



# Vulnerabilities of the plastic waste sorting at source for recycling in HCMC, Vietnam. A waste audit.

## Abbreviations

CITENCO: City Environment Company

ENDA: Environment and Development Action in Viet Nam

ES: Environmental sanitation

EPR: Extended Producer Responsibility

HCMC: Ho Chi Minh City

HI: Health insurance

IRD: French Research Institute for Sustainable Development

IWCs: Independent waste collectors

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

SI: Social insurance

VND: Vietnam Dong, Vietnamese currency

WSAS: Waste sorting at source

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## I) Introduction

### A) Rationale

According to HCMC Department of Natural Resources and Environment, the City disposes of 9,500 tons of domestic solid waste every day, in which plastic waste accounts for a high proportion (ranked after organic waste only), about more than 1,500 tons. The amount of waste increases on average from 6 - 10% per year. The rapid increase of municipal solid waste, which has diverse and complex properties and composition, has put pressure on the waste management, collection, transportation and treatment.

The solid waste collection, transportation, and treatment are still spread out and not centralized. Vehicles, equipment and technology for collection, transportation and treatment are not synchronous and modern yet. The current solid waste treatment has not focused on solutions to reduce, reuse, recycle and recover energy from waste, thus, a high amount of solid waste is treated by landfill technology. At the moment, Ho Chi Minh City has not successfully organized a network for recyclables collection. More than 80% of recyclables amount (mostly LDPE, PS and organic waste) is buried with domestic waste, exhausting resources and budget, and affecting the environment.

Global plastic pollution has already caused serious consequences for the environment and the marine, as well as influenced several economic and social issues. An estimated 11 million tons of plastic are leakage into the world's oceans every year<sup>1</sup>. Globally, 32% of packaging waste is being disposed of into the environment<sup>2</sup>.

In recent years, Vietnam has made great efforts in environmental protection and waste management, especially regarding plastic waste. Vietnam has issued many important legislations such as: National Strategy for General Management of Solid Waste to 2025 with vision towards 2050; Directive No. 33/CT-TTg of the Prime Minister on strengthening management, reuse, recycling, disposal and reduction of plastic waste; Decision No. 1316/QĐ-TTg of the Prime Minister approving the scheme for strengthening management of plastic waste in Vietnam; The National Action Plan on Sustainable Consumption and Production for the Period of 2021-2030 and other Action plans on reducing plastic waste of Ministries and local authorities. Law on Environmental Protection – No. 72/2020/QH14 – approved by the Fourteenth National Assembly on November 17, 2020, introduced the concept: "Circular Economy is an economic model in which design, production, consumption and service activities aim to make use of resources and materials, extend product life-cycle and minimize negative impacts on the environment". Besides, the 2020 Law on Environmental Protection also has specific provisions on extended producer responsibility (EPR) and other provisions related to the reduction, recycling, reuse and disposal of plastic waste

### B) Research context

The pilot project 'Enhancing plastic packaging collection, sorting and recycling', implemented by the Institut de la Recherche pour le Développement (IRD) and the Hanoi Architectural University (HAU), is funded by the 'Rethinking Plastics – Circular Economy Solutions to Marine Litter' project of the European Union and the German Federal Ministry for Economic

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<sup>1</sup> Lau, Winnie WY, et al. "Evaluating scenarios toward zero plastic pollution." *Science* 369.6510 (2020): 1455-1461

<sup>2</sup> Neufeld, F. Stassen, R. Sheppard, T. Gilman, Eds., *The New Plastics Economy: Rethinking the Future of Plastics* (World Economic Forum, 2016)

Cooperation and Development (BMZ). '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.

To fulfill all the activities of the pilot project, IRD contracted with ENDA to elaborate and conduct social surveys along the post consumers plastic packaging value chain (including consumers, domestic and recyclable aggregators, transporters, recyclers) in order to identify and report in HCMC on the difficulties encountered for the sorting, collection, monitoring and traceability of waste.

### C) Research Objectives

- To audit the domestic waste situation in District 4, Binh Thanh District, and Nha Be District of HCMC
- To evaluate the vulnerability of the plastic value chain and to identify the difficulties encountered for the sorting at source, collection, monitoring, and traceability of recyclable waste in HCMC
- To suggest solutions to the identified difficulties and problems.

### D) Subject and scope of the research

Details on research subjects, number of questionnaires, and sites are specified in Table 1. The survey period was from September 15, 2021 to the end of December 2021.

*Table 1: Number of questionnaires by research subject and site.*

Subject	Site		
	District 4	Binh Thanh District	Nha Be District
Household	15	15	15
Aggregator	6	14	9
Company	3	3	3
Grocery store	3	3	3
Market	1	1	1
Supermarket	1	1	1
School	1	1	1

Sampling methods:

- For domestic waste from households, companies/offices, grocery stores

Before the audit, Enda staff worked directly with leaders of independent waste collectors' cooperatives in District 4 (Environmental Service Cooperative of District 4), Binh Thanh (Thong Nhat Environmental Sanitation Cooperative), and Nha Be (Environmental Service Agricultural Cooperative of Nha Be) to plan the time, place, and manner of the audit and to coordinate collaborators, volunteers, and local independent waste collectors who would support the audit.

+ Duration: The audit lasted 7 days from Monday to Sunday for three districts of #4, Binh Thanh & Nha Be, from November 1 to November 21, 2021. The audit took place in the afternoon for District 4 and Binh Thanh, and in the morning for Nha Be District; these are the daily waste collection times in these research sites.

+ Locations: streets having population density and waste generation representatives for the selected locations, based on the advice of independent waste collectors and with the availability of all research subjects to participate in the waste audit.

+ Waste audit procedure: After making a list of subjects for sampling, namely households, companies/offices, and grocery stores in the research sites, Enda staff and independent waste collectors were assigned to conduct the audit according to the planned time and locations. Waste was sorted directly at the households where it was collected into different types as follows:

- Organic waste
- Plastic bags
- PET plastic bottles
- Shampoo and shower gel bottles
- HDPE
- Food wraps
- Single-use plastics
- Other plastics (household appliances, children's toys, and so on)
- Other waste



*Figure 1: Waste sorted on-site by an independent waste collector.*

After sorting, all sorted waste was weighed on an electronic scale and recorded. Then, the waste was handled by independent waste collectors as usual.



*Figure 2: An independent waste collector is weighing each specific type of waste after sorting.*

Enda staff interviewed households, companies, and grocery stores according to the questionnaire. Volunteers and local independent waste collectors also participated in the interviews.

- For aggregators

Enda staff directly interviewed and observed the aggregators.

- For waste from supermarkets, schools, and markets

Since May 10, 2021, all schools must comply with the Directive of the People's Committee of Ho Chi Minh City on suspension of direct teaching and educational activities in educational institutions within the City. The daily waste statistics at the schools and the percentage of waste by type were estimated based on the daily amount of waste collected by waste collectors before the pandemic. The waste amount was estimated based on the number of garbage bins with a known daily capacity.

For markets and supermarkets, questionnaires were completed based on the information collected from direct interviews with waste collectors, shop owners, and small traders in the survey areas. The waste amount was estimated based on the number of garbage bins with a known capacity collected daily by collectors. The survey was conducted from November 22 until December 15, 2021.

## **II) Enabling and challenging factors during the survey**

### **A) Enabling factors**

The close cooperation between Enda Vietnam (consultant) and IRD/ Rethinking Plastics (consultant hiring party) helps solve arising issues easily and actively support each other.

Enda Vietnam has long experience in environment sector, especially in solid waste management in HCMC. Enda has started working in the field of environment and paid its attention to informal sector in the solid waste management system of HCMC and community awareness raising on environment, waste sorting at source since 2006 until now. Thanks to Enda's working relationship and understanding of the informal sector & community, communication with these forces is not a difficult task for data collecting. Enda Vietnam has a long-term cooperation and working relationship with HCMC Department of Natural Resources and Environment as well as other local authorities working in the City solid waste management system, especially City Environment Companies (CITENCO) of Districts and the City. Enda Vietnam has extensive experience with projects in the community; so, it is enthusiastically supported by the communities wherever the survey takes place.

The staffs and volunteers serving the survey all have experience in working with the solid waste and informal sector.

### **B) Challenging factors**

The survey took place when HCMC suffered complicated and severe waves of COVID-19. On the first days of the survey, authorities imposed curfews across HCMC, all services were closed including aggregators. Until October 1, 2021, authorities started to loosen curfew restrictions and only a few aggregators were opened. After November 2021, the situation gradually returned to normal. Due to this issue, it takes a lot of time to collect sufficient information and data from aggregators as required (according to IRD's terms of reference). For some aggregators, interviews were conducted three times to get complete information.

As Enda Vietnam's staffs and volunteers directly surveyed and interviewed households, markets, supermarkets, offices/companies, school, aggregators, independent waste collectors, street waste pickers during the complicated developments of the pandemic, it's mandatory to provide the staffs and volunteers with proper and costly personal protective equipment to ensure safety and prevent risks of spreading or contracting of the disease.

Because 100% of the surveyed aggregators in particular and aggregators in HCMC in general operating without business licenses, they were afraid or shy to provide information to the survey team. We have to make commitments not to disclose any personal information in order to avoid affecting their business in the future. As they have no business licenses, they receive a lot of reminders and warnings from the local authorities. Therefore, these aggregators face a high risk of going out of business in the future.

Due to the complex developments of COVID-19 in HCMC and the fear of catching or spreading the disease for both interviewers and interviewees, we faced some difficulties in making contact with these households, markets, school, daily shops, aggregators, independent waste collectors and street waste pickers.

Rainy weather affected the waste audit and the survey as well as the audit results because the audit needed to be carried out continuously for seven days in each research site.

For markets and supermarkets, survey participants were unable to answer a few questions that are representative of the entire facility, such as contract signing with recyclables collectors, the necessity of recycling bins, and so on.

### III) Main findings

#### A) Households

At the audited sites, on average **one household generated about 2.94 kg of waste/day, equivalent to 0.88 kg/person** (Figure 3). Binh Thanh got the highest average amount of waste per household as well as per capita with 3.37 kg/day and 0.97 kg/person. Next was District 4 with 3.11 kg/household/day and Nha Be with 2.33 kg/household/day. However, in terms of the amount of waste per capita, Nha Be had a larger amount of waste than District 4 (0.90 kg/person in comparison with 0.79 kg/person) Figure 4.

