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ORIGINAL PAPER

# Towards a Just Circular Economy Transition: the Case of European Plastic Waste Trade to Vietnam for Recycling

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## Abstract

Exporting waste for recycling to destinations without sound recycling capacity raises questions of fairness and sustainability. Due to insufficient recycling infrastructure in Europe to manage the growing generation of plastic waste, there has been an increase in waste trade for recycling in a complex global value chain, with the stated goal of achieving sound resource recovery. However, such trade poses increasing governance and sustainability challenges. The EU has implemented policies and systems for plastic waste management, including separate collection to prevent potential harm and promote resource reuse. Nevertheless, waste handling is often outsourced without transparency to countries with cheaper operating and labour costs, which can cause harm to individuals, societies, and the environment. Fifty per cent of the collected European plastic waste for recycling is shipped for recycling outside the EU without accountability. This Vietnamese case study of the EU plastic waste exports for recycling aims to increase our understanding of waste governance and its circularity, sustainability and justice implications. We adopt a multidisciplinary perspective to understand the challenges of the EU's plastic waste export practices for the broader socio-ecological system. We propose a multidisciplinary framework as an ecocentric ethical guide for just and circular future waste shipment practices with strong consideration for the social and ecological dimensions. We hope that this research and its outcomes can provide insights for forthcoming policies, such as the United Nations treaty on plastic waste pollution.

**Keywords** Plastic waste trade for recycling · Circular economy · Recycling · Plastic waste value chain · Just transition

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## Introduction

Plastic waste is traded globally for recycling in an increasingly unequal world. Depending on social, economic, cultural, and technological contexts, the same plastic waste that needs to be recycled or disposed of in one location can be scrap or resource or cause harm elsewhere [89]. Recycling infrastructure and technology determine what happens to waste, its level of circularity and sustainability and usually reflect the level of economic development [20, 22, 76]. For example, recycling in the 'formal' sectors usually at least provides workers with personal protective equipment and treats pollutants before discarding them. In contrast, the 'informal' sector might not have the capacity to manage recycling with such health and environmental considerations [59, 102]. The circularity and sustainability outcomes of shipping plastic waste for recycling are contingent on the local context of the waste value chain, including the actors involved and their motivations, waste infrastructure, and policy and its implementation. A systematic review of transboundary waste trade found a need for a contextual and solution-oriented understanding of such trade [89]. Any attempt at a just circular economy transformation must consider the full value chain, ethics, geographic context and its social, environmental and economic dimensions.

Plastic production and waste have resulted in environmental and social issues, including toxic exposure in both land and marine animals, as well as humans [63, 70]. Global plastic production between 1959 and 2017 is estimated at 9.2 billion tonnes, with only 10% being recycled and 14% incinerated [37]. Research estimates that two-thirds of all plastic ends up in the natural environment [21, 70]. Unmanaged plastic waste has been linked to toxic exposure in our ecosystem [8, 70]: microplastic is found in human bloodstream as well as in the milk, meat and blood of farm animals, and their effects are unknown [15, 49]. Using existing data on ocean plastic input and ocean circulation models by van Sebille et al. [96] estimates that the fate of 99% of the plastic waste in the oceans is currently unknown. Their estimated quantity ranges from tens of thousands to hundreds of thousands of tonnes [77].

As a significant plastic consumer, Europe produces 26 million tonnes of plastic waste annually [26]. In 2018, plastic waste treatment included energy recovery (42.6%), recycling (32.5%) and landfilling (24.9%) [27]. Another study finds that 24.5 million tonnes of plastic waste were generated in 2020, of which 50% were incinerated, 14% were recycled and 8–15 million tonnes were unaccounted for [88]. Accurate plastic waste data is scarce [3, 9]. Of the collected plastic waste for recycling, about 50% is shipped outside of the EU for recycling because of a 'lack of capacity, technology or financial resources to treat waste locally' [26, 28, 29]. For instance, 46% of separated polyethene in the EU is shipped outside the country [8]. Major destinations include China (until the waste import ban of 2018), Indonesia, the Philippines, Thailand and Vietnam [28, 31, 82]. These countries typically have lower recycling capacities than the EU and account for over half of the global land-based plastic waste leakage to the environment [40]. Thus, shipping plastic waste to destinations with less stringent environmental and social regulations than in the EU and insufficient infrastructure to process (domestic and imported) plastic waste is socio-ecologically and ethically questionable.

Before the ban on importing low-quality waste plastic as part of its National Sword policy, China imported significant quantities to feed its large domestic demand with low-cost transboundary imports [10, 34]. Nonetheless, with a recycling rate of only 25% [46], China disposed of a greater proportion of its plastic waste into the environment, causing significant environmental issues [100]. The Chinese import ban disrupted the global plastic waste

trade [10, 100] and caused plastic waste diversion to new export destinations in Southeast Asia. According to Eurostat, EU plastic waste shipped to Hong Kong, India, Indonesia, Malaysia, Taiwan, Thailand, Turkey, and Vietnam increased ([28], Fig. 1). For example, during this period, Vietnam and Malaysia saw an increase in plastic waste imports of over 100%, forcing them to rethink the legal and policy framework related to plastic waste imports [17, 100]. Chinese import ban and stricter regulations in other importing countries led to stockpiling of plastic waste in exporting countries [47].

In 2019, 9% of imported plastic waste in Vietnam came from the EU, with Japan accounting for 41.9%, Hong Kong for 8.25% and the Philippines for 6.47%, among others [65, 94]. Over the last five years (2016–2020), Vietnam's imports of all plastic waste and exports from the top five European exporters (Belgium, Germany, Netherlands, Spain and the UK) have increased [50, 94]. Despite challenges in managing domestic plastic waste [79, 87, 92, 103], Vietnam remains an EU plastic waste export destination. Estimates suggest that Vietnam recycles 9 to 33% of the imported plastic waste, not all of which meets international sustainability standards [17, 79, 103]. Although the plastic waste trade may be profitable for some, it shifts waste management responsibility elsewhere and can harm individuals, society and the environment [4, 93]. Furthermore, Bishop et al. [8] estimate that 1–7% of shipped polyethylene from the EU ended up in the ocean, suggesting a lack of due diligence on the part of exporters.

