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# Residents' waste management practices in a developing country: A social practice theory analysis



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## ABSTRACT

Waste management has become a growing concern globally and caused rising environmental costs in developing countries. The efficiency of a waste management system depends on many factors, including residents' waste management practices and a governmental commitment to sustainable waste management. This study employs the social practice theory to qualitatively examine residents' perspectives on waste management in the context of Vietnam as a developing country where a massive portion of plastic waste originates from household disposal. The research involves conducting twelve focus groups in five different research locations, including two largest cities and three coastal and marine protected areas. Data analysis is performed using inductive and deductive coding principles and an interpretivist approach. The findings reveal residents' classification of sustainable waste management practices from residents' perspectives. According to residents, while adequate technical infrastructures can facilitate sustainable waste management practices, it is the social context that motivates or demotivates and can mould a practice into a habit. The study therefore provides useful implications for sustainable waste management systems that would require the government's effective leadership and coordination of technical infrastructures as well as the orchestral efforts from involved social institutions, including families, communities, businesses, formal and informal waste sectors, and social organisations.

#### 1. Introduction

In recent years, there has been a strong scholarly interest in waste management issues, due to the exponential increase of solid waste generated across developed and developing countries (Bui et al., 2020). It is estimated that the annual global waste volume will increase to 3.40 billion tons by 2050 (Kaza et al., 2018). Research has shown that waste, especially waste flowing in bodies of water, has caused huge costs to the economy and human welfare (Beaumont et al., 2019).

There is a growing research body on waste disposal worldwide (e.g., Brennan and Portman, 2017; Brouwer et al., 2017; Fasihi and Parizadi, 2021; Finnegan and Gouramanis, 2021; Istrate et al., 2020; Shen et al., 2019). Most studies on waste management are situated in developed countries (e.g., Almosa et al., 2017; Chaudhary et al., 2021; Ferronato and Torretta, 2019; Goncalves et al., 2014; Merli et al., 2018; Moraes et al., 2021) whereas this issue in developing countries has been increasingly critical (Cetrulo et al., 2018). Because waste management behaviours are influenced by policies, infrastructure, and culture (Breukelman et al., 2019; Bui et al., 2020; Pietzsch et al., 2017), different countries present different problems, perceptions, and behaviours. Due to the complication of external factors, individual residents do not entirely control their behaviours and practices (Phulwani et al., 2021). Hence, it is necessary to identify the factors shaping residents' waste management practices from their perspectives (Chaudhary et al., 2021).

Previous studies on waste management in developing countries have examined a range of topics, mostly focusing on urban waste management practices (e.g., Azevedo et al., 2021; Breukelman et al., 2019; Chowdhury et al., 2020; Debrah et al., 2021; Kulkarni, 2020; Serge Kubanza and Simatele, 2020). As earlier indicated by Wilson (2007), the complication of waste management systems is often high in developing countries for several technical and cultural reasons, but their waste sectors still have a heavy concentration on waste collection and removal rather than a holistic waste management approach. Moreover, waste

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studies in developing countries are fragmented and do not describe the current state from residents' perspectives (Bui et al., 2020). For instance, in Vietnam, previous studies span across different topics, such as waste policy (e.g., Hoang and Fogarassy, 2020; Xuan Son, 2021), waste generation from consumption (e.g., Liu et al., 2021; Nguyen et al., 2021; Pham Phu et al., 2018; Su et al., 2021), urban waste management (e.g., Chau et al., 2020; Tsai et al., 2021) and marine waste (e.g., Kerber and Kramm, 2021; Xuan Son, 2021). Two recent emerging themes in Vietnam-based studies are plastic waste (e.g., Hahladakis, 2020; Khuyen et al., 2021) and municipal waste (e.g., Khuc et al., 2023; Tsai et al., 2020). Findings from these studies propose sustainable waste management solutions from the government with active involvement from residents. The paradox is that waste solutions are often put in implementation without adequate input from residents (Yukalang et al., 2018). Since sustainable waste management practices are becoming critical for ensuring the quality of life for residents (Nguyen et al., 2020; Salhofer et al., 2021), research collecting in-depth narrative data about the complexity of residents' waste practices and factors shaping their waste practices will provide practical insights.