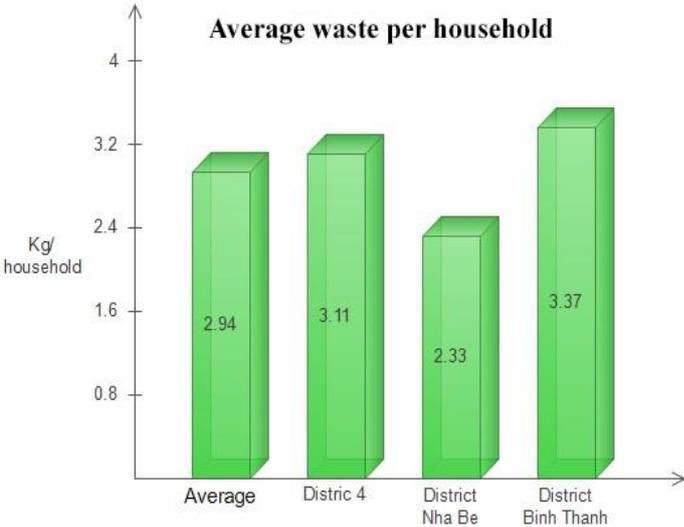


Figure 3: Average waste per households measured at Districts 4, Nha Be and Binh Thanh

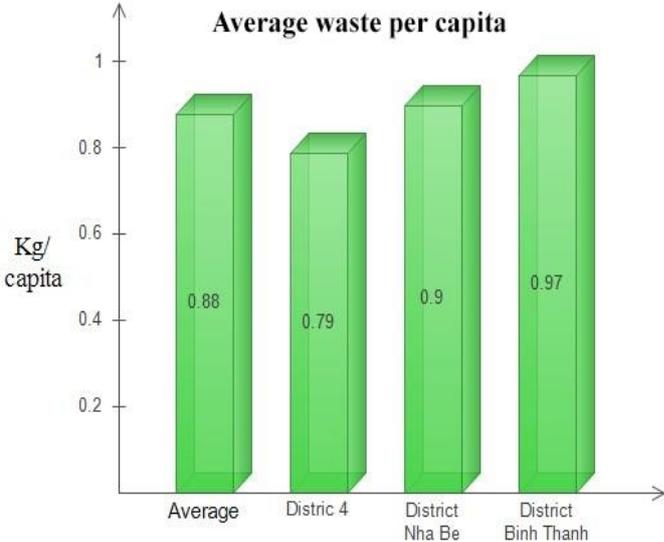


Figure 4: Average waste per capita measured at Districts 4, Nha Be and Binh Thanh.

Organic waste accounted for **80%** of the total amount of waste (by weight), plastic waste for **15%**, and the remaining waste for **5%** (Figure 5).

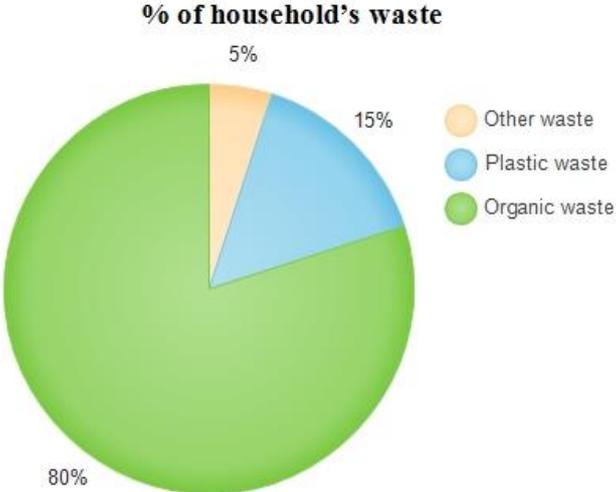


Figure 5: percentage of organic, plastic and other waste in household's waste

Among plastic waste, **plastic bags and packaging (LDPE) accounted for the largest proportion, with 61%** (Figure 6). Single-use plastic (PS) made up the second largest part, with **14% of the total amount of plastic waste, followed by PET 8%, HDPE 6%, PVC 3%, PP 0%, and other plastics 8%**.

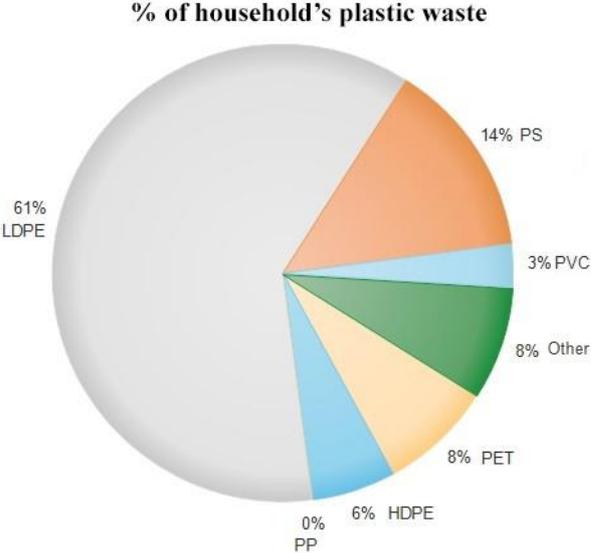


Figure 6: type of plastic waste and their respective percentage in household's plastic waste.

**Plastic waste collected for recycling accounted for 22%** (Figure 7). It includes PET bottles: 8%; shampoo, shower gel bottles and similar products (HDPE: 6%); as well as other plastics: 8%. This amount of plastic waste was collected by street waste pickers and independent waste collectors, and was sold to aggregators.

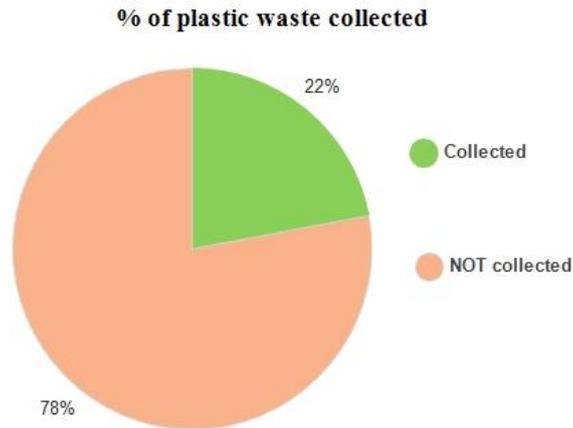


Figure 7: percentage of plastic waste collected and not collected at households.

The remaining plastic waste accounted for more than **78%** (Figure 7) but was not collected due to their non/low-economic value and hard-to-recycle nature, including plastic bags and packaging (LDPE:61%, PS:14) and PVC: 3%.

After the surveys in the districts 4, Binh Thanh, and Nha Be, Binh Thanh had **the largest over all amount of plastic waste** (49% of the total amount), District 4 made up **32% of the total amount, and 19% was the proportion of Nha Be**. The plastic waste amount in Binh Thanh area was high because many households ran online businesses at home during the pandemic, so their amount of disposed plastic bags and packaging was higher than that of other households. In Nha Be District, thanks the amount of plastic waste was lower than in the other two sites because the street waste pickers already crossed these streets to collect/purchased high-valued plastics from households so the remained plastics in waste audited was lower than Binh Thanh or Q4 ( not collected high-valued plastics before audit).

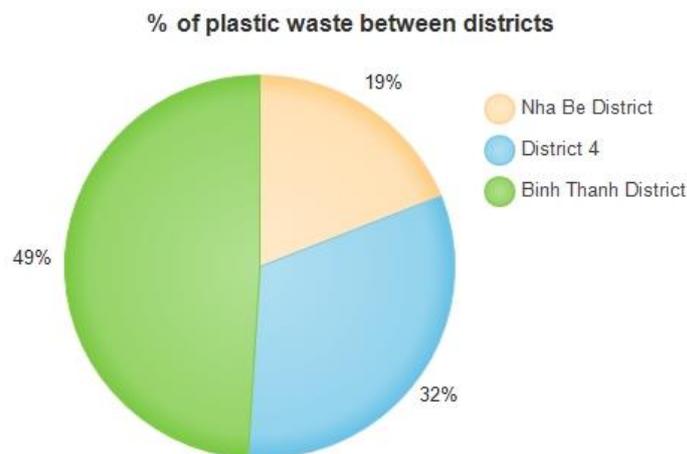


Figure 8: repartition of plastic waste at households between districts 4, Nha Be and Binh Thanh.

During the Covid-19 pandemic, from May to October 2021, waste generation from most households increased as members of families were not allowed to leave their houses due to the government decree (curfew order) (Figure 9). The amount of plastics also went up during the pandemic due to the growth in the use of disinfectant sprays, hand sanitizers, mouthwash, and so on.

**% of increase/ decrease volume of waste during the epidemic**

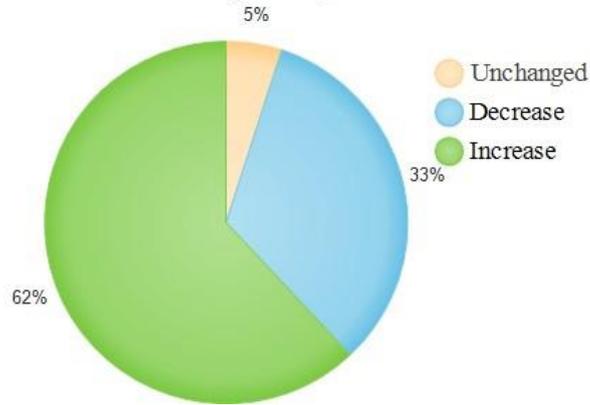


Figure 9: variation of volume of waste during the pandemic.

49% of households sorted their waste for recyclables while the remaining did not (Figure 10).

**% of household waste sorting**

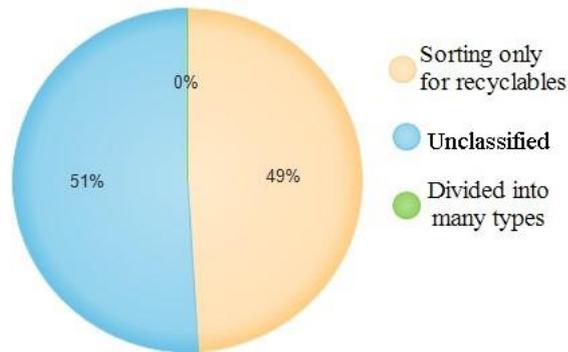


Figure 10: percentage of households operating the waste sorting at source.

40% of households sorted their waste made profits from waste sorting. Some households sorted their recyclables and gave them to Independent waste collectors and street waste pickers, renouncing the profits (Figure 11).

**% of households benefited from recyclables sorting**

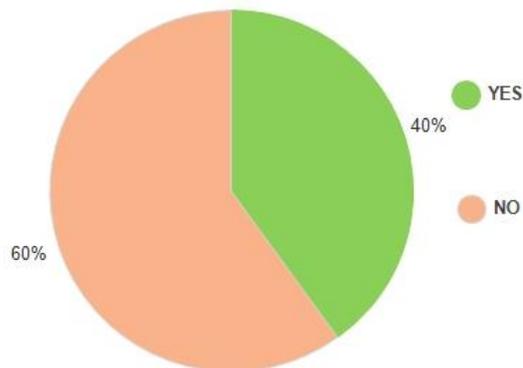


Figure 11: percentage of households getting profits from recyclables waste sorting.

Most of the recyclable waste sorted by the community people were high-valued plastics and metal products (Figure 12). High-valued plastics accounted for **42% (PET, HDPE and other plastics) while metal products made up 37%**, mainly beer and soft drink bottles. Paper products accounted for 19% of the amount of recyclables sorted by the people. Although single-use plastics were recyclable, they were not sorted by the people because they had low economic value and were too bulky to be stored indoor, so they only accounted for 2% of the amount of sorted recyclables.

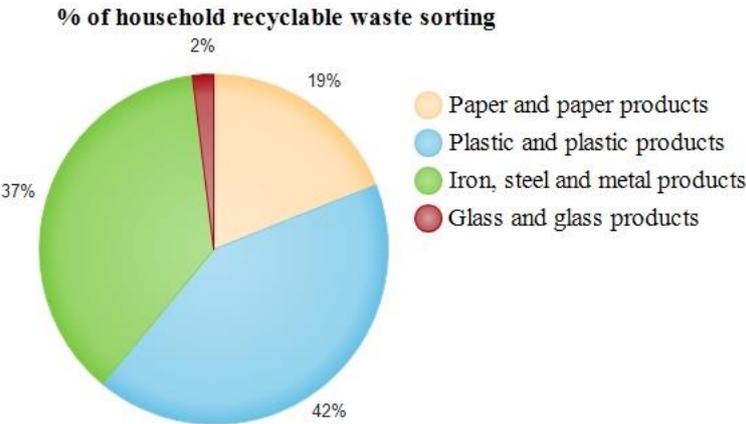


Figure 12: type and respective percentage of recyclablewaste sorted by households.