Exporting plastic waste without considering its impact on destination countries is an unsustainable waste management practice. Rather, it is a 'tragedy of the commons' — where decisions based on personal interest harm others and the environment [41]. The trade relies on cheap shipping and lowering costs by employing the cheapest labour [64]. By 'distancing the waste' to hide the consequences of overconsumption, the harm associated with waste is cheaply and easily foisted on others, usually the poor, less powerful and the vulnerable [5, 18, 64, 89]. However, despite the magnitude of the trade, little is known about plastic waste trade governance and its impacts on destination countries. Some recent research aim to bring quantitative insight into the plastic trade across the

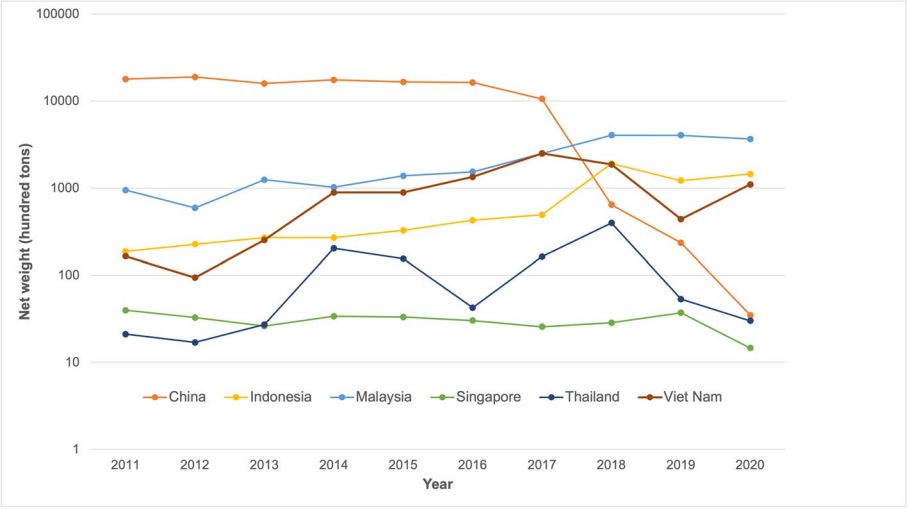


**Fig. 1** Logarithmic graph showing exports of European plastic waste to South East Asian countries in the last 10 years as reported by Europe (source: Eurostat)

life cycle of plastic [7, 32], and the UN treaty on plastic waste to be forged by 2024 aims to bring enforceable regulations to tackle plastic waste pollution in the entirety of its life cycle [95].

Germany, the UK (then in the EU), the Netherlands, France and Belgium (in order of quantity exported) were among the top 10 plastic waste exporters in the world in 2016 [77]. Model calculations of polyethene shipped from the EU for recycling show that 14% were landfilled, 6.4% were incinerated and 3.3% ended in the ocean, i.e. 23% were not recycled [8]. Even though the EU has a lofty ambition to 'transition towards a circular economy for plastics' [27] and a recently revised EU waste shipment regulation [30], such practices of shipping plastic waste for recycling to destinations without accountability show the disconnect between European ambitions and actions. Researchers are critical of the EU plastic strategies even with stricter revised EU policies. Based on a Dutch study, Calisto Friant et al. [12] argue that being 'frontrunners' by focusing solely on a technocentric approach (for example, increasing the recycling rate) might solve some symptoms of plastic problem but not systematically address its causes. For a circular extended producer responsibility (EPR), Vermeulen et al. [97] propose a shift from downcycling to other value retention options (see "Circular Economy, Plastic Waste and Recycling" for value retention) by engaging diverse actors and practices while incorporating the global waste value chain. Global North to Global South trade of plastic waste in an unequal context for waste valorisation decreases equity, fairness and distributive justice [19]. Other researchers (see [42–44]) argue that such unequal trade causes systemic harm and increases global inequality.

This research investigates the impact of plastic waste trade on the circular economy and proposes a multidisciplinary framework for governing future waste trade while also incorporating a social and ethical dimension into the analysis of the circular economy and recycling value chain. Specifically, it seeks to address three key questions: (i) how is the plastic waste trade for recycling currently governed? (ii) What challenges exist within the waste value chain? (iii) How can this trade be made more circular and just? To answer these questions, the study incorporates perspectives from the circular economy, reverse logistics, justice and equity, environmental governance and ecocentric ethics. The study focuses on the social and environmental costs associated with shipping plastic waste to Vietnam for recycling, using a variety of research methods such as stakeholders mapping and interviews, analysing policies and conducting an in-depth study of recycling practices in an informal recycling village. Afterwards, this study suggests a comprehensive framework for governing waste shipment that incorporates a multidisciplinary approach and five disciplinary perspectives, aiming to promote a just circular economy. This research connects the growing literature on global plastic waste trade to the literature on (just) circular economy transition and intends to inform the national and international policy developments that will guide plastic waste trade.

## Theoretical Perspectives

The process of trading plastic for recycling involves a complex value chain involving various policies and governance structures across different geographical locations and has socio-ecological implications. To fully comprehend this intricate value chain and its governance, a multidisciplinary perspective is necessary. In this regard, we delve into concepts from five theoretical perspectives: circular economy, reverse logistics,

environmental governance, justice and equity and ecocentric ethics, which will also help analyse the results and guide the discussion.

## Circular Economy, Plastic Waste and Recycling

Circular economy, our first perspective, advocates regeneration by slowing, narrowing and closing material and energy loops and proposes multiple value retention options [36, 75]. Short-loop options include refuse, reduce, reuse/resell and repair for waste reduction; medium-loop options include refurbishing, remanufacturing and repurposing for value-adding and long-loop recycling, energy recovery and remining for value retaining [75]. From a sustainability perspective, researchers argue that choosing between value retention options should be steered by integrated market dynamics addressing sustainability, people, planet and prosperity (PPP) framework, quality and functionality (see: [14, 98]). Researchers point out that the social, moral, justice and transboundary dimensions necessary for a just circularity transition are yet to be incorporated strongly into the circular economy discourse [6, 13, 38, 89]. To analyse waste shipment for recycling, we take a broader circular economy perspective, including the social and environmental dimensions, with attention to justice and equity globally.

Recycling mass materials is theoretically one of the least preferred options in the circular economy hierarchy. Yet, due to the emphasis on recycling policies in recent decades, it is popular in the circular economy discourse and practices compared to other more circular value retention options. Recycled products have become increasingly popular with (environmentally aware) consumers as virgin plastic generally has a higher social and ecological footprint than recycled plastic. The European Union aims to recycle 65% of municipal and 75% of packaging waste by 2030 and to make all packaging waste recyclable [26, 78]. Observing the EU's lack of plastic (waste) prevention targets, Zero Waste Europe calls for a 20% reduction by 2025 and 50% by 2030 [106], advocating reducing waste along with recycling.