This research is situated in Vietnam as a developing country grappling with rising waste issues. With a growing urban population at 40.4% in 2021 and a lack of effective waste management policies and infrastructure (Chau et al., 2020; Hoang and Fogarassy, 2020; Tien et al., 2019), Vietnam generates 15 million tons waste per year (MONRE, 2019), with a significant contribution from its two largest cities, Ho Chi Minh City and Hanoi (Anh and Hung, 2020). The country is the fourth largest contributor to plastic pollution in the oceans (Jambeck et al., 2015). Coupled with the citizens' low environmental awareness, waste management systems are inadequate, making waste too complicated a problem to solve (Kerber and Kramm, 2021; Tsai et al., 2020). Although there are efforts to improve waste management, a gap remains in waste management systems in different regions of the country (Tsai et al., 2021). Waste management practices from residents' perspectives are therefore worth exploring.

#### 2. Theoretical framework

A systematic review by Raghu and Rodrigues (2020) shows that individual behaviour theories have been widely adopted in waste management behaviour studies. Whilst individual behaviour theories such as Theory of Planned Behaviour and Theory of Reasoned Action are often extended to include more variables, research findings are limited to only reporting whether and to what extent such proposed individual behaviour models can increase the predictive validity (Raghu and Rodrigues, 2020). From a practical perspective, individual behaviours are influenced by not only personal characteristics but technical infrastructure and social factors as well. Even if individuals hold positive values and attitudes on waste management or sustainable consumption, the shortage of the external factors such as policy, regulation, technical infrastructure, and social context will create a gap between values, attitudes and behaviours (ElHaffar et al., 2020; Groening et al., 2018; Joshi and Rahman, 2015). From a theoretical perspective, social behavioural theories are underrepresented in waste-related research (Raghu and Rodrigues, 2020). Furthermore, the dearth of qualitative research may lead to a shortage of findings that can offer insights from research subjects themselves.

The Social Practice Theory (SPT), which was originally proposed by Bordieu (1977) posits that practice is a routine behaviour as the outcome of activities (Reckwitz, 2002). The works of Schatzki (1996) and Reckwitz (2002) further developed the SPT by integrating the structuration theory of Giddens (1984) about the role of routines in everyday life and social systems. Hence, SPT allows researchers to focus on any practice in separation or in combination (Du and Pan, 2021). In light of SPT, waste management behaviours are the results of technical infrastructure and social structures inherent in individuals' waste practices (Warde, 2005). Città et al. (2019) summarise the explanatory structure of the SPT as follows: First, the condition for carrying out an action (e.g., waste disposal) is referred to as a situation. For instance, in order that a person can dispose of waste properly, there should be adequate technical infrastructure as an essential enabler. Second, the person engaged in this situation takes part in a practice (e.g., waste disposal practices). Third, habit will be shaped when a person undertakes a practice repeatedly, reflecting how social structures are embodied in individuals in the form of trained capacities for specific actions (Wacquant, 2016). To elaborate, in order that individuals form a habit of waste sorting, there must be social conditions for them to sort waste so repeatedly that waste sorting becomes normalised habits over time. Thus, SPT can explain how waste management behaviours are conducted, repeated, and reinforced. As reported by Reckwitz (2002), SPT has been used to explore sustainable behaviours in specific social contexts, such as energy conservation (e.g., Du and Pan, 2021; Labanca, and Bertoldi, 2018; Sonnberger and Gross, 2018). Nonetheless, SPT has been underutilised in studies on waste disposal behaviours.

According to Marshall and Farahbakhsh (2013), a holistic approach is needed to embrace sociocultural, environmental, economic and technical aspects of waste management systems and hence a knowledge of residents' perceptions and perspectives towards waste and waste management is essential. Previous studies have shown that understanding residents' waste management behaviours in their specific sociocultural contexts is crucial for effective waste solutions (Petts, 2001; Yukalang et al., 2018). Moreover, qualitative studies are necessary to gain a deeper understanding of residents' waste experiences and how they are influenced by factors such as living conditions and waste infrastructure (Bui et al., 2020). This study applies the SPT approach to gather qualitative input from residents about their perspectives on waste disposal behaviours in their sociocultural contexts, thereby gaining an in-depth understanding of the external conditions affecting their waste management behaviours. We aim to answer the following question: How do technical infrastructures and social institutions shape residents' waste management practices?