**62% of the sorted recyclables at households were collected by independent waste collectors**, followed by **38% collected by street waste pickers (ve chai)** (Figure 13). Independent waste collectors would sort recyclables from households and sell them to aggregators. Some households had the habit of pre-sorting recyclables for independent waste collectors, the others sorted their waste to sell them to street waste pickers. About 70% of recyclables mixed with domestic waste were sorted out by independent waste collectors (estimated by independent waste collectors), the remaining 30% were not sorted due to a lack of time. However, during the pandemic, there was a remarkable reduction in the amount of recyclables sorted by waste collectors. Some independent waste collectors even stopped collecting recyclables to minimize the possibility of infection.

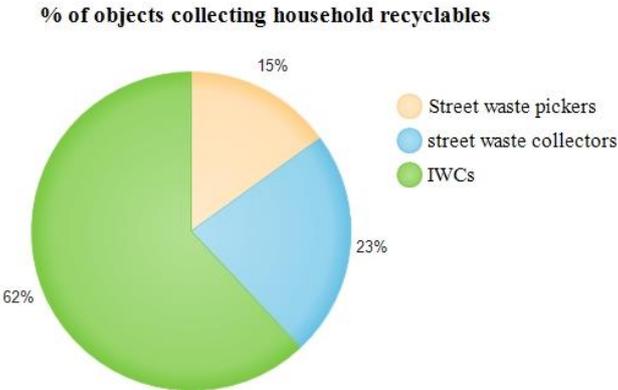


Figure 13: Type and respective percentage of collectors collecting the recyclable waste at households.

In terms of recyclables trading, most households **neither needed** an accessible waste collecting facility or waste traders **nor wanted to enter any contracts** with official collection

units (Figure 14). Because the economic value of the trade with recyclables was much lower than their main income, most people were not interested in profits from selling recyclables or any legal obligations from entering into contracts. Besides, as HCMC had independent waste collectors collecting up to 65% of daily domestic waste, IWCs could easily have access to the sources of recyclables and sell them to aggregators.

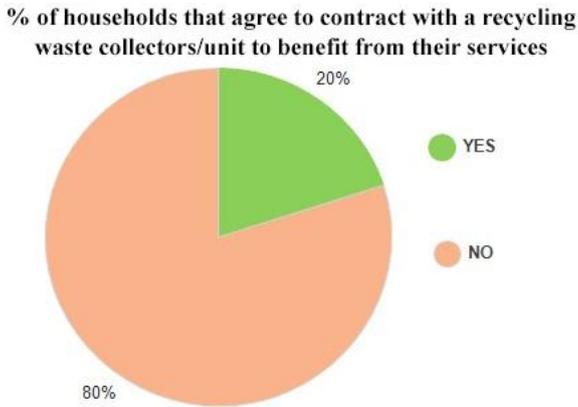


Figure 14: percentage of households agreeing or not to contract with recycling waste collector unit.

The percentage of households **receiving training on waste segregation at source was 80%** (Figure 15). According to the survey results, in every district there were many training courses on waste segregation at source held locally by organizations, such as Women’s Union, Youth Union, and Enda Vietnam. However, no household applied their knowledge on waste segregation at source in practice because there was no system of segregated waste collection, thus, urban/City environmental companies and independent waste collectors still mixed the sorted waste when collecting and transporting it. But most people already knew how to segregate their waste. According to the survey results, **91% of survey participants knew about waste segregation at source** (Figure 15).

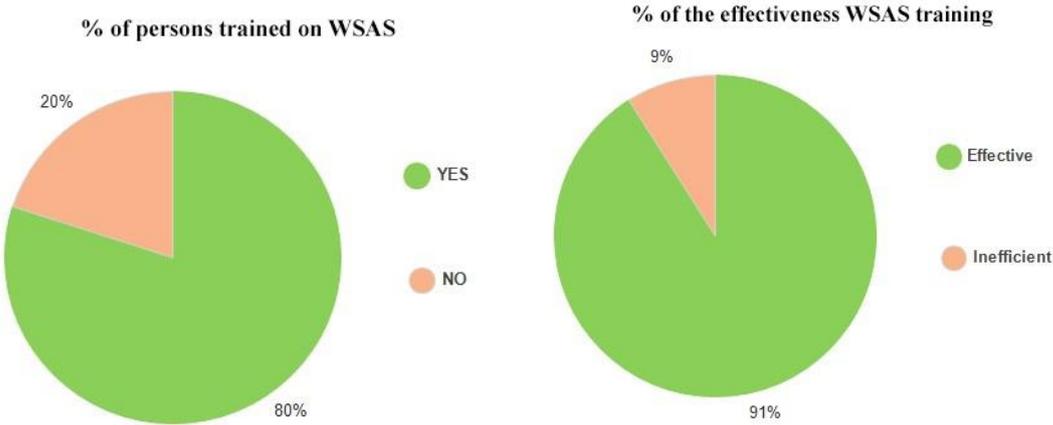


Figure 15: a-left) percentage of inhabitants trained for waste sorting at source (WSAS) in households and b-right) percentage on the perception of effectiveness on WSAS by inhabitants.

Among the households participating in the survey, **51%** did not have enough space in the house to store recyclables and **58%** needed recycling bins (Figure 16).

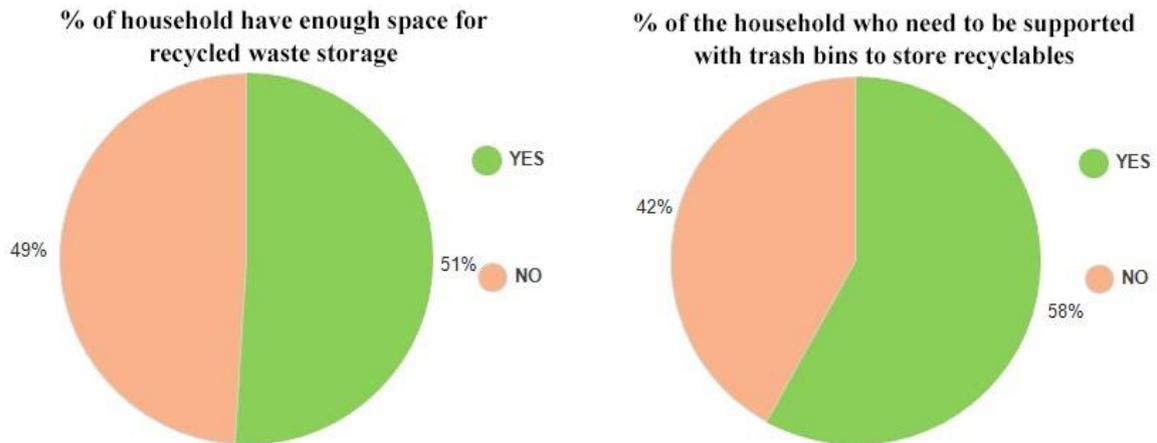


Figure 16: percentage of households a-left) having or not enough space to store the waste and b-right) needing or not recyclables bins.

The households' recyclable waste was collected by independent waste collectors & street waste pickers, so **71% of the households participating in the survey thought that it was not necessary to have a public collection space on the streets for recyclables**. The remaining **29%** stated that it was necessary to have a collection space on the streets for recyclables after waste segregation at households (Figure 17).

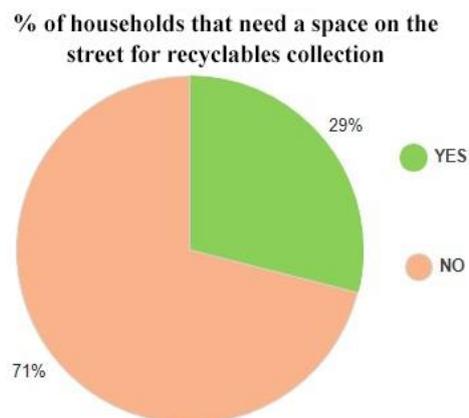


Figure 17: percentage of households favorable or not to have public collection space for recyclable waste

In terms of the Extended Producer Responsibility (EPR) mechanism, all interviewed households were not aware of this mechanism (Figure 18).

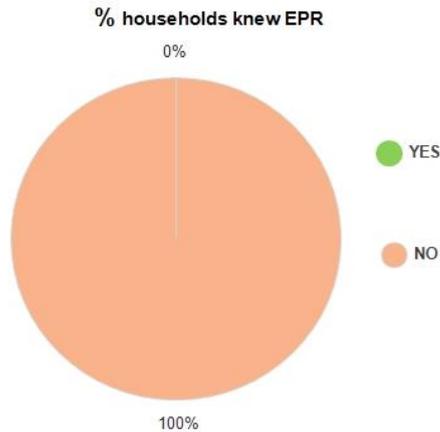


Figure 18: percentage of households aware of the EPR mechanism.

### B) companies and offices

The waste audit at three company offices, which had returned to normal operation after the pandemic revealed that the amount of waste in these offices were **organic waste at 21%**, **plastic waste at 38%**, and **other waste at the highest proportion of 41%**, consisting of mainly cardboard and printing papers (Figure 19).

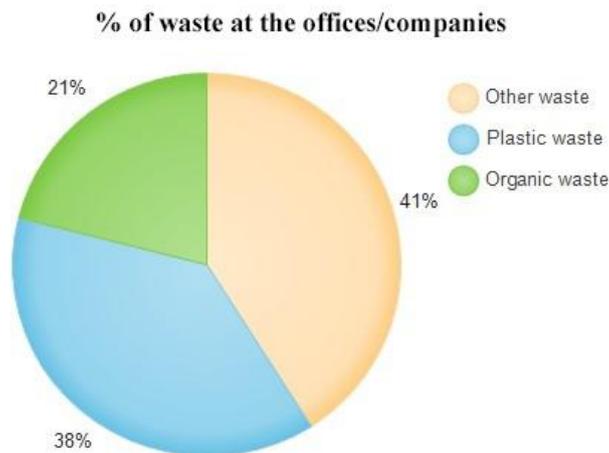


Figure 19: percentage of organic, plastic and other waste in office's waste.

Among plastic waste in the offices, plastic bags and packaging accounted for the highest percentage of **45% of the total amount**, **single-use plastics (coffee cups, food containers, etc.) ranked second with 33%**, **PET bottles made up 19%**, and the remaining plastic including food wraps, HDPE bottles & others only accounted for a small percentage of 1-2% (Figure 20).

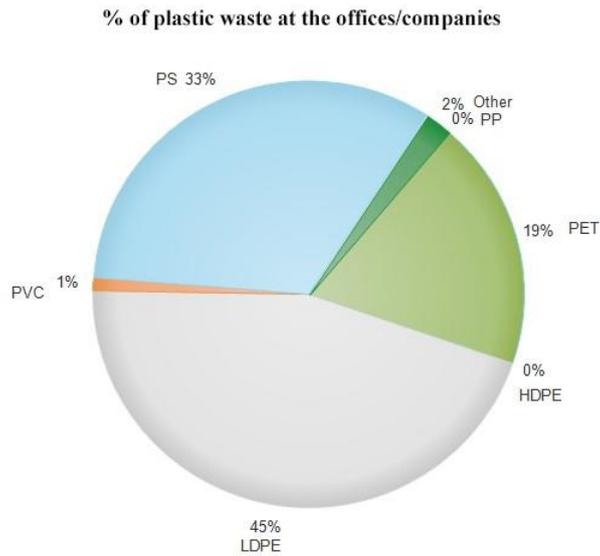


Figure 20: type of plastic waste and their respective percentage in office's plastic waste

According to the survey results, no personnel was trained about waste segregation at source and no waste segregation at source was ever conducted at the offices (Figure 21). Waste segregation at source did not catch enterprises' attention because it had nothing to do with their business and they did not have any legal obligations.