Plastic comes in various shapes, sizes and chemical compositions like polyethene terephthalate; high-density polyethene; polyvinyl chloride, low-density polyethene, polypropylene and polystyrene or styrofoam [67]. This variety determines the use, reuse and recycling, but not all plastic recycling is technically possible [33]. Primary recycling uses mechanical means like cleaning, shredding and drying to maintain or enhance the quality (upcycling), while secondary recycling loses the quality (downcycling) [72, 84]. Tertiary recycling or depolymerisation involves chemical processes and uses more energy to break down chemically. It is suitable for plastic with multiple compositions and contaminated plastic, which cannot be mechanically recycled [73, 84]. Besides recycling (Table 1), current plastic waste management focuses on incineration and landfilling, the least preferred value retention options in the circular economy.

**Table 1** Overview of the types of plastic recycling (adapted from [72, 84])

| Recycling type | Description |
|---|---|
| Primary | Mechanical, upcycles |
| Secondary | Mechanical, downcycles |
| Tertiary | Chemical recycling |

### Reverse Logistics

Our second perspective is reverse logistics — the process of transferring end-of-life products from one place to another either to use as a resource or to discard. The transition from a linear to a circular economy depends in part on viable reverse logistics, which involves stakeholders such as producers, retailers, scrap pickers, recyclers and others, as well as the actors in the logistics network and their contexts [58]. Mishra [58] conducted a systematic literature review on reverse logistics for the circular economy and found some attention paid to the triple bottom line. Its social factors include stakeholder participation, employment performance and stability, health and safety, collaboration and community engagement; economic factors include return on investments, cost optimisation, efficiency, value capture and the aid of technology and innovation; and environmental factors include minimising harm to the environment by reducing pollutant by-products, energy use, resource use, land and water use, and prioritising and optimising secondary raw materials [1, 58].

The review identified twelve barriers to circular economy adoption, including lack of transparency, access to technology, high cost, short-term profit-seeking, lack of collaboration, knowledge gaps, lack of incentives and leakages during recovery [58]. Another literature review on a recycling network focusing on social, technological and political dimensions found similar findings in the social dimension [80]. However, neither review considers decent livelihood, job security, human rights, a living wage, labour rights and other social justice and equity issues that are typically associated with the waste value chain (see [90]). Therefore, these crucial issues need attention in the reverse logistics literature.

### Environmental governance

Another relevant perspective addresses governance. Governance, in general, solves collective action problems through institutions and their arrangements [24, 48]. In the research context, our collective action problem becomes how to feasibly increase the circularity of EU's plastic waste for recycling and minimise environmental harm while promoting justice and equity (or at least not creating injustice and inequity)? Governance includes actors and their interactions determined by power and influence (politics), interaction rules for actors (polity) and instruments used to achieve the goals of governance (policy) [24]. Driessen et al. [24] and Partelow et al. [68] present different modes of governing sustainability challenges in environmental governance theories. For example, the EU adopts a public-private approach, while Vietnam's governance is centralised. Policy diffusion and policy transfer are fields of study that examine how governance in one country can influence policy and governance in another (see: [39, 53, 83]) and is pertinent to this research.

The circular economy is one such influential policy area with wider global uptake. More and more countries are copying circular economy policies with or without adapting to their local socioeconomic and political context. In an increasingly interconnected world where nations open up to global markets, policy and actions in one place have (intended and unintended) sustainability and equity implications elsewhere, which is studied under the concept of 'telecoupling' [23, 45]. Telecoupling researches interactions between distant and directly or indirectly connected systems observing systems, agents, flows, causes and effects to understand how a third party is affected [45]. For example, how the Chinese waste ban policy had and is causing a series of positive and negative effects globally [101].

In this research, we investigate how recycling-focused circular economy targets and waste exports in the EU create trade-offs that affect people and their environment in Vietnam.

### Justice and Equity

Our fourth perspective focuses on the need for justice and equity in circular economy and reverse logistics that primarily consider material flow and reducing environmental harm. The broader criticism of circular economy literature lacking the social dimension [12, 81, 99] seems applicable to the reverse logistics and recycling network literature. Agyeman [2] points out that equity and justice considerations are usually left out of sustainability discourse by focusing too much on the environmental aspect. Furthermore, Soja [85] showcases the necessity of spatial justice in a just transition, considering how activity in one geographic location can affect equality and equity elsewhere. Additionally, just transitions must incorporate procedural, distributive and restorative justice [54, 62, 86]. Thus, for a just circular economy transition, justice and equity must be incorporated into actors' interactions, relationships and practices across the value chain. The current linear economy, characterised by take-make-dispose, is a driver of social injustice by fostering unequal consumption and wealth accumulation in the Global North and its related societal and environmental threats disproportionately shifted to the Global South [5, 43]. Historically and currently, transboundary waste trade is associated with waste colonialism, thus justice and equity considerations are necessary to understand unequal waste trade.

### *Kyōsei* — Ethics for Mutual Flourishing

The last perspective focuses on symbiosis for mutual flourishing. McRae [55] revisits the Japanese notion of *kyōsei* or 'symbiosis' or 'living together' in environmental ethics, drawing on mutualistic symbiosis ideas from nature as well as business ethics. *Kyōsei* is the key paradigm for Caux Roundtable that guides international business for ethical and social responsibility [16, 55]. Building on the notion of intrinsic value of the individual, the society and the environment and focusing on interconnectedness among them, *kyōsei* proposes balancing the well-being of the individual with the well-being of the society and the well-being of the environment (see Fig. 2; [55]). In *kyōsei*, ethics emerges through