## 3. Materials and methods

## 3.1. The research sites

For this study, we selected five locations in Vietnam, including Hanoi in the North, Ho Chi Minh city in the South and three coastal provinces -Nam Dinh in the North, Tuy Hoa-Phu Yen in the Centre, and Phu Quoc Island in the South (see Fig. 1). Hanoi and Ho Chi Minh city are the two largest cities of Vietnam and listed amongst the 15 most polluted cities in Southeast Asia (International Trade Administration US, 2022). As of 2022, Hanoi hosts 8435,650 people whilst Ho Chi Minh city is the home of 9389,720 people (General Statistics Office of Vietnam, 2022). On the other hand, Vietnam has a coastline of 3260 kms (Vietnam Embassy in the US, n.d.) and is known as a country with a longer coastline and poor waste management system, which is more likely to wash plastic into the oceans (Meijer et al., 2021). Therefore, we also wanted to collect narrative data on waste practices from those residing in provinces along the coastline. Nam Dinh, Tuy Hoa-Phu Yen and Phu Quoc Island are classified as Coastal and Marine Protected Areas (MPAs) in Vietnam, which are threatened by various ecosystem change drivers (Brooks et al., 2015), including fast-paced economic expansion (Khuu et al., 2023). Vietnamese MPAs are governed for the purpose of conserving biodiversity while improving the livelihood of the local population (Börger et al., 2021). Hence, a relative level of representativeness of the country was achieved, given the inclusion of residents from metropolitan and coastal provinces in three regions of the country, which can provide insights on waste management from diverse perspectives and experiences.



Fig. 1. Research Locations.

3.2. Methods

The study gained institutional ethics approval prior to data collection. We used focus groups to collect narrative data because focus groups allow a free sharing of opinions in small groups of participants (Saunders, 2019). Furthermore, focus groups enable interactions between participants to reveal perceptions and personal understanding which would be otherwise untapped in survey questionnaires or one-on-one interviews (Kitzinger, 1995).

Research participants were recruited according to three criteria. They must be (1) over 18 years old, (2) living continuously for over 12 months in the research locations, and (3) currently residing in the research locations at the time of the interview. Age was used to organise focus groups to give the comfort of exchanging opinions with peers. There were six to ten participants in each focus group lasting between two hours and two hours and thirty-five minutes. Twelve focus groups were conducted: three in Ho Chi Minh City (total 18 participants), three in Hanoi (total 18 participants), and two in each of three coastal provinces - Tuy Hoa-Phu Yen (total 17 participants), Nam Dinh (total 20 participants), Phu Quoc (total 19 participants). Focus groups were audio-recorded and transcribed with participants' signed consent. In total, there were 92 participants, of which almost two-thirds were female (63%). There was a relatively even distribution of participants across age groups - 18-25 years old group (18.25%), 26-35 years old (20.65%), 36-45 years old (20.74%), 46-55 years old (19.57%) and over 55 (19.57%). Most provincial participants were working in farming (42%) and fishing (51%) whereas those from the two largest cities were

office workers (72%) and self-employed (28%).

#### 3.3. Data analysis

Clean data was first imported into NVivo software for coding and theme development. Six steps of analysis were undertaken: (1) the data were preliminarily explored through several readings of the transcripts; (2) transcribed interviews were checked by initial screening, using word cloud, tree map, and cluster analysis; (3) data were auto-coded by NVivo software to inductively identify the most prominent themes; (4) themes were then developed deductively based on thematic questioning linked directly to research questions; (5) triangulation of data were achieved by a cross-check of developed themes across multiple transcripts/sources; (6) finally, content analysis was conducted to confirm the themes (Ayres et al., 2003). Two peer researchers in our team conducted independent analyses and a debrief was used to compare and finalise the results for reporting.

## 4. Results

The structural thematic map is given in Fig. 2. Based on this thematic map, four main themes and their sub-themes were deducted from NVivo for interpretation (see Table 1).

The results are presented based on the four main themes arising from residents' reflections: (1) sustainable waste management practices, (2) unsustainable waste management practices, (3) technical infrastructure, and (4) social institutions. In accordance with the SPT and residents'



Fig. 2. Structural Thematic Map.

perceptions, the technical infrastructure encompasses waste management infrastructure, regulations, and knowledge base, whereas social institutions shape the social situation in which waste management practices occur. The findings highlight the interplay between the main themes.