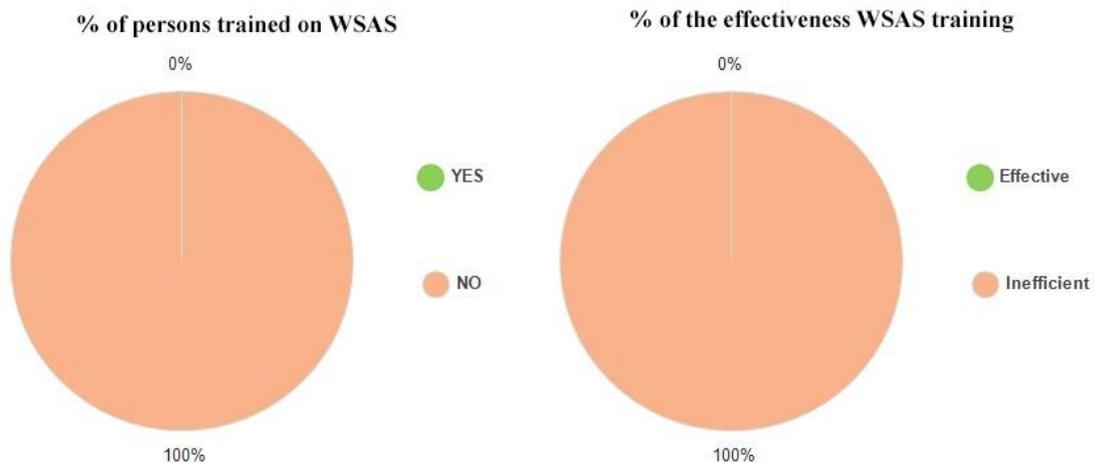


Figure 21: a-left) percentage of inhabitants trained for waste sorting at source (WSAS) at offices and b-right) percentage on the perception of effectiveness on WSAS by inhabitants.

Companies participating in the survey were also not aware of the EPR mechanism (Figure 22).

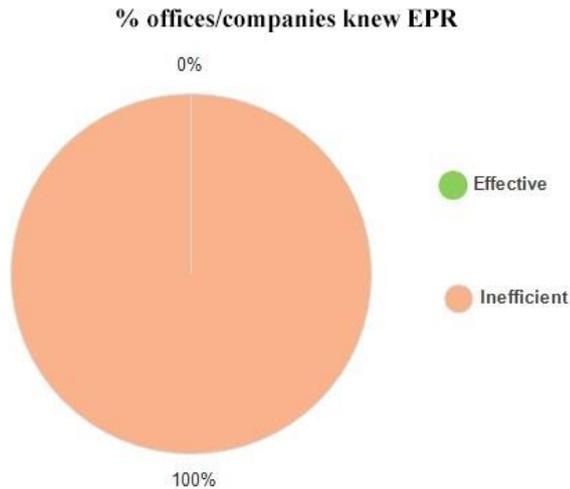


Figure 22: percentage of offices aware of the EPR mechanism.

In term of recyclables, companies did not sort recyclables before disposing of it because they had no space to store recyclable waste (Figure 23). Therefore, the companies did not need any recycling bins either. Recyclable waste was collected with other types of waste.

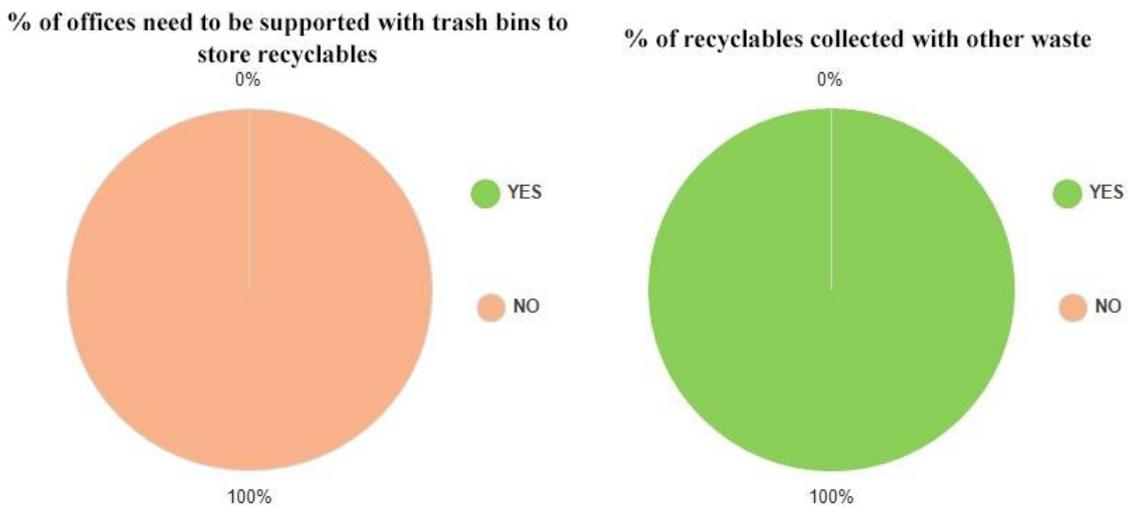


Figure 23: a-left) percentage of offices needed support with trash bins and b-right) percentage of recyclable waste collected together with remaining waste.

The companies neither made any profits from the recyclables trading nor wanted to enter any contracts with recyclables collectors or traders because of the very few profits and legal issues when entering contracts (Figure 24).

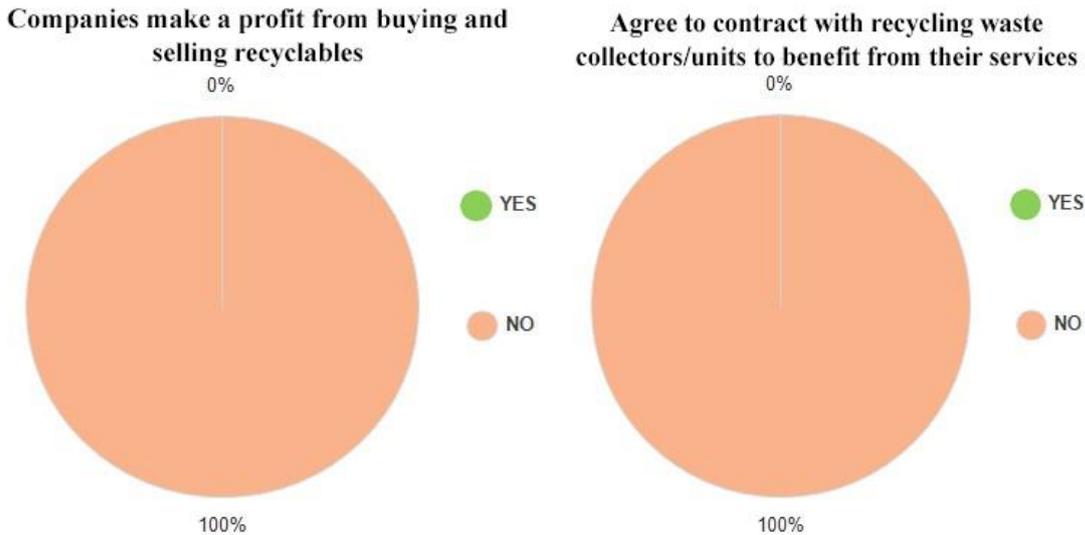


Figure 24: percentage of offices a-right) making or not profit from recyclable waste and b-right) agreeing to contract with recyclable waste collectors.

### C) Schools

During the survey, schools were closed in accordance with Government directives, so there was no waste generation in place. **The average amount of waste was about 520 kg/day**, specifically, 480kg/day for District 4, 600kg/day for Nha Be District, and 480kg/day for Binh Thanh District (Figure 25). The above waste volumes were estimated based on the number of garbage bins of known capacity at schools by independent waste collectors.

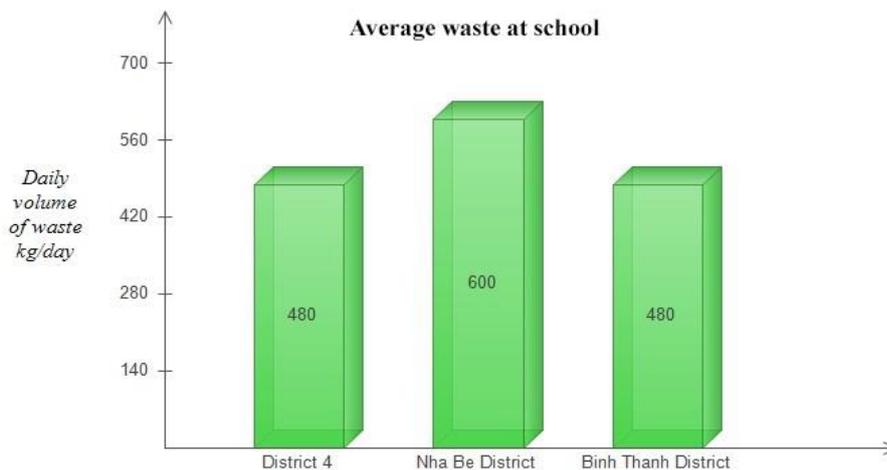


Figure 25: average daily volume of waste at schools of districts 4, Nha Be and Binh Thanh.

According to estimates by independent waste collectors, the amount of waste at schools consisted of the following compositions and percentage:

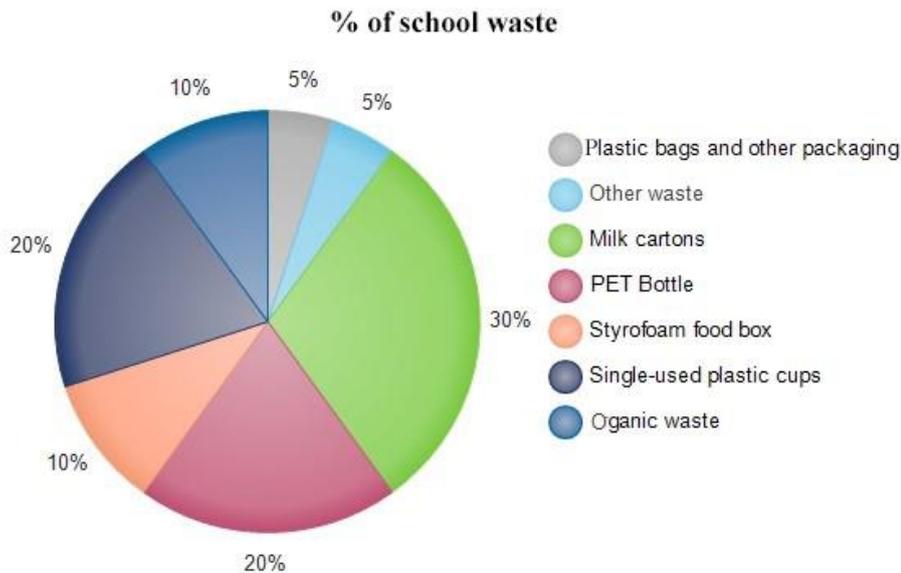


Figure 26: composition and respective percentage of plastic waste at schools.

