of the project. However, EEPSEA is not responsible for decisions or actions taken on the basis of the content of this report.

We acknowledge the contributions of Pernod-Ricard, Diageo, the Vietnam Beverage Associations, local glass producers, wine and beer producers, consumer goods firms, waste collectors, restaurants, bars owners, public service providers, retailers, policy makers, researchers. Their input through interviews and discussions has been invaluable.

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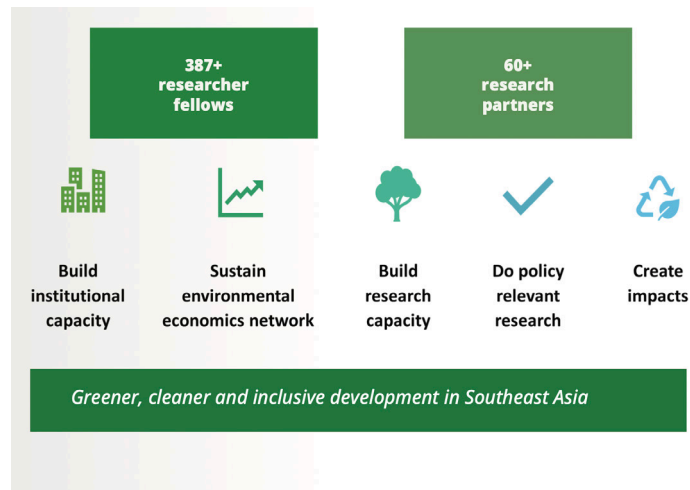
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As of December 2023

# About EEPSEA

EEPSEA conducts environmental economics and transdisciplinary research to address challenges at the human-environment interface in Southeast Asia. We engage researchers from diverse disciplines, decision-makers, and communities to foster sustainable development in the region.

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