## 4.1. Sustainable waste management practices

Participants classified sustainable and unsustainable waste management practices mainly based on environmental and economic impacts. According to more than 90% of participants, sustainable waste management practices can reduce the impacts of waste economically and environmentally. Whilst they mentioned waste collection, waste sorting, waste reduction, reusing and reselling as sustainable waste practices, two thirds of participants referred to their own effort sorting waste in their home, for example: We try to keep waste to the minimum. At home, my family gathers waste in separate bins. We put organic waste into a green bin and plastic and paper in a black bin for reselling. (Female, Tuy Hoa-Phu Yen)

Participants often reused or sold plastic bottles to *ve chai* (a scrap trader who buys and resells tradeable waste items such as paper, old magazines and newspapers, cardboard, metal cans, and plastic bottles). From participants' experience, plastic bags and other single-use plastics were regarded as end-of-life plastic waste and thus thrown away to end up in landfills. Noteworthily, more than half of participants expressed a high level of motivation for reselling plastic trash due to financial saving, for instance:

We often reuse plastic bottles to contain liquids like water or homemade milk. That can save me money buying containers. (Female, Ho Chi Minh city)

#### Table 1

Thematic Summary (extracted from NVivo).

Theme and Sub-theme	Files/ Sources	References
Sustainable waste management practices	10	108
Waste sorting	7	35
Waste reduction	7	13
Waste collection	7	31
Reusing	6	16
Reselling	7	13
Unsustainable waste management practices	10	153
Public littering	8	42
Waste burning	8	19
Plastic waste dumping	9	52
Dumping waste into bodies of water (river, canal,	6	33
sea)		
Non-sorting	6	9
Technical infrastructures	12	233
Waste bins	7	29
Waste trucks	6	17
Waste collectors	10	35
Waste treatment facility	6	22
Landfill	6	22
Incinerators	6	13
Waste regulations	11	32
Waste education programs	11	63
Social institutions	52	317
Family	11	57
Neighbours	6	19
Community	10	64
Government	10	57
Waste authorities	9	37
Manufacturers	8	40
Informal waste collectors	9	14
Other social organisations	6	29

I resell plastic bottles, old magazines and newspapers to *ve chai*. Sometimes, when we have parties at home, we often keep beer cans for reselling to *ve chai*. So, trash is money. (Male, Tuy Hoa-Phu Yen)

One-third of participants even said they would always wait for *ve chai* to get some money from their tradeable waste. However, their efforts to reduce waste were limited only to plastic bottles, paper and sometimes metal cans that they could resell for a salvage value.

#### 4.2. Unsustainable waste management practices

Regarding unsustainable waste management practices, the prominent focus was littering. Participants believed that the government should be held responsible for managing littering. They stated, "Vietnam is a developing country, and the government does not have clear regulations on littering." (Male, Hanoi), and as a consequence, "part of the population may feel free to litter" (Female, Ho Chi Minh city). Nonetheless, one-fifth of participants held strong opinions about the reasons for littering and attributed littering to eroding social responsibility. This minority expressed a strong voice against littering whereas the others showed a neutral stance. One of the most vocal opinions is:

Many people are aware of the environmental issues of littering but they still litter. Some are highly educated and even have university degrees. They know the law but always break the law because they don't have any sense of social responsibility. They never spend time learning about waste management practices. I often see people leave their household waste in public places. What is worse, when they see others litter, they end up littering because they think litter is socially accepted. Bad behaviours and habits are contagious like a virus (Female, Tuy Hoa-Phu Yen)

Notably, all participants talked about seeing other people litter, but none shared their own littering experiences even though the facilitator probed them. In their opinion, littering was a public issue and trash dumping in bodies of water was the most alarming waste issue. All participants residing in coastal areas expressed their frustration with littering. One participant noted:

People go to the beach and eat there, throwing away plastic bags and bottles. Tourists from other areas are even worse, they do not care because this is not their land. Their leftover waste is swept into the sea, causing severe pollution to the marine ecosystem. (Female, Tuy Hoa-Phu Yen)

More than ten participants who lived in a fishing community emphasised the serious environmental and economic consequences of waste dumping in bodies of water, saying:

When waste enters the sea, it decomposes and damages the ocean's ecosystem as well as its creatures. Waste can also reduce food sources for fish, causing direct and indirect deaths to the fish, and finally damage sea economies. (Male, Tuy Hoa-Phu Yen)

We've been experiencing hardship in our fishing economy due to sea pollution. People are concerned about fish quality, and we cannot sell the fish we catch at the price we want. (Male, Phu Quoc)

Thirty-six participants representing two major cities, however, experienced another type of littering dilemma arising from inadequate social responsibility and public negligence. They said:

People complain all the time about the locations of public waste bins. When we put public waste bins in front of Ms. A's house, she complains and asks to move the bins because of the trash smell. We move the waste bins to Ms. B's house, and it ends up in front of Ms. A' house eventually. (Female, Hanoi)

People are selfish in this matter. We cannot evenly distribute waste bins in our district and residents are forced to go a long way to throw trash. Many choose to leave trash in public places, causing a serious littering situation. (Male, Ho Chi Minh city)

In addition to non-sorting, waste dumping into bodies of water, and littering, other unsustainable waste practices were identified as waste burning (due to lack of waste collection infrastructure) and plastic waste dumping (due to plastic overconsumption). All participants knew that the indiscriminate disposal of plastic waste into the environment was causing the most adverse environmental problem, but they admitted that they did little to reduce their plastic waste except for reusing and reselling plastic trash to *ve chai*.