**Milk cartons accounted for the highest proportion with 30% of total waste, followed by beverage bottles, mineral water (PET), and single-use plastic cups accounting for 20% of total waste** (Figure 26). Styrofoam boxes for food and organic waste accounted for 10% of the total volume, the rest were plastic bags and other waste accounting for 5% of each type. Most students were trained to segregate waste at source. However, there was no suitable waste collection system in place for the different waste types. Currently, schools only allow students to sort waste into two main types: recyclable waste (plastic bottles, aluminum cans) and general waste.

#### **D) Supermarkets**

The selected supermarket chain was Bách Hóa Xanh, one of the supermarket chains, which sells daily necessities, hence, there were a large number of customers and a stable amount of daily waste. **The daily amount of waste at supermarkets was about 500kg/supermarket/day**, of which Binh Thanh District had the highest amount of waste with 720kg/day (three 240l containers); District 4 had about 480kg of waste/day (two 240l containers) and Nha Be had 300kg of waste/day (Figure 27).

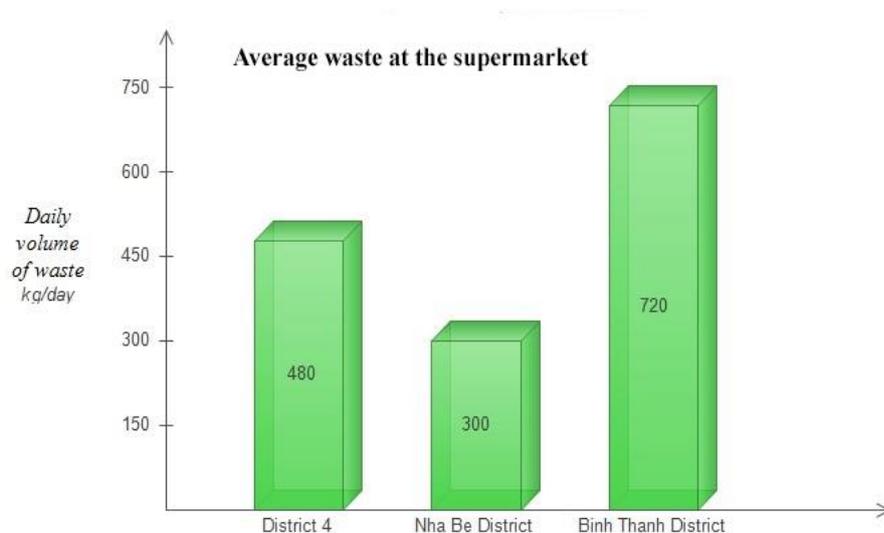


Figure 27: average daily volume of waste at supermarkets of districts 4, Nha Be and Binh Thanh.

The difference in the amount of waste was the result of a dense population at the district, leading to an increase in the amount of goods to meet customers' needs, leading to an increase in the amount of waste. According to waste collectors' statistics, 67% of the amount of waste in supermarkets was organic waste, most of which was leftover fruits and vegetables as well as rests from the processing of meat, fish, and seafood; 23% of the waste was plastic bags and 10% was other waste such as paper, glass, and foam boxes.

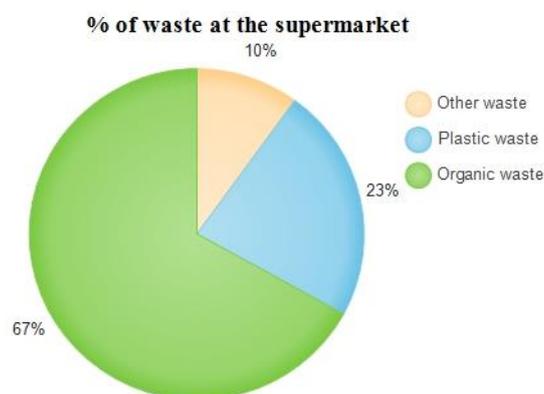


Figure 28: percentage of organic, plastic and other waste in supermarket's waste

Supermarket employees participated in training courses on waste segregation at source and they all knew how to sort waste. Currently, supermarkets only sort waste into recyclables and general waste (Figure 29). Recyclables were given to independent waste collectors and was not profitable. 100% of recyclables (PET, HDPE, metal, and cartons) were sorted and given to waste collectors (Figure 29).

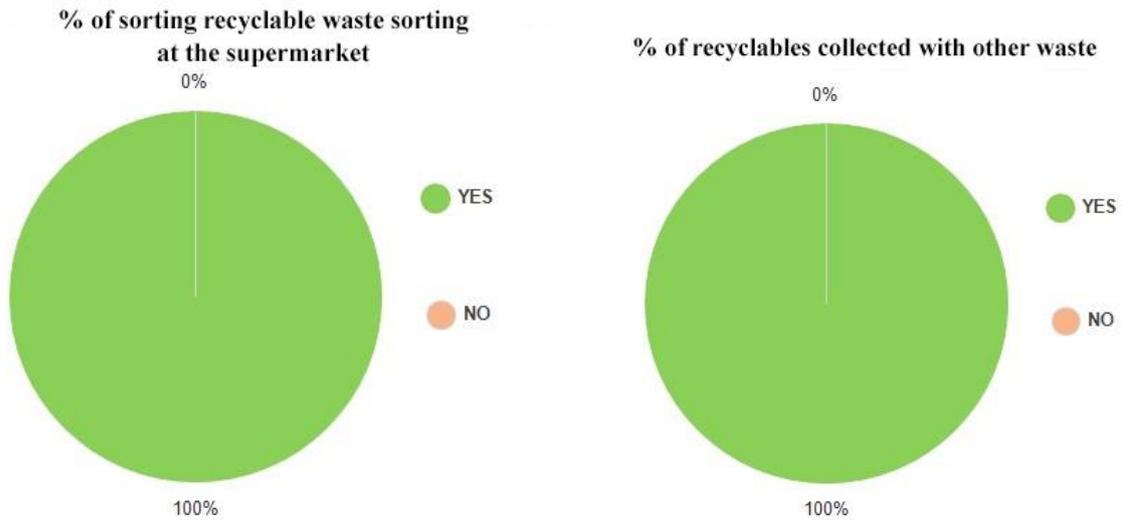


Figure 29: percentage of recyclable waste a-left) sorted at supermarket and b-right) collected together with remaining waste.

### E) Grocery stores

Usually at grocery stores, the families live and do their business there. Hence, the amount of waste at the grocery stores was equivalent to that of a household. However, at the grocery stores, more plastic waste (mainly product packaging, plastic wrappers, and plastic bags) was generated from their business than a household did.



Figure 30: percentage of organic, plastic and other waste in grocery store's waste.

For the plastic waste at grocery stores, plastic bags accounted for a high proportion of up to 82% of the total amount of plastic waste; single-use plastics (PS) accounted for 10% (Figure 31).

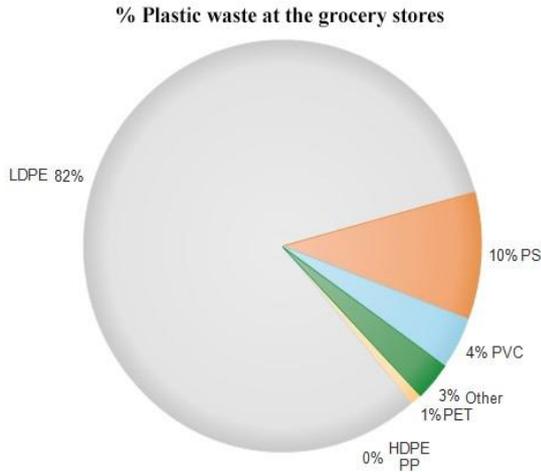


Figure 31: composition and respective percentage of plastic waste at grocery stores.

**Grocery stores had a high amount of recyclables from (mainly) cartons and PET bottles, so they all sorted their recyclables and earned money from selling them** (Figure 32). Grocery business households were trained in waste segregation at source at their district and knew how to segregate waste at source. 67% of grocery stores did not have enough space to store recyclables in their houses, and so 100% did not need support to get recycling bins (Figure 32).

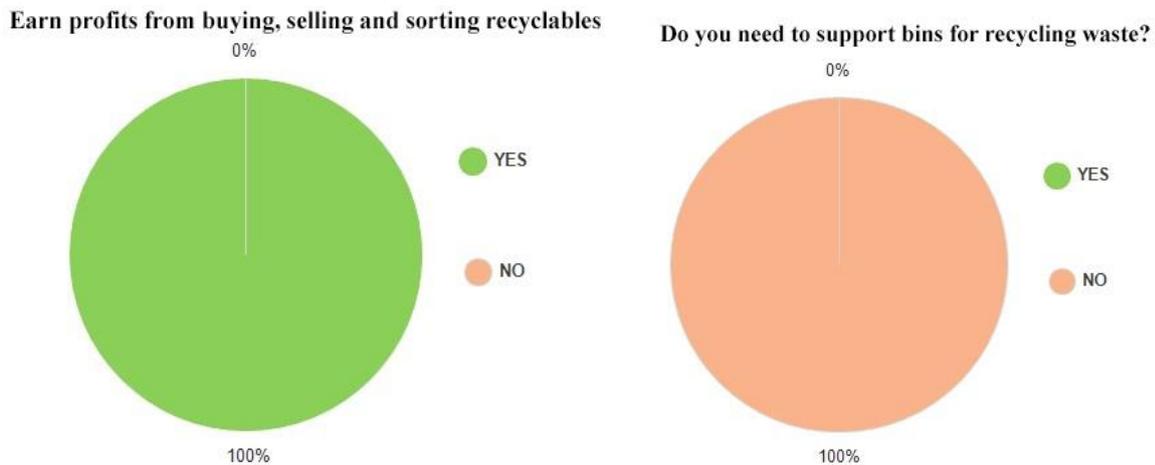


Figure 32: a-left) percentage of grocery stores making profit from selling recyclable bins b-right) percentage of grocery stores needed support with trash bins.

Grocery stores could benefit from the sale of recyclables; 75% of the amount of recyclables was purchased by street waste pickers (Figure 33).

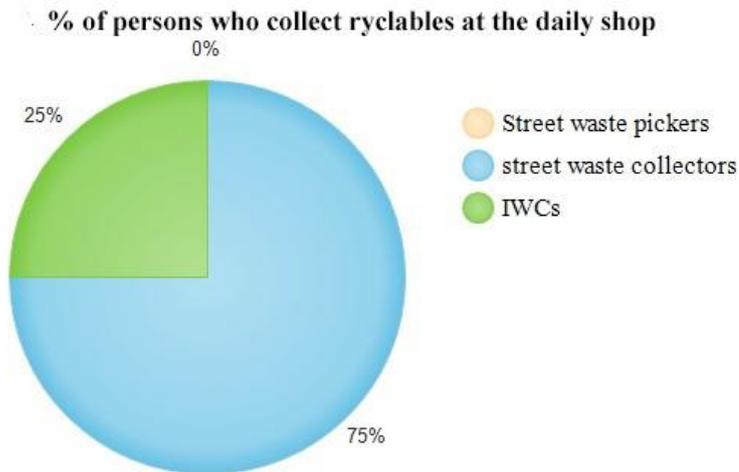


Figure 33: type of recyclable waste collector purchasing the waste from grocery stores

Grocery stores were reluctant to enter into contracts with recyclable waste collectors or units because they wanted to avoid legal (Figure 34). During the pandemic, trade was restricted, hence, the amount of recycling waste collected by street waste pickers decreased.