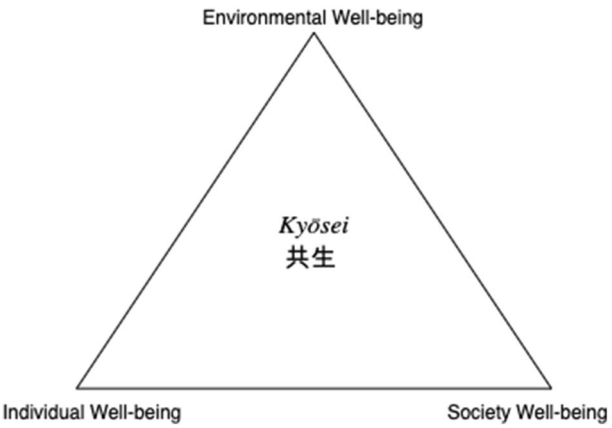


**Fig. 2** Symbiosis for mutual flourishing — an ecocentric ethical framework built on the radical interrelatedness of an individual with society [55, 56]

interconnected double negation: first, the individual negates society for individual rights, and the individual negates oneself for the common good (refer to [55] for 'double-negation'). This double-negation process benefits individuals, society and the environment. Otherwise, a conflict exists between the individual, society and the environment, which can be interpreted as a sustainability problem in this waste trade context. McRae [56] further links *kyōsei* to *kyōei* or mutual flourishing, drawing from concepts of 'cooperation for mutual benefit', 'conflict resolution' and 'maximising efficiency' (as in 'avoidance of waste' or 'waste is foolish'). Combining *kyōsei* and *kyōei*, he proposes 'symbiosis for mutual flourishing', which can be applied to navigate conflicts in interactions, relationships and practices (i.e. governance) in reverse logistics and circular economy actors. For instance, the conflict between cost savings and minimising environmental and social harm can be minimised by investing in waste infrastructure domestically or in the destination of waste exports to ensure mutually beneficial symbiosis. *Kyōsei* is an ecocentric ethical framework that proposes a shift from the anthropocentric worldview, often associated with the underlying cause of the socio-ecological crisis [55, 56].

Symbiosis for mutual flourishing focuses on actors, their actions and also on their relationships. *Kyōsei* framework recognises the interrelationships between individuals, society and their environment and asserts that social and environmental injustices and inequalities are detrimental to mutual flourishing, causing harm to all parties involved. The framework is closely linked to the ideas of just sustainability, spatial justice and just transition and can be associated with the concept of strong sustainability. Strong sustainability stipulates that without a functioning biosphere (environment), there will be no individual, society or economy (see [60, 61, 69]). The concept of *kyōsei* can be applied to interconnect telecoupling relationships in the waste value chain to promote mutual benefit.

By integrating these five perspectives with the results, the study proposes a framework to inform policy and practices on waste shipment, as presented in "Future Direction — a Framework for Waste Shipment for a Just Circular Economy Transition".

## Methods

A qualitative case study design [105] was used in this research. The case study enabled an in-depth contextual examination of governance for waste shipment and recycling, delving into experiences of people, their livelihoods and practices. It emphasized the social dimension of waste trade for recycling. We focused on Minh Khai craft village, one of Vietnam's biggest recycling centres for imported plastics ("Fate of Imported Plastic — a Focus on Minh Khai Craft Village"). We highlight current trends, determine key drivers and enablers and analyse existing practices.

Vietnam was chosen for its significance in the global plastic waste value chain, particularly as a key destination for European exports. Following the Chinese ban on plastic waste imports, there was a significant increase in exports to East Asian countries. Initially, we intended to conduct broader research on plastic waste trade in Southeast Asia, including the circular economy policies of the EU and Japan. However, limited fieldwork opportunities due to COVID-19 and a lack of transparency in multiple countries made it difficult to conduct multiple case studies. Therefore, we focused on Vietnam, one of the primary destinations for European plastic waste recycling. We then established a deeper research collaboration with a national institute specialising in circular economy research, and Vietnamese experts provided valuable local knowledge for investigating this often non-transparent

**Table 2** Overview of stakeholders interviewed and their sectoral representation ($n$ = 21)

| Stakeholder | Number | Names |
|---|---|---|
| Recycling companies | 2 online, 9 in-person | RC 1–11 |
| NGO | 2 in-person | NGO 1–2 |
| Academic/researcher | 2 Online, 2 in-person | ACA 1–4 |
| Government | 4 Online | GOV 1–4 |

value chain. This collaboration was crucial in identifying and conducting a focused study in Minh Khai, which serves as a hub for recycling imported waste in Vietnam.

The data collection process involved four phases. In the first phase, 55 documents were reviewed, including academic literature and relevant Vietnamese and EU policy documents on transboundary plastic waste trade, plastic waste management and circular economy. These documents provided context and identified actors in the value chain. The second phase involved mapping out actors and their interactions based on the previous phase. From November 2020 to May 2022, 50 stakeholders from the government, waste processing and importing companies and non-governmental organisations were approached for online and in-person interviews in Vietnamese and English multiple times (Table 2). In the third phase, structured and semi-structured interviews were conducted in Vietnamese and English between December 2020 and May 2022, which were then translated (if necessary) and transcribed. Finally, a six-week fieldwork was conducted in March and April 2022 when travel restrictions were lifted after the pandemic. This enabled in-person interviews and site visits, including an opportunity for an in-depth study at Minh Khai village, assisted by Vietnamese colleagues. During this period, a total of nine online interviews, twelve in-person interviews and five field visits were conducted. The materials collected from the interviews and field visits were then analysed using the multidisciplinary perspectives.

## Results

This section presents the research findings, which include an overview of waste governance in Vietnam encompassing both domestic and imported waste. The challenges posed by the lack of transparency in the value chain during the fieldwork are also discussed. Additionally, a detailed analysis of the study conducted at the informal recycling village of Minh Khai with pictures is provided.

### Waste Governance, Policies and Actors in Vietnam

To understand the context of imported plastic waste for recycling, it is crucial to understand domestic waste governance. Vietnam, a socialist republic with a population of 96 million, is among the world's fastest-growing economies. Policy making for waste management is the responsibility of the central government shared with various ministries. The Vietnam Environment Administration (VEA), the Department of Legislation and the Institute of Strategy and Policy on Natural Resources and Environment (ISPONRE) all operate under the Ministry of Natural Resources and Environment of Vietnam (MONRE), and play crucial role in shaping environmental regulations.