## 4.3. Technical infrastructure

Participants stressed the importance of adequate technical infrastructures to ensure sustainable waste disposal. According to them, essential components of the technical infrastructure included waste collection bins, trucks, and collectors. Interviewed coastal residents confessed that they frequently burnt their household waste due to a lack of waste infrastructure,

There are not enough waste trucks and collectors in our area. We cannot leave our waste in the house forever. I often burn my home waste and rake the ground after every burn. (Male, Phu Quoc).

When asked where their waste would go to, more than half of participants favoured landfills, whilst only one third preferred waste burning in incinerators. Only five participants stressed the need for a holistic approach to waste treatment, stating:

Burying waste in landfills is a temporary solution and burning it creates air pollution. The best way is to have advanced waste treatment facilities that manage waste in an environmentally friendly manner. (Female, Tuy Hoa-Phu Yen)

Overall, the focus groups disclosed a heavy focus on waste collection and removal but there was a small segment of participants who recognized the need for a holistic approach to waste management. Despite being unaware of the know-how, they expressed an intention to financially contribute to a holistic waste management system through an environmental tax scheme.

## 4.4. Social institutions

In terms of the social institutions that involve waste disposal, participants identified eight actors. Firstly, in their perceptions, home waste management would be a feminine task. Vietnam was still heavily patriarchal and thus, women were expected to be responsible for home waste management, including waste gathering, sorting and educating family members about sustainable disposal practices, as one participant summarised:

Women must be responsible for household waste disposal because they are home makers. In my family, that is the job of my wife. (Male, Hanoi)

Many male participants agreed but added that they might help when necessary.

Secondly, participants said that neighbours and resident communities played impactful roles in shaping waste disposal practices. They shared that others' waste practices did affect their own; for example, two thirds of participants reported giving up on waste sorting after seeing their neighbours litter carelessly or never sort waste. When asked about reporting such non-compliance behaviours to authorities, more than 90% of participants were reluctant, quoting face-saving culture as the reason for not taking any action. They stated:

I never report non-compliance cases to the local authority. They are my neighbours, and I must save face for them. (Female, Nam Dinh).

Notably, there were intense discussions on the practices of those residents who live near the waterway, such as:

Residents who live near the river often throw their household waste into the river and we do not see any social awareness campaign or propaganda or policy to address this problem. Some people are aware of the waste situation, and they go a far distance just to end up throwing their waste into the river that is far from their home. We are disappointed that the local authority does nothing to stop it. (Male, Tuy Hoa- Phu Yen)

In the last pig epidemic, some people even dumped dead pigs into the river. We suspect that those who live upstream of the river will dump anything into the water, and those who live downstream have to suffer. (Male, Nam Dinh)

Thirdly, participants stressed the role of the government in addressing waste management issues. They called for the government to take a more proactive role in providing waste infrastructure and personnel, waste regulations and educational initiatives to raise public awareness. Technical knowledge base about waste management was perceived critical as this knowledge might impact their self-efficacy. Participants also complained that there was an absence of environmental focus in the formal education system run by the government.

People are not aware of littering consequences because the existing education system by the government fails to teach children about this. (Male, Tuy Hoa-Phu Yen)

The government must provide waste education programs to give us technical knowledge about how to dispose of waste properly. How can they expect everyone to dispose of waste properly? (Female, Ho Chi Minh City)

Whilst coastal residents placed more emphasis on regulations, those in major cities insisted that waste education programs were more important. They believed such programs were crucial in improving their technical knowledge base and thus self-efficacy, without which no behavioural change could be activated and retained. Interestingly, *ve chai* (scrap traders) were perceived to be highly influential on household disposal behaviours, particularly waste sorting and waste reduction. Participants agreed that they shaped the habit of sorting home waste for reselling because of *ve chai*, for example:

We wait to sell our trash to *ve chai*. To us, they serve as informal waste collectors. (Female, Tuy Hoa-Phu Yen).