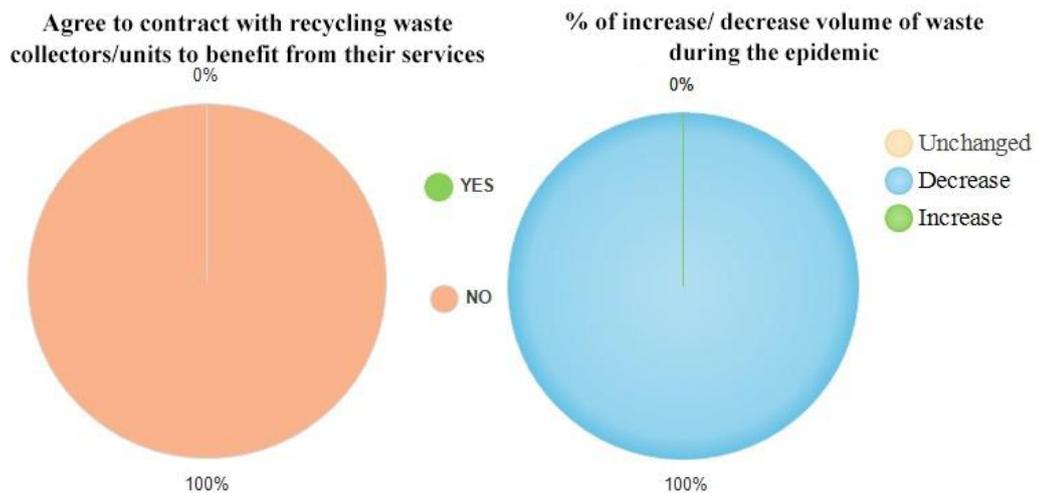


Figure 34: a-left) percentage of grocery stores agreeing or not to contract with recyclable waste collectors and b-right) change of volume during the pandemic at grocery stores.

Recyclables were only partially sorted (high value waste), a part of low-value recyclables such as LDPE and PS was collected together with other types of waste.

**% of recyclables collected with other waste**

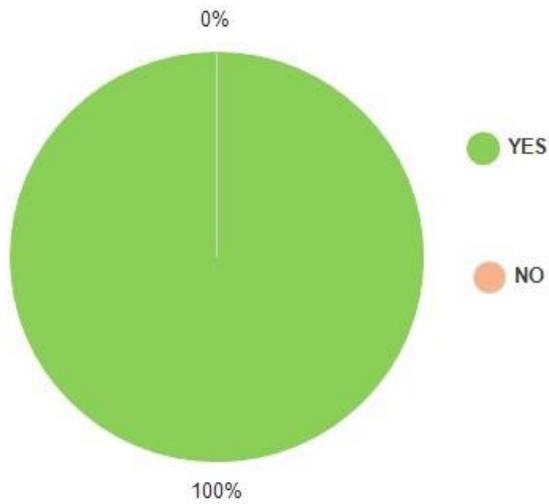


Figure 35: percentage of recyclable waste collected together with remaining waste at grocery stores.

### F) Markets

The investigated markets were three markets with a relatively large amount of waste and many traders and customers, including Phan Van Tri Market in Binh Thanh District, Cau Cong Market in District 4, and Phu Xuan Market in Nha Be District. According to estimates, the amount of organic waste accounted for 82% of the total waste at the markets, **the amount of plastic waste accounted for 18%** (Figure 36).

**% of plastic waste at the market**

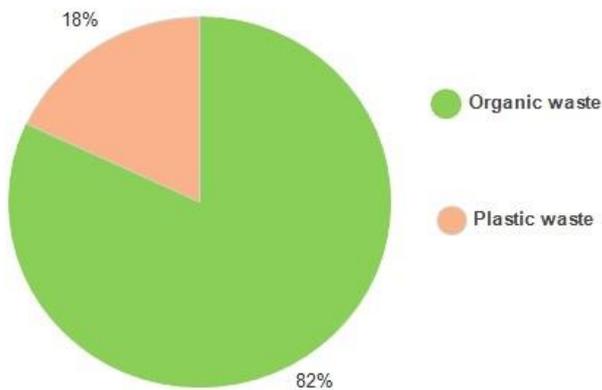


Figure 36: composition of waste and their respective percentage at markets.

**The daily amount of waste at the market was about 1,266 kg/market.** The amount of market waste in Nha Be area was the largest with a volume of 2 tonnes/day, followed by Binh Thanh with a volume of 1 tonne/day and lastly, District 4 with a volume of 800kg/day (Figure 37).

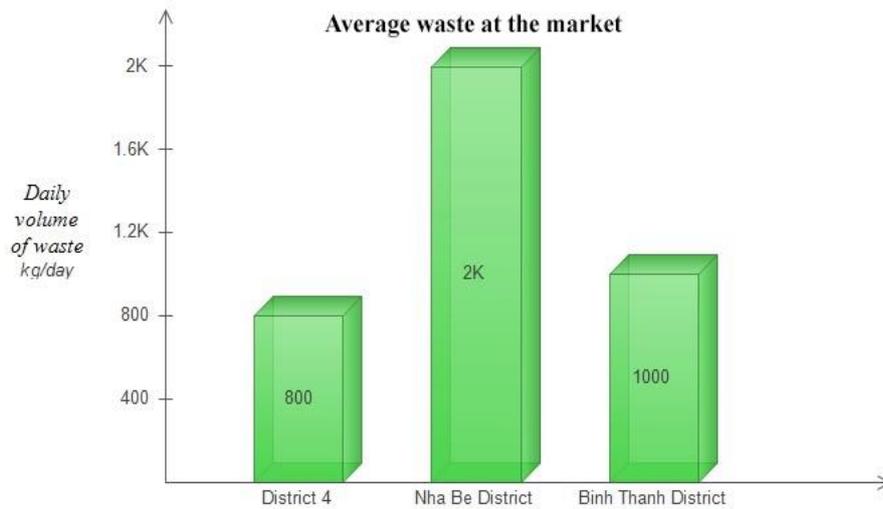


Figure 37: average daily volume of waste at markets of districts 4, Nha Be and Binh Thanh.

According to the survey, the market traders were trained to segregate waste at source but the waste collectors kept collecting recyclable wastes together with other types of waste (Figure 38). Therefore, waste segregation at source was not carried entirely out.

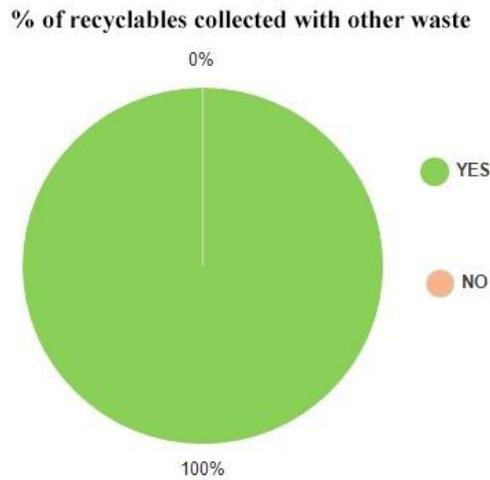


Figure 38: percentage of recyclable waste collected together with remaining waste.

The Extended Producer Responsibility (EPR) mechanism was unknown and inaccessible to market traders (Figure 39).

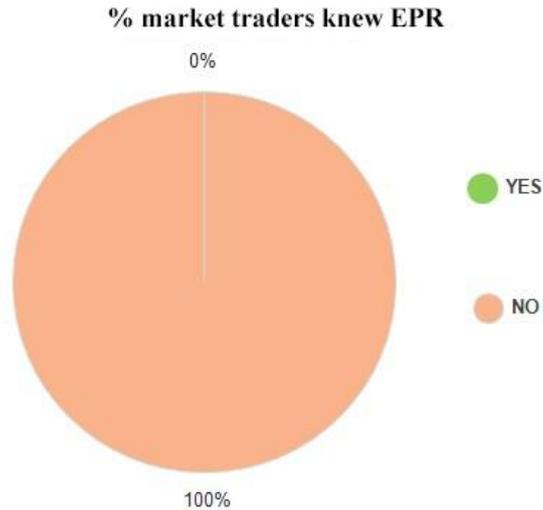


Figure 39: percentage of market traders aware or not of the EPR mechanism.

Small traders at the markets did not have space to store recyclables, so they were collected together with other types of waste. Moreover, the amount of high-value recyclables at the markets only accounted for a very small part, compared to plastic bags and organic waste, so small traders had no income from recyclables and did not want to sign contracts with recyclers.

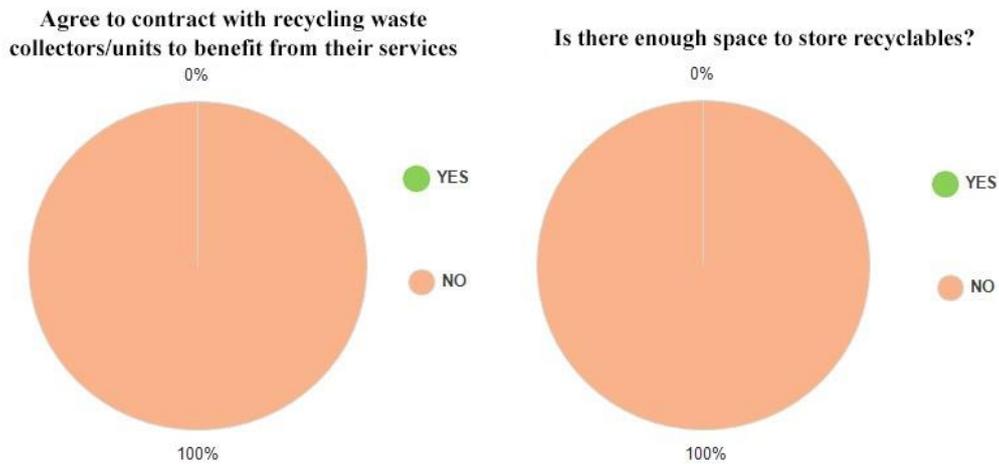


Figure 40: percentage of market traders a-left) agreeing or not to contract with recyclable waste collectors and b-right) agreeing or not on the space available to store recyclable waste

### G) Aggregators

Regarding composition of plastic waste purchased by the aggregators ( % of plastic waste purchased by the aggregators

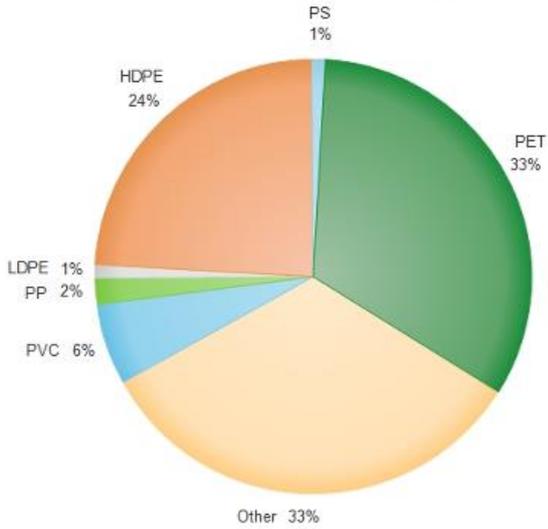


Figure 41), **PET accounted for the most with 33%, followed by HDPE 26%, PP 2%, PS 1%, LDPE 1%, PS 1%, and other types of plastic waste 33%.** Other types of plastic waste here refer to broken plastic pots or chairs, helmets, slippers or, in other words, hard plastic. It can be seen that there is a huge disparity in comparison with plastic waste data from households (LDPE 61%; PS 14%, PET 8%, HDPE 6%, PVC 3% & PP 0% and other plastic 8%) (Figure 42). Thus, a large amount of single-used plastic products (LDPE, PS) are disposed of into the environment through landfills or rivers and canals.