The legal framework for waste management in Vietnam is based on the Vietnamese Law on Environmental Protection (LEP), which was first enacted in 1993 [11, 66, 91]. The latest revision in 2020 (effective in January 2022) incorporates EPR and the circular economy, focusing on green growth along with decrees, decisions, action plans and strategies [51, 57]. Despite these revisions, implementation and enforcement of waste management policies remain a challenge. For instance, in Ho Chi Minh, there have been ongoing back-and-forth policies for waste segregation into three (organic, waste and recyclables) and two (recycled and others) categories yet without any implementation (interview, RC4). This example also highlights the involvement of multiple government levels and actors, which complicates streamlining policy-making, implementation and enforcement. MONRE is responsible for implementing LEP and shares responsibilities with other bodies, making coordination for implementation, enforcement and effective monitoring complicated. Figure 3 illustrates the various actors engaged in the waste value chain, including national government ministries, local public bodies and other stakeholders. Business organisations, especially plastic recycling, play an active role in waste management and influencing policy. One recent example includes lobbying to increase the concentration of impurities allowed in imported plastic waste (interview: RC 2,4,6; NGO 1). Both the formal and the informal recyclers engaged with imported plastic waste. Academics work closely with government, business and INGOs, indirectly guiding and shaping the policy landscape. NGOs often raise critical voices but are usually in the minority and unheard (Interview, NGO 1).

Guided by existing policies and laws, mostly state-owned companies collaborate with the informal sector, ve Chai, to manage waste, including plastic waste. Financial and technological challenges prevent Vietnam from achieving its goal of waste segregation and thus affects domestic recycling (interview, RC4). The informal sector plays a significant role in waste collection, transporting waste from households to waste processing companies and sorting

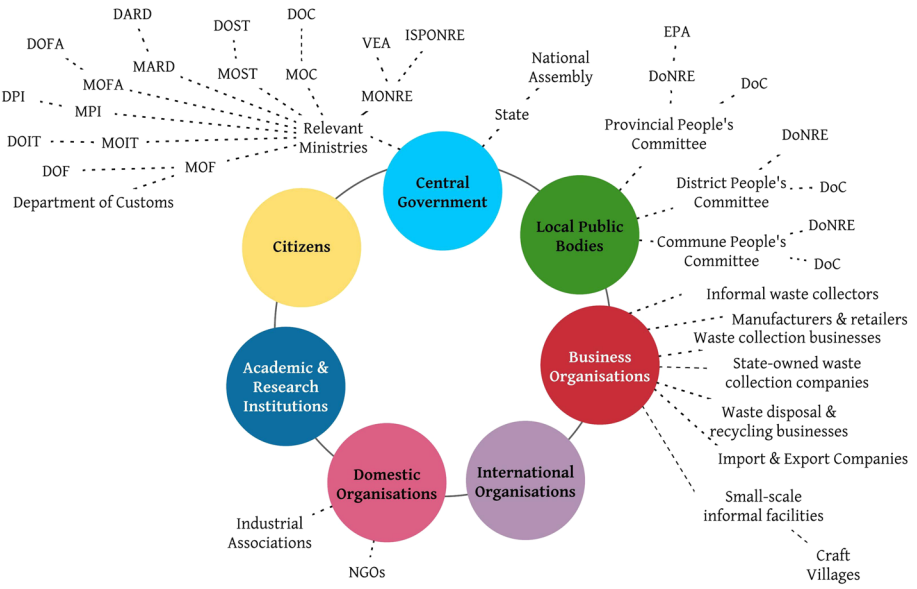


**Fig. 3** The stakeholder map represents the primary actors and actor groups involved in the waste management system in Vietnam, as identified through the various phases of our research. (See abbreviations list)

valuable items for sale in the secondary market (interview, RC4). Waste pickers are usually paid by households through a waste picker collective in larger cities. The informal sector workers use various means of transportation, such as pushcarts, bicycles, scooters, vans, tractors or cars, and work closely with waste processing and recycling companies (interview, RC4). There is a push to formalize the traditional profession dating 'hundreds of years', on which one managerial level waste worker reflects that 'formal or informal labour is just a concept, what is important is trying to take care and support the workers' (interview, RC4). She further identified 'sorting garbage' and 'financing and management of new (incinerator) technology' as major challenges, overcoming which would require 'change in entire system including people, machine and management methods, including some privatisation' (interview, RC4). Figure 4 provides an overview of the waste management practice in Vietnam.

## 'Scrap' imports in Vietnam

Vietnam's Law on Environmental Protection provides regulations for importing plastic waste based on environmental safety standards and publishes a list of permissible imports. There is insufficient infrastructure and technology for sound waste management, so waste imports which cannot be recycled are not officially permitted (Interview, GOV 1). The law sets environmental standards for recycling and also mandates that waste importers use a portion of the recycled materials for production. A legal decision specifies the types permissible plastic waste for importation, and a decree requires importing companies to have wastewater treatment, a dedicated separate storage warehouse, an environmental impact assessment of the company and a certificate of eligibility for environmental protection of the imported scrap (Interview GOV 1, GOV 3). Importing companies need a permit issued by MONRE that requires compliance with strict regulations and mandates they recycle at least 30% domestic waste (Interview GOV 1). Recycled materials, mainly into plastic

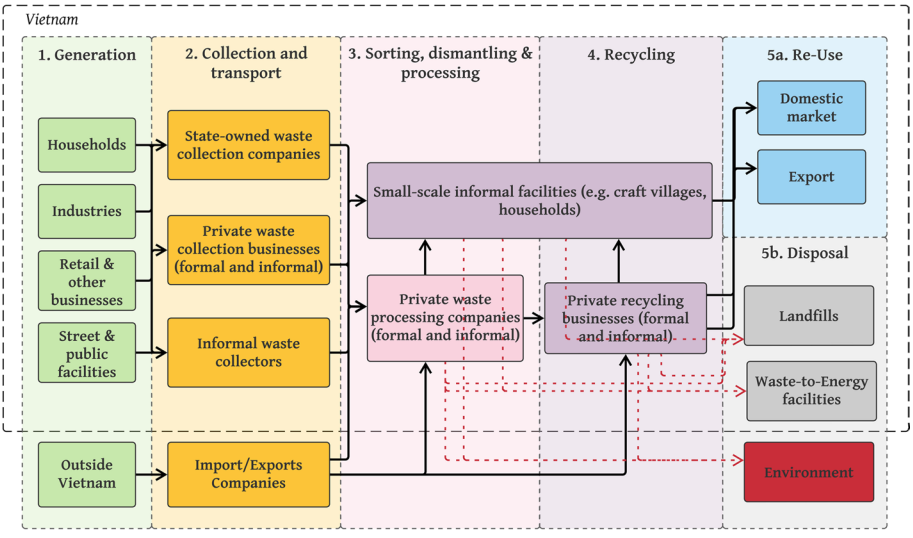


**Fig. 4** Overview of the waste management value chain and value retention options in Vietnam. Red lines indicate the disposal of non-recyclable components

pellets, are sold mainly in the domestic market, while non-recyclable materials are discarded. Landfill remains a primary method of plastic waste management, although incineration is preferred (interview, WMC1,6,9,10).