The next social factor identified in the waste system was the manufacturer. All participants considered manufacturers to be waste generators and expressed frustration towards manufacturers' excessive use of plastic:

Manufacturers rely too heavily on plastic packaging. We consumers cannot reduce plastic waste if manufacturers keep producing it. (Male, Hanoi)

All participants felt that they had little power as consumers to make choices to reduce plastic consumption and demanded that the manufacturer reduce plastic production.

On a positive note, two thirds of participants praised social organisations for the increasing involvement in educating resident communities about waste issues and waste management:

In my area, such social organisations as the Women's Association and Youth League are doing an excellent job in running local campaigns to activate community involvement in waste management. I learn enough from them about environmental issues to change my waste disposal habits. (Female, Nam Dinh)

Some participants even shared:

Most government programs are just political propaganda which bring no effect to change the waste situation in our community. We prefer to get involved in environmental activities organised by social organisations. (Female, Ho Chi Minh city)

In short, the discussions revealed that social institutions set norms and expectations that might mould waste management practices in a positive or negative direction. Whilst participants admitted reducing effort to sort and reduce waste due to non-compliant neighbours, they would expect other social institutions such as the government, social organisations, family, and resident communities to motivate and support their compliance behaviours.

## 5. Discussion

According to the interview data, residents classify sustainable waste management practices primarily based on environmental and economic impacts and very few placed an emphasis on public health consequences of waste. On the one hand, this finding echoes past research that indicates the focus on the environmental and economic aspects of waste management in developing countries (Wilson, 2007). On the other hand, it is inconsistent with prior studies emphasising human health problems caused by waste disposal and treatment (Chaudhary et al., 2022; Istrate et al., 2020). For instance, as reported by Chaudhary et al. (2022), emissions from waste burning bring about a huge amount of air pollution causing serious health problems. It seems that residents in this study take health effects of waste very lightly.

First, interviewed residents show consensus on the classification of sustainable and unsustainable waste management practices. Two thirds of them reported efforts around waste sorting. This finding is dissimilar to a recent Vietnam survey reporting that only 38.63% of respondents sort waste at home (Khuc et al., 2023). Nonetheless, more than half of residents in this study show a rather weak attitude towards waste sorting as they find it too hard to make waste sorting a habit in their daily life. There were excuses such as time, inadequate infrastructure and non-compliance of others. That helps explain why residents give up on waste sorting when seeing others dump all sorts of waste into the same bin. Furthermore, residents expressed a short-term orientation in waste

reduction effort as they were motivated by immediate impacts such as economic savings (i.e., reselling for money) rather than a moral sense for environmental protection. Our findings thus contrast with previous reporting that moral obligation influences residents' intention to sort waste (Shen et al., 2019). In our study, immediate direct benefits of waste sorting prevail whilst the sense of moral duty is absent in all focus groups.

Second, regarding unsustainable waste management practices, interviewed residents think that littering originates from a lack of social responsibility. The literature reports that public awareness of littering is low in developing countries (Singer et al., 2019). Many residents in this study, however, feel that blame must be attributed to the government for not having effective regulations. Their perceptions may be based on the inherent thinking in part of the population that assumes developing countries are more lenient in terms of environmental law enforcement; or at some extreme, law guidelines do not even exist (Serge Kubanza and Simatele, 2020). This contextual factor was previously found to have a significant impact on the sense of responsibility for litter in residents of developing countries (Lissah et al., 2021) and still resonates with our study.

Additionally, prior research shows that social norms influence littering (Almosa et al., 2017). Littering seems to be socially accepted (Hansmann and Steimer, 2015) as people do not make litterers accountable. This explains why interviewed residents hold "follow the crowd" perceptions about public littering as it is perceived as a public issue but not a personal responsibility. This may reflect the concept of public negligence (Sewak et al., 2021), which is attributable to a lack of personal responsibility, which seems to pervade across all the focus groups.

Third, our study shows that a knowledge base and waste regulations are considered indispensable components of the technical infrastructure. Our findings reflect previous research stating that ineffective waste management results from the lack of waste regulations (Serge Kubanza and Simatele, 2020) and the failure to provide technical infrastructure (Abdul Aziz et al., 2019; Almosa et al., 2017). Waste education programs are considered by interviewed residents to be a major part of the technical infrastructure needed to enforce waste regulations and facilitate compliance behaviours. Without the technical knowledge about waste management, residents do not know how to dispose of waste properly and consequently cannot form the basis for practice.