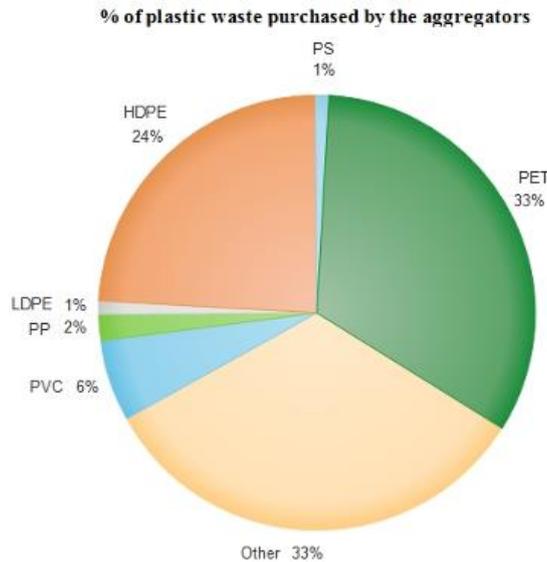


Figure 41: composition of plastic waste and their respective percentage purchased by aggregators.

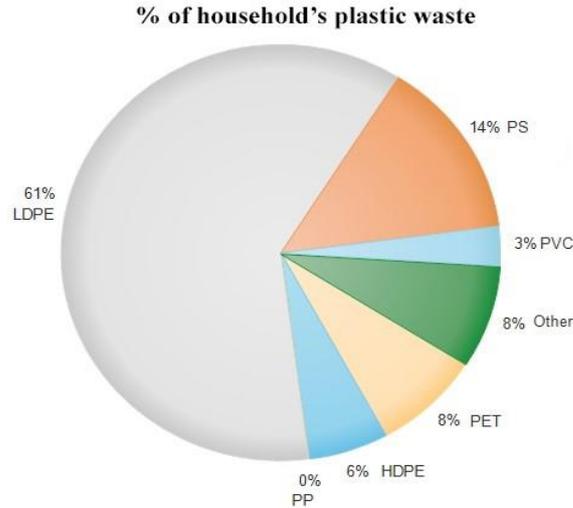


Figure 42: composition of plastic waste and their respective percentage generated by households.

## IV) Conclusions and recommendations

### A) Conclusions

**There remain inconsistencies in waste segregation at source, which leads to low efficiency in the sorting, collection, transfer and recycling of waste.**

Through interviews with households, grocery stores, supermarkets, schools, aggregators, and transferring stations, most of the people (90% of the interviewees) have been trained on waste segregation and know how to do it. However, there are overlapping regulations, such as Decision No. 44/2018/QĐ-UBND issued on November 14, 2018 requesting the implementation of waste sorting in the entire Ho Chi Minh City into organic, recyclable and inorganic waste (or remained waste). After that, the People's Committee of Ho Chi Minh City issued Document No. 782 dated November 4, 2019 regulating waste segregation into recyclable and non-recyclable waste. Therefore, when participating in household waste audits, 49% of households stated that they sorted waste into high-value recyclable waste (such as PET bottles, metals such as beer cans, coke cans, and cartons) and for the rest, they put all types of waste together in one bag.

**The domestic solid waste collection infrastructure systems in Ho Chi Minh City in particular and in Vietnam in general are not synchronized, leading to the ineffectiveness of waste segregation and recycling.**

Through interviews with the above research subjects, the reason why residents did not segregate waste at source was because the collection system was not consistent. After waste sorting at source, the workers of CITENCO or Independent waste collectors collected all types of waste together because they did not have separate garbage trucks. This caused distrust of the residents and they felt that there was no need to sort waste anymore. Some

of them just sorted their high-value recyclables to sell or give them away to Independent waste collectors.

**There is a lack of monitoring system for the enforcement of laws or regulations related to domestic solid waste management in HCMC.**

Although the WSAS regulations are available and people have the required knowledge, they do not segregate waste as there are no monitoring system and no sanctions for the compulsory implementation of WSAS in place. Most of the interviewees said that they had paid the waste collection fee, so the city environment companies or Independent waste collectors would have to sort the waste.

**Most of the low-value plastic waste (such as single-use plastics: LDPE and PS) was not collected and recycled. Instead it was transported to landfills and buried.**

It is revealed from the interviews with households, schools, markets, supermarkets, offices, companies and Independent waste collectors that the percentage of single-use plastics accounted for 61-82% of the total amount of plastic waste. However, all of them were not collected for recycling because of their low value, even though the recycling companies' demand for disposable materials such as LDPE and PS was quite high in HCMC. Paradoxically, recycling companies had to import these types of waste from other areas for production while HCMC had a very large amount of this type of waste.

**It was difficult to control the input of plastic products from supermarkets, grocery stores or food packaging companies because they did not provide information.**

When conducting the waste audit at households, markets, grocery stores, and company offices, the consulting team only received information on this figures from households as waste generators. As for supermarkets, companies or grocery stores, only their waste could be audited, the team did not receive comprehensive information about how much packaging they imported and packed.

**When it comes to environmental issues or circular economy, we also need to think about recycling organic waste, not just focusing too much on plastic waste.**

The seven day waste audit for households, supermarkets, and grocery stores showed that organic waste accounted for 67-80% (by weight). When conducting a waste audit, it was rainy and wet, so the amount of organic waste could have accounted for a higher percentage than the previous statistics (60-65%).

**During the COVID-19 outbreak, plastic waste increased significantly in comparison with other types of waste.**

More single-use plastics were used because this helped prevent the spread of the disease. Shops that previously used glass cups also switched to single-use plastic cups to limit the spread of the contagious disease and because they were more convenient for online sale or take-away.

## B) Recommendations

The revised 2020 Law on Environmental Protection replaced the 2014 Law on Environment and has specific regulations on WSAS. Therefore, resources should be planned to communicate a consistent way of waste segregation to residents in HCMC, avoiding the overlapping of documents that causes confusion, which regulation to follow.

Ho Chi Minh City in particular and Vietnam in general should invest in a synchronous domestic solid waste collection infrastructure system to maximize the effectiveness of the WSAS program and ensure the availability of separate garbage trucks. This will increase the rate of waste recycling and especially plastic waste recycling.

A system to monitor the enforcement of waste segregation and recycling should be established with incentive mechanisms and appropriate sanctions. It can be clearly seen from the example of wearing helmets. People practice it very well. At first, most people had not been used to wearing a helmet, but if they did not do it, they would be fined by the traffic police. Sanctioning, therefore, leads to changes in people's behaviors. We should also consider to have an environmental police or a community monitoring board to enforce the 2020 Law on Environment.

An incentive for the recycling of disposable plastic products (LDPE and PS) should be applied. In HCMC, the recycling rate of high-value plastics (such as PET, HDPE, and other plastics) is very high (up to 98%). Particularly, the recycling of low-valued plastics (LDPE, PS, etc.) is very difficult because there is no space for storage. Most aggregators operate without a business registration certificate and the local authorities have reminded them many times. As a result, they are afraid to expand their area to buy single-used plastics, for which the recycling companies were not yet able to organize a separate collection from street waste pickers or independent waste collectors. **We should improve the recycling system from the existing foundations to ensure the livelihoods for the poor working in waste recycling (informal forces in solid waste management) and help the city to reduce urban poverty. When solving environmental problems, we should also think about co-benefits (environmental, economic and social problems) at the same time.** Therefore, supporting existing aggregators registering their businesses and encouraging them to purchase disposable low-value plastics are also solutions to increase recycling of plastic waste in HCMC in particular and in Vietnam in general.

A clear mechanism to manage the input and output of plastic consumption should be available. This will help us control the amount of waste that is discharged to the environment and oceans.

When communicating to the residents about WSAS and plastic waste, the risk for human health should be included for higher effectiveness. Consequently, residents may easily change their behaviors because it is related to their health.

A long-term plan to communicate to the public about EPR should be developed because so far the interviewees have had no understanding of this mechanism.

An incentive mechanism for the market of products recycled from waste, including plastic waste or organic waste (compost) should be established.



## Appendix

### APPENDIX I: Survey questionnaires (households, grocery stores)

#### SURVEY QUESTIONNAIRES (Households, grocery stores)

No:.....

#### A. GENERAL INFORMATION

Full name:.....
Age:..... Sex:.....
Address:.....
Phone:.....
Number of people in household:.....

#### B. CONTENT OF THE SURVEY

##### 1. How do you do waste sorting at source?

- organic waste, recycles & remained waste ( inorganic waste)
- Only sorting recyclables
- Don't do waste sorting

Reasons : .....

##### 2. If you do waste sorting at source, which kind of recyclables sorted?

- Metals (Iron, aluminum, copper, stainless steel, ...)
- Plastics (PET, HDPE, PE,PS, PVC, LDPE,...)
- Papers
- Glasses
- Others:.....

##### 3. Who collect recyclables?

- Street waste pickers
- Independent waste collectors
- recyclables collectors
- Others:.....

##### 4. Do you need to access to the aggregators nearby you so you can easily sell your recyclables?

- Yes  No  Others .....

##### 5. What is the main composition in your households' waste?

- Organic waste ( food, fruits...)
- Recyclables ( iron, plastics, papers...)

- Remained waste (glasses, LDPE, PS,...)
- Others:.....

**6. How many kilograms of waste your house generated per day?**

: .....kg/ngày

**7. Percentage of recyclables in your domestic waste??**

Rate: .....%

**8. How many kilograms of plastics/day generated?**

: .....kg/day

Including:

- PET ( PETE): : .....kg/day
- HDP (HDPE):: .....kg/day
- PVC:.....kg/day
- LDPE: .....kg/day
- PP: : .....kg/day
- PS: .....kg/day

**9. Knowledge on waste separation & EPR?**

Do you participate on waste separation training courses? details .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If yes, Is it useful for you? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you know or understanding of EPR? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you have enough space for waste separation? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you need to have donation of waste bin for recycles? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is it necessary to have space at ward/villages to collect recycles? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you have profits from selling recycles or doing waste separation? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you agree to sing contract with recycles collection companies/ units to have benefits from their services? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do recycled wasted collection mixed with others> .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No

**10. How do you deal with your domestic waste?**

- Put at gathered points                       Bury     Rrelease to environment
- Fire     Separated waste
- Others.....

**11. Does your area conduct waste collection?**

- Yes     No     Others .....

If yes, how does waste collected?

- 1 time/day                                       1 time/2 days                                       Not fixed time
- Others:.....

How much you pay for collection fees every month?.....

**12. Do you feel happy with current collection's schedule?**

- Yes     No     Others: .....

**13. How does your house generate waste during Covid-19 pandemic?**

- Increased
- No change
- Reduced
- Others

**C. OTHER SUGGESTIONS:**

.....  
.....

**APPENDIX II: Survey questionnaires (Office/Company)**

**SURVEY QUESTIONNAIRES  
(Office/Company)**

No:.....

**A. GENERAL INFORMATION**

Name:.....
Address:.....
Phone:.....
MST:.....

**B. CONTENT OF THE SURVEY:**

**1. How long has your company operated?**

- 1-2 years
- 2-5 years
- 5-10 years
- >10 years

**2. Number of people in your company?**

Number:.....Males:.....Females:.....

**3. How does your company operate at the current time?**

- Common as before
- Apply the distance
- Closed
- Others

Details:.....

**4. What is the main composition in your company's waste?**

- Organic waste ( food, fruits...)
- Recyclables ( iron, plastics, papers...)
- Remained waste (glasses, LDPE, PS,...)
- Others:.....