Despite abovementioned policies and a growing demand for recycled plastic in Vietnam, most interviewees mentioned that not all imported plastic waste is of high quality and recyclable. However, imported plastics are of better quality than unsorted and dirty domestic plastic waste. Among the imported plastic waste, recyclers preferred those from Japan as they were the cleanest. In 2018, Vietnam halted plastic waste importing permits after being overwhelmed by increased plastic imports following China's ban on plastic imports. Getting a permit remains difficult and requires meeting strict requirements and being able to pay a deposit based on imported volume to guarantee that no illegal activities are conducted. However, we learnt that having a 'good relationship' helped to get such permit (Interview, RC 8,10,11). Despite many attempts, we could not access businesses with import permits, and thus much of their operation remains obscure. Figure 5 illustrates how plastic for recycling is collected in the EU and partly what happens to it once shipped to Vietnam. Despite insights into policies and regulations, much practice remains obscure, as indicated by the question mark in the figure.

## Lack of transparency

One major challenge of researching the waste value chain is the lack of transparency and a lack of information on the waste shipment process. We experienced these in our own research efforts. Access to essential stakeholders like MONROE and the port authority was difficult, even though our Vietnamese collaboration partners were connected to the

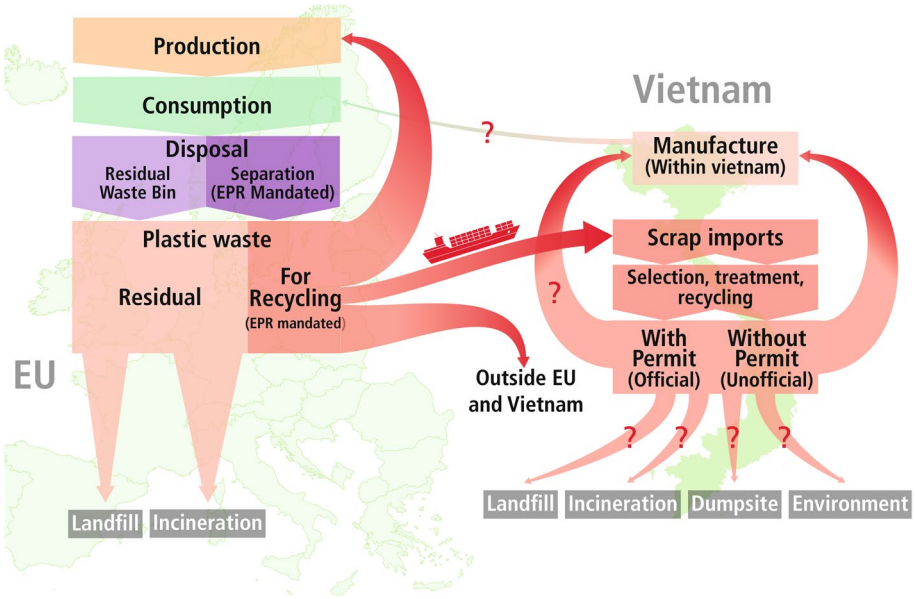


**Fig. 5** EU ships half of the collected plastic waste abroad for recycling, some of it to Vietnam, but the fate of the plastic remains unknown. The question mark represents obscurity in the waste value chain

central government. Furthermore, we could not connect to importers and recyclers with government permits to import and recycle such waste. Despite receiving assurances from a European company regarding the transparency and sustainability of their plastic waste export to Vietnam assurances further reinforced after the recent Basel Convention revision and reflected in the revised EU waste shipment regulation afterwards — (Interview, RC 3), we were unable to obtain contact information of the Vietnamese importer of their plastic waste in Vietnam, as our attempts were met with silence by the exporting company. The purported benefits of the new policy development were unfounded due to obscurity. Without access to companies with import permits, we focused on the more accessible 'craft villages', where imported plastic waste is recycled mostly without such permits. However, it is hard to establish what proportion of imported plastic waste they recycle and what happens to the discards. The craft villages are neither formal nor informal; each business has different legal arrangements. Most have some kind of business permit but operate without a permit to import or recycle imported waste. They seem to have robust informal network(s) but are not as publicly organised as groups like the Vietnamese Plastic Association (VPA).

The Plastic Recycling Branch of VPA represents over 300 plastic enterprises and 400 individual and business members. During an interview, an industry leader with 20 years of experience in plastic recycling expressed enthusiasm for developing new sustainability policies and actions related to domestic recycling (Interview, RC 6). The interviewee was knowledgeable about domestic plastic recycling but was unaware of any plastic importing or imported plastic recycling company. His company focused on pioneering a domestic plastic waste collection system. On imported plastic waste, he reflected, 'MONRE strictly manages the import of scrap, and at the same time strictly regulates the conditions on wastewater and emissions in the recycling process; there is no effect on the environment and human health' (Interview, RC 6). Later, during field visits, we found questionable environmental and human health conditions, despite these laws and regulations. What happened to the imported plastic was obscure even to an expert with years of experience and connections in the Vietnamese plastic recycling sector. Many Vietnamese we interacted with during the research were surprised to learn that Vietnam imported plastic waste for recycling and remarked that the focus should be on recycling domestic plastic waste instead. Circularity and sustainability of waste trade hinge on transparency and accountability in the value chain but are currently absent despite newly revised policy and practice standards. The Prior Informed Consent (PIC) protocol of the Basel Convention does not apply to commonly traded plastic waste 'destined for recycling in an environmentally sound manner and almost free from contamination and other types of waste' [93], which is a missed opportunity for enforcing transparency through a global policy regime.

### Fate of Imported Plastic — a Focus on Minh Khai Craft Village

Minh Khai craft village, located 20 km outside the capital, Hanoi, is one of the biggest Vietnamese recycling hubs for imported plastics. Traditionally, craft villages made handicrafts during their free time from farming. However, in Minh Khai, 870 households recycle 500–600 tonnes of plastic waste daily for livelihood [79] (Fig. 6). Most recycling takes place in the front yard of their homes (see Figs. 6 and 7). The practitioners refer to plastic waste as 'scrap' since they view it as a source of income and not a burden. Due to the absence of a robust domestic plastic waste collection system, domestic plastic scrap is generally considered unclean unless it comes directly from the manufacturer. Only a few recyclers with one-to-one relationships with domestic

**Fig. 6** Photos from Minh Khai Village (top to down) showing front yard recycling, storing plastic in the environment and the street and European plastic pile imported for recycling

manufacturers had access and recycled clean domestic waste, while others depended on imports. The rising demand for recycled plastic content in products, both within Vietnam and globally, has led to a greater need for recycled material in the Vietnamese manufacturing sector. As a result, without a steady supply of clean domestic plastic scrap, these recyclers have to rely on imported scraps, often without permits and through informal networks.