Fourth, according to interviewed residents, although technical infrastructure is essential in ensuring proper waste management practice, it is the social situation that is more impactful on their waste disposal practices. For example, ve chai (scrap dealers) are mentioned as influential waste collectors encouraging residents' waste reduction effort. Ve chai is referred to as informal waste workers by United Nations Vietnam (Weina and Nguyen, 2020). In fact, the plastic recycling process in Vietnam is reliant on informal waste collection channels (Salhofer et al., 2021). The role of informal actors in waste management systems has been highlighted in BRICS - Brazil, Russia, India, China, South Africa (Gonçalves et al., 2018) where informal actors are an integral part of the national waste management scheme. Developing countries can learn from BRICS to acknowledge the importance of informal actors in shaping waste reduction behaviours (Tong et al., 2021). Unfortunately, this is not the case in Vietnam where ve chai (scrap traders) are neither integrated nor recognised in local or national waste management systems.

Fifth, another consensus in the focus groups is the severity of plastic waste pollution and the attribution of plastic waste generation to the supply side. Participants feel powerless to make their own choices not to consume plastic or to reduce plastic consumption. That might be because of the notion of consumer vulnerability that occurs when control is not in the consumer's hand (Baker et al., 2005). According to Marazzi et al. (2020) and Goldman et al. (2021), consumers' proactive reduction of plastic use proves to be effective in decreasing plastic waste. Nonetheless, without a technical knowledge base, residents may never

consider their power as consumers to reduce plastic consumption and the resulting plastic waste. This points back to waste education programs that must improve not only the knowledge of waste and waste management but also an understanding of consumer rights and responsibilities since education is important in behavioural change (Dalu et al., 2020; Govindan et al., 2022; Matsekoleng and Tomé Awshar, 2020).

Sixth, interviewed residents in this study mention the influences of others on their own disposal behaviours. Witnessing such noncompliance behaviours as non-waste-sorting may negatively influence their intention to continue sustainable waste management practices. Our study finds that most residents choose to keep silent about noncompliance and face-saving culture is used as an excuse for not engaging in tangible actions against deviant waste management practices. In practice, face-saving culture is prominent in a collectivist culture such as that of Vietnam (Le and Quy, 2021; Nguyen et al., 2021; Pham et al., 2020). While the characteristics of communities could be a factor influencing non-compliance and compliance (Briguglio, 2016), we have found a consensus that female members of the family are expected to be accountable for household waste management. Thus, cultural factors that impacts socially structured behaviours such as waste management must be examined (Kaplan Mintz et al., 2019).

Seventh, past research indicated that the government's role is required in leading sustainable waste management (Tsai et al., 2021). In our study, residents also agree that the government should lead the national waste management program, but the lacking opinion is related to how the government legislates industry responsibility. As argued by Azevedo et al. (2021), it is necessary to regulate packaged product industries and require them to have structures to deal with the resulting plastic waste, such as proper treatment, reusing and recycling. Governments can direct industry attention to the lifecycle of products to raise the rate of recyclable materials (Cetrulo et al., 2018), and thus enforce environmental legislation on industry. However, interviewed residents do not express any awareness of the connection between the government and industry, showing an inability to fully grasp the social institutions that contextualise plastic consumption and disposal.

Furthermore, deviant waste practices have been regarded as a critical concern of residents. Especially, illegal waste dumping into bodies of water aroused their anger and discontentment. However, their concerns have not turned into any tangible actions to stop deviant waste practices and their effort to confront non-compliance is lacking. Residents would rather call for the government's law making and enforcement to alleviate non-compliance. This is in line with the SPT as it also suggests that changing habits requires an unfreezing of existing habits and using conditions to activate behavioural change. The practical implications are obvious: the government is expected to not only provide waste infrastructures but also regulate non-compliance within specified waste legislations. Residents rely on the active role of the government in unfreezing non-compliance habits in order to reinforce sustainable waste management practices.

Finally, interviewed residents' consensus on the role of social organisations illustrates their increasing involvement in waste management. Our finding partly echoes prior studies which confirm non-government organisations' roles in creating residents' awareness of waste management (Chowdhury et al., 2020; Kulkarni, 2020). Residents prefer to get involved in waste education programs organised by social organisations, demonstrating that social attachment and commitment to waste management practices can be strengthened through collaboration with resident communities, rather than political propagandas by the government that manipulate more than educate and motivate.