**5. Does your company do waste separation at source?**

- Yes
- No
- Others: .....

**6. If your company does waste sorting at source, which kind of recyclables sorted?**

- Metals (Iron, aluminum, copper, stainless steel, ...)
- Plastics (PET, HDPE, PE,PS, PVC, LDPE,...)
- Papers:
- Glasses
- Others:.....

**7. How many kilograms of waste your company generated per day?**

: .....kg/ngày

**8. How many kilograms of plastics/day generated?**

.....kg/day

Including:

- PET ( PETE): : .....kg/day
- HDP (HDPE):: .....kg/day
- PVC:.....kg/day
- LDPE: .....kg/day
- PP: : .....kg/day
- PS: .....kg/day

**9. Knowledge on waste separation & EPR?**

Do you participate on waste separation training courses? details .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If yes, Is it useful for you? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you know or understanding of EPR? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you have enough space for waste separation? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you need to have donation of waste bin for recycles? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is it necessary to have space at ward/villages to collect recycles? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you have profits from selling recycles or doing waste separation? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you agree to sing contract with recycles collection companies/ units to have benefits from their services? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do recycled wasted collection mixed with others> .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No

**10. Does this area conduct waste collection?**

- Yes
- No
- Others .....

If yes, how does waste collected?

- 1 time/day
- 1 time/2 days
- Not fixed time

Others:.....

Rate of collection's fees/month:.....

**11. Do you feel happy with current waste collection's schedule?**

Yes

No

Others: .....

**C. OTHER SUGGESTIONS:**

.....  
.....  
.....

**APPENDIX III: Survey questionnaires (Market / Supermarket)**

**SURVEY QUESTIONNAIRES  
(Market / Supermarket)**

No:.....

**A. GENERAL INFORMATION**

NAME :.....
Address:.....
Phone:.....

**B. CONTENT OF THE SURVEY:**

**1. How long has this market operated?**

- 1-2 years
- 2-5 years
- 5-10 years
- >10 years

**2. Number of small traders in the market?**

Number:.....

**3. How does this market run at the current time?**

- Common as before
- Apply the distance
- Closed
- Others

Details:.....

**4. What is the main composition in the market' waste?**

- Organic waste ( food, fruits...)
- Recyclables ( iron, plastics, papers...)
- Remained waste (glasses, LDPE, PS,...)
- Others:.....

**5. Do the traders do waste separation at source?**

- Yes
- No
- Others:.....

**6. If your market do waste sorting at source, which kind of recyclables sorted?**

- Metals (Iron, aluminum, copper, stainless steel, ...)
- Plastics (PET, HDPE, PE,PS, PVC, LDPE,...)
- Papers
- Glasses
- Others:.....

**7. How many kilograms of waste this market generated per day?**

: .....kg/ngày

**8. How many kilograms of plastics/day generated?**

: .....kg/day

Including:

PET ( PETE): : .....kg/day

HDP (HDPE):: .....kg/day

PVC:.....kg/day

LDPE: .....kg/day

PP: : .....kg/day

PS: .....kg/day

**9. Knowledge on waste separation & EPR?**

Do you participate on waste separation training courses? details .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If yes, Is it useful for you? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you know or understanding of EPR? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you have enough space for waste separation? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you need to have donation of waste bin for recycles? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is it necessary to have space at ward/villages to collect recycles? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you have profits from selling recycles or doing waste separation? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you agree to sing contract with recycles collection companies/ units to have benefits from their services? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do recycled wasted collection mixed with others> .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No

**10. Does this area conduct waste collection?**

Yes

No

Others .....

If yes, how does waste collected?

1 time/day

1 time/2 days

Not fixed time

Others:.....

Rate of collection's fees/month:.....

**11. Do you feel happy with current collection's schedule?**

Yes

No

Others: .....

**C. OTHER SUGGESTIONS:**

.....  
.....  
.....

**APPENDIX IV: Survey questionnaires (School)**

**SURVEY QUESTIONNAIRES  
(School)**

No:.....

**A. GENERAL INFORMATION**

School's name:.....
Address:.....
Phone:.....
MST:.....

**B. CONTENT OF THE SURVEY:**

**1. How long has the school operated?**

- 1-2 years
- 2-5 years
- 5-10 years
- >10 years

**2. Number of teachers in the school?**

Number:.....Males:.....Females:.....

**3. Number of students in the school?**

Number:.....Males:.....Females:.....

**4. How does the school operate at the current time?**

- Common as before
- Apply the distance
- Closed
- Others

Details:.....

**5. What is the main composition in the school's waste?**

- Organic waste ( food, fruits...)
- Recyclables ( iron, plastics, papers...)
- Remained waste (glasses, LDPE, PS,...)
- Others:.....

**6. Does the school conduct waste separation at source?**

- Yes
- No
- Others:.....

**7. Who collect the school's waste?**

- Street waste pickers
- Independent waste collectors
- CITENCO
- Others:.....

**8. If the school does waste sorting at source, which kind of recyclables sorted?**

- Metals (Iron, aluminum, copper, stainless steel, ...)
- Plastics (PET, HDPE, PE,PS, PVC, LDPE,...)
- Papers:
- Glasses
- Others:.....

**9. How many kilograms of waste the school generated per day?**

: .....kg/ngày

**10. How many kilograms of plastics/day generated?**

: .....kg/day

Including:

- PET ( PETE): : .....kg/day
- HDP (HDPE):: .....kg/day
- PVC:.....kg/day
- LDPE: .....kg/day
- PP: : .....kg/day
- PS: .....kg/day

**11. Knowledge on waste separation & EPR?**

Do you participate on waste separation training courses? details .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If yes, Is it useful for you? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you know or understanding of EPR? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you have enough space for waste separation? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you need to have donation of waste bin for recycles? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is it necessary to have space at ward/villages to collect recycles? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you have profits from selling recycles or doing waste separation? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you agree to sing contract with recycles collection companies/ units to have benefits from their services? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do recycled wasted collection mixed with others>	<input type="checkbox"/> Yes	<input type="checkbox"/> No

.....		
-------	--	--

**12. Does this area conduct waste collection?**

- Yes                                       No                                       Others .....

If yes, how does waste collected?

- 1 time/day                                       1 time/2 days                                       Not fixed time

Others:.....

Rate of collection's fees/month:.....

**13. Do you feel happy with current waste collection's schedule?**

- Yes                                       No                                       Others: .....

**C. OTHER SUGGESTIONS:**

.....  
.....





Do you know or understanding of EPR? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you have enough space for waste separation? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you need to have donation of waste bin for recycles? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is it necessary to have space at ward/villages to collect recycles? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you have profits from selling recycles or doing waste separation? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you agree to sing contract with recycles collection companies/ units to have benefits from their services? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do recycled wasted collection mixed with others> .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No

**11. Do your aggregator recycle plastics to other products?**

- Yes                                       No                                       Others .....

**12. Outputs for recycles collected from aggregator?**

- Sell for larger aggregators
- Sell for recycling companies
- Sell for big companies for export
- Others .....

**13. Does your aggregator have difficulties in recent time?**

- Yes                                       No                                       Others.....

If “Yes” What it is:

- Inputs for aggregator
- Output for aggregator
- Legal documents ( business licenses)

Details: .....

**14. Do you have difficulties during Covis-19 pandemic outbreak?**

- Yes                                       No

Others:.....

**15. During Covis-19 pandemic, do the quantity of plastics collected change?**

- Increased in comparison with before ( no covid-19)
- No changes.
- Reduces in comparison with before
- Others .....

Reasons:.....

**16. Does your aggregator have annual business plan or reports?**

- Yes  No

**17. Does your aggregator have monitoring plan for solid waste management?**

- Yes  No  Others .....

**C. OTHER SUGGESTIONS/ IDEAS:**

.....

.....

.....

**APPENDIX VI: Survey questionnaires (Independent waste collectors and Street Waste Pickers)**

**SURVEY QUESTIONNAIRES  
(Independent waste collectors-Independent waste collectors and Street Waste Pickers)**

Số phiếu:.....

**A. GENERAL INFORMATION**

Full name:..... Sex:.....Age.....
Address:.....
Phone:.....

**B. CONTENT OF SURVEY**

**1. How many years you work in this area?**

- 1-2 years
- 2-5 years
- 5-10 years
- >10 years

**2. Do you sign contracts or join in social protection program (insurances programs)?**

- Yes
- No
- Others: .....

**3. Do you join in Cooperatives or others organizations for waste collection?**

- Yes
- No
- Others:.....

**4. How does the situation of recycles purchased/ picked up in recently?**

- Advantages
- Disadvantages
- Many disadvantages
- Others

Details:.....

**5. What kind of recycles do you pick/ collected?**

**8. What kind of recycles collected in aggregator?**

- Metals (Iron, aluminum, copper, stainless steel, ...)
- Plastics (PET, HDPE, PE,PS, PVC, LDPE,...)
- Papers
- Glasses
- Others:.....

Notes:.....

**6. How many kilograms of plastics you collect per day?**

.....kg/day

**7. Details of plastics collected, prices of purchasing and price of selling:**

- PET ( PETE): : .....kg/day

Purchasing :.....Vnd/kg      Selling: .....Vnd/kg  
 HDP (HDPE):: .....kg/day  
Purchasing :.....Vnd/kg      Selling: .....Vnd/kg  
 PVC:.....kg/ngày  
Purchasing :.....Vnd/kg      Selling: .....Vnd/kg  
 LDPE: .....kg/day  
Purchasing :.....Vnd/kg      Selling: .....Vnd/kg  
 PP: : .....kg/day  
Purchasing :.....Vnd/kg      Selling: .....Vnd/kg  
 PS: .....kg/day  
Purchasing :.....Vnd/kg      Selling: .....Vnd/kg  
 Other plastics:.....  
Purchasing :.....Vnd/kg      Selling: .....Vnd/kg

**8. Knowledge on waste separation & EPR?**

Do you participate on waste separation training courses? details .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If yes, Is it useful for you? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you know or understanding of EPR? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you have enough space for waste separation? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you need to have donation of waste bin for recycles? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is it necessary to have space at ward/villages to collect recycles? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you have profits from selling recycles or doing waste separation? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you agree to sing contract with recycles collection companies/ units to have benefits from their services? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do recycled wasted collection mixed with others? .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No

**Other ideas/ suggestions**

.....  
.....  
.....

**9. During Covid-19 pandemic, do the quantity of plastics collected change?**

- Increased in comparison with before ( no covid-19)
- No changes.
- Reduces in comparison with before
- Others .....

Reasons:.....

**10. Do you get difficulties during Covid -19 pandemic time?**

- Yes
- No

Details:

.....  
.....  
.....

## Authors

This report was written by NguyenThi Hoai Linh (ENDA Vietnam).

## Editors

Elena Rabbow (GIZ ; Rethinking Plastics); Emilie Strady (IRD); Fanny Quertamp (Expertise France; Rethinking Plastics)

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### Expertise France

The French public agency for international technical assistance

Address

Siège social 40 bd de Port  
Royal  
75005 Paris  
France

### ENDA Vietnam

C2 Buu Long, Bac Hai  
Resident, Ward 15, District  
10,  
70000 HCMC  
Vietnam  
<https://endavn.org.vn/>

### Deutsche Gesellschaft für

**Internationale Zusammenarbeit (GIZ) GmbH**

Registered offices

Bonn and Eschborn, Germany

Address

Dag-Hammarskjöld-Weg 1 - 5  
65760 Eschborn, Germany  
T +49 61 96 79 - 0  
E [info@giz.de](mailto:info@giz.de)  
I [www.giz.de](http://www.giz.de)

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