Most recyclers in Minh Khai preferred Japanese plastic waste as they found it to be cleaner and required less effort to process. Japan also seems to invests in building relationships and developing recycling infrastructure in countries where they export waste. Recyclers stated that they did not need to wash Japanese plastic scrap for recycling (Interview, RC A, B, C). On the other hand, scrap from Europe was considered less desirable and dirty (see Fig. 7), while US scraps were considered the dirtiest (Interview, RC C, D). Recyclers preferred to pay more for cleaner scrap because dirty scrap created more waste and pollution during recycling, produced lower quality recyclate, required more work and fetched lower profit. Based on research estimates, 15–25% of the imported scrap brought to this village cannot be recycled. Depending on its value, waste was either handed down to other waste collectors or dumped in the environment. Furthermore, it is estimated that 25–30% of imported plastic waste is discarded as residual waste, with 7 million litres of wastewater discarded daily into open dumps and waterways from Minh Khai [104]. Due to the lack of proper storage facilities, these

**Fig. 7** Photos showing workers in their work environment engaging in secondary recycling of mostly imported plastic for recycling in Minh Khai Village

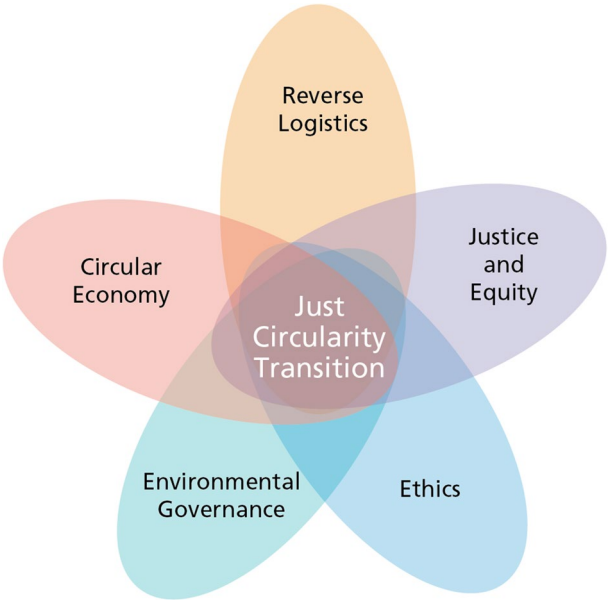


**Fig. 8** Multidisciplinary framework for analysing waste shipment for a just circularity transition

scraps were kept in the front and backyard of the house, by the side of the road, or on any open land (see Fig. 7). The air filled with smoke from melting plastics into pellets and untreated wastewater from recycling process caused health and environmental harm.

Reflecting on the period since the Chinese ban, when Vietnam noticed a sharp increase in plastic waste, one recycler states, 'people made a lot of money when there was an influx of plastic before the government strengthened regulations' (Interview, RC 6). Despite stricter regulations that included issuing selective import permits to companies meeting government standards, getting hold of imported waste is not a challenge to these recyclers without importing permits. For most, it is usually a phone call to a broker or a visit to the port away. Even though importing companies are obliged to recycle imported scraps and not sell them, imported scrap is easily accessible in the market. Different quality of scraps from various regions of the world came at different prices and determines the quality of recyclate. From Minh Khai, we drove an hour to Hai Phong port following an insider tip and noticed plastic waste with labels for the European market sold by Chinese brokers in one warehouse. China dominated the plastic waste trade for decades before the ban, so Chinese businessmen actively engaged in the plastic waste trade in Vietnam and elsewhere. Near the port, there were many warehouses with plastic waste in various conditions. Some even stored openly next to the river and rivulets. The one we visited was in dilapidated condition. Clearly, health, sanitation and environmental guidelines were not a priority in most of these businesses. Policy and its enforcement gaps were omnipresent. Most recycling companies without import permits bought imported plastic waste from such middlemen. They had some license to operate the business and had to follow basic health and safety regulations. To surpass regulations, bribing the inspector seem to be a common occurrence. Other recyclers mentioned the possibility of importing plastic scraps without a permit by bribing customs officials. Rather than industrial, Minh Khai craft recycling village looked more like a city suburb among rice fields, filled with modern houses with tropical plants but with do-it-yourself recycling in the front yard surrounded by huge waste piles and engulfed by melting plastic fumes.

All the recycling centres we visited employed basic mechanical recycling, where scraps are sorted, cut, washed, melted and downcycled into pellets (see Fig. 8). These were often covered open spaces in the front yard of the owner's house, with 10–15 employees. Most owners believed their activities were not very harmful 'you get sick living anywhere these days' (interviewee RC 8), 'the water is clean enough to be thrown in the drain' (interviewee RC 10). We observed people, including business owners, cooking, eating and living in this area next to the fumes of melting plastic and spilling wastewater and children playing. By its side, plastic waste from all over the world, including the EU, was being stored, processed and recycled.

Spending a few days in Minh Khai overwhelms one with plastic and its burning fumes. It shows how policies (Vietnamese or European) promoting plastic recycling and its enforcement are disconnected from its global value chain, workers and their environment, enabling such dire recycling circumstances that violate human rights. Exporting plastic increases the recycling rate in the EU at a significantly cheaper price than recycling in the EU but at the cost of questionable facilities and practices that harm workers and their environment. While much of the fate of all such shipments remains obscure, in Minh Khai, most imported plastic waste is downcycled. All these add up to the true cost of European recycling, borne by people and the environment far away in an ethically questionable recycling practice. This practice of unequal exchange without ethical consideration harms other individuals, communities and the environment. One cannot help but

wonder what an unassuming European plastic consumer, most likely a believer in democracy, equity and justice, and who makes an effort to separate plastic for recycling, would say about this inherently undemocratic and unjust practice. Would the average European be willing to work in the same conditions as the workers in Minh Khai village?

## Discussion

This section explores the importance of justice and equity in achieving circularity and emphasises the need for careful and ethical governance that considers the full value chain perspective on an international level. Then, we introduce a framework that integrates these two essential elements.