## 6. Conclusion

Based on the SPT, this study delves into the waste management practices and perceptions of residents in Vietnam. This study is the first investigation in a developing country to use SPT to understand the nature of residents' waste management practices and explore the impact of technical infrastructure and social institutions from their own perspectives. The repeatability of waste management practices and the formation of habits emphasise the need to consider the technical and social conditions that either support or hinder sustainable waste practices.

Unlike previous studies that only provide quantitative data, this qualitative study gains a more in-depth understanding of the underlying mechanisms and motivations. Residents' opinions indicate that technical infrastructures only provide prerequisites for sustainable waste management practices whereas social institutions can motivate and mould behaviours into regular practices and habits. This is an important implication for developing an effective waste management system. Without infrastructure, residents face difficulties in properly disposing of waste but social actors have a longer-term impact on shaping waste management practices in a positive or negative direction. The study therefore provides avenues for future research on social engagement for intervention and behavioural change strategies.

Furthermore, the study shows that in residents' perspectives, personal waste responsibility ends at the point of waste collection. This indicates the prevalence of a reactive approach to waste management amongst some residents, who tend to focus on disposal rather than reducing waste generation through conscious consumption choices. This also highlights the need for education about the role of consumer power in reducing waste and promoting sustainable consumption.

The perspectives of residents shine a light on the crucial role of social structures in fostering sustainable waste practices. The government is perceived as the most influential actor in shaping social structures, as they are responsible for regulating waste authorities, resident communities, manufacturers, and informal waste sectors. Residents expect the government to prioritise policy and infrastructures as an enabler for any micro transformation to take place at the resident level. This has significant implications in a developing country, where inadequate government action can lead to residents' using a lack of waste facilities, regulations, and knowledge as justifications for deviant waste management practices that may become normalised habits over time. Additionally, ve chai as informal waste workers positively influence residents' waste sorting and minimisation efforts. As such, national waste management systems would be better off when formally integrating this informal sector to use economic incentives for motivating household waste sorting and reduction. Moreover, the findings demonstrate residents' trust in one social actor, namely, social organisations. Achieving a shift in waste management behaviours requires not only policy measures at a macro level, but also effective communication and education efforts at a misolevel.

We propose the following policy recommendations. At the macro level, the government can legislate and enforce waste management to prevent non-compliance as well as coordinate technical infrastructures to facilitate compliance. The government is expected to regulate noncompliance behaviours within specified waste legislation frameworks because residents rely on the government in unfreezing non-compliance habits to reinforce proper waste behaviours. Moreover, incorporating the informal sector in waste management systems is recommended as an effective measure to motivate residents' waste reduction efforts. To do this, the government must formally acknowledge the role of informal waste sectors by legislation and thus will be able to expand waste management networks through millions of informal waste collectors without having to finance them. Integrating informal waste sectors with formal waste sectors will allow effective collaboration for a synchronized waste collection and treatment system. This integration will also allow residents to have a holistic view of waste management and to feel incentivized to reduce waste through informal waste sectors' efforts. Additionally, the government can embed training on responsible consumption and production and sustainable waste management in the formal education system to educate young people about consumer rights and citizen responsibilities. Simultaneously, manufacturers must be

regulated for controlling plastic production and consumption. At the misolevel, the government can leverage residents' trust in social organisations by partnering with the latter to provide training and education on waste management. Especially, increasing personal responsibility for household waste disposal and public littering should be part of this training to prevent public negligence towards waste issues. Involving male members of the family in household waste management training is the first step towards achieving a transformation in social perceptions of gender roles. As the orchestral effort in reducing waste cannot happen without the involvement of residents, waste authorities must conduct periodical assessments of residents' opinions relating to technical in-frastructures and social conditions required to develop and maintain sustainable waste behaviours in families and resident communities.

Several research limitations should be acknowledged. Firstly, the samples used may not accurately represent the entire population. While the samples were recruited from five research sites, it would be beneficial to conduct a follow-up survey to collect data from other cities and provinces to validate the findings.

Moreover, the study only offers insights into waste management from residents' perspectives. Future studies could address the limitations by collecting opinions from key stakeholders, including waste authorities, waste collection and treatment operators and social organisations involved in environmental protection and waste management. By doing so, researchers can develop a holistic framework for waste management involving relevant stakeholders who work together to provide technical and social contexts for facilitating sustainable waste management practices.

#### **Declaration of Competing Interest**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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