### Challenges: obscure reverse logistics without circularity, justice and equity

In Vietnam, due to the absence of robust plastic waste collection, imported plastic waste serves as a cost-effective and profitable raw material for recycling companies to meet the surging demand for recycled plastic. In the EU, recycling infrastructure cannot keep up with the growing plastic waste generation to meet recycling targets. The EU's increased emphasis on recycling without adequate recycling capacity gives rise to a lengthy and complicated waste value chain, involving several reverse logistics actors worldwide. The lack of sufficient recycling capacity in Europe and plastic waste reduction ambitions leads to the exportation of plastic waste for recycling, which presently lacks sustainability or circularity regulations. Outsourcing to a location with inexpensive labour, poor work safety standards, downcycling and negligent pollution management may lead to economically cheaper recycling but cause harm to people and the environment in far-off places. Such EU-Vietnam plastic waste trade for recycling is not transparent and is based on unequal exchange. Increasing plastic waste generation, lack of its management in the EU and lack of ethical consideration in policy and its implementation in the EU and Vietnam has led to neo-colonial exploitation in the form of waste shipment for recycling.

Barrie et al. [5] highlight the exploitative nature of long-distance trades of low-value waste that makes the world more unequal and call for a fair, inclusive and circular trade. Other scholars recognise the importance of fairness, inclusivity and diversity in the circular economy as necessary for societal transformation [13, 97]. Exporting plastic waste from the EU might help waste management and meet recycling targets; however, waste shipment to destinations without sound recycling undermines the principles of just transition and circular economy in multiple ways. First and foremost, shipping waste without accountability harms individuals, societies and the environment in faraway places, thereby telecoupling the EU's plastic waste management with exploitation and harm in other regions. Secondly, the present practices in the waste value chain, which are largely based on exploiting each other and the environment, undermine the capacity for effective governance and foster corruption, illegal and illicit activities, neocolonialism and obscurity within the value chain. Thirdly, such unequal waste trade reinforces inequities, inequalities and exploitation (see: waste colonialism [35, 52, 71]). Fourthly, recycling plastic waste without ethics adds to the least value retention option while bringing significant socio-ecological costs, which is a far cry from just circularity. Finally, these unethical practices undermine regulations and

reinforce profit-seeking over society and the environment, preventing mutual well-being and flourishing in the waste value chain and beyond.

Although achieving higher recycling targets in the EU is commendable, meeting these targets by sending plastic waste to destinations with questionable recycling practices and without accountability raises ethical concerns. For instance, estimates show about 23% of the EU's plastic waste for recycling is not recycled [8]. For example, recycling loss and downcycling in Minh Khai village caused harm to workers and the environment, as well as loss of resources. Thus, circular economy policies and practices should be designed carefully, considering the well-being of the entire waste value chain and the environment, both in the EU and Vietnam. Research (see [90]) also indicates that 'sustainability efforts', such as recycling without full waste value chain perspective in policy-making and enforcement, can perpetuate global injustices and inequities. Transboundary waste shipment currently lacks circularity, fails to incorporate ethics, just transition and spatial equity and overlooks the international implications. Perhaps it may be better to incinerate or landfill waste in Europe than to increase recycling percentages by exporting waste and causing socio-ecological harm elsewhere. Alternatively, the EU could realise its circularity ambitions by creating ethical and trustworthy recycling facilities either abroad or within the EU. Otherwise, the current gaps in policy and practice undermine the legitimacy of the EU and its discourses. Even with newer international, European and national policies on waste trade and circular economy, waste trade for recycling continues to pose socio-ecological harm and exploitation. Recycling policies should be inclusive, transparent and enforceable and practices should be monitored. Existing practices incentivise and reinforce a lack of transparency in the waste value chain, which conceals unsustainable and unethical practices. EU policies, action and governance should account for telecoupled consequences and incorporate equity and justice throughout the value chain.

When adopting popular discourses such as the circular economy into practice, it is crucial to carefully consider the local social, economic, cultural and technological contexts. Best practices, policy transfers and policy diffusion must be carefully adapted and contextualised to local realities. In this adaptation process, it is essential to uphold principles of fair, ethical, inclusive, transparent and collaborative circular economy and waste governance, as compromising these principles can perpetuate unsustainable practices [5, 90]. To address these challenges, we suggest a framework that can guide future waste shipments for achieving the European Union goal of a just transition towards a circular economy.

## Future Direction — a Framework for Waste Shipment for a Just Circular Economy Transition

Our findings highlight the importance of prioritising ethics, justice and equity in plastic waste governance throughout the value chain to achieve a fair and sustainable circular economy transition. For this, we have developed a multidisciplinary framework (illustrated in Fig. 8).

We observed how the existening unequal relationships within the waste value chain undermine sustainable and circular outcomes. Considering the intricate relationships among actors, policies, countries, societies and the environment in the recycling value chain, along with their intended and unintended impacts on individuals, societies and the environment, future waste shipments must be oriented towards a just circular economy transition. This proposed framework integrates the diverse perspectives discussed

in "Theoretical Perspectives", and serves as a guide for waste shipment discourses, policies and practices and a starting point for future related research. The framework incorporates both abstract concepts such as justice, governance and circular economy and practical approaches such as policies, reverse logistics and ethics to guide the relationships between actors in the waste value chain.

Socio-ecological and ethical considerations should not be limited by geographical boundaries. The proposed multidisciplinary framework asserts that ethical standards in waste governance should apply throughout the entire waste value chain, encompassing spatial equity and just sustainability. Waste trade, as observered in this case of the EU-Vietnam, should be transparent and mutually beneficial (see *kyōsei*) for both the EU and Vietnam, fostering the well-being of all individuals, society and the environment. Governance and practice in reverse logistics and circular economy should integrate ethics, justice and equity. Collaboration, transparency, observance of human rights and dignity, equity and justice and empowerment of the informal sector should inform the individual-society relationship. Striving for the least socio-ecological harm, governance should aim for mutual well-being. This includes reducing plastic consumption and thus waste generation by implementing waste prevention [25] and waste proximity principles [74] for mutually beneficial society-environment relationship. This has potential to foster mutual well-being across the entire value chain for the individuals, society and their environment instead of perpetuating the current exploitations.

The insights of this framework presented in this discussion are applicable to all countries involved in the trading of various waste streams, not just restricted to the plastic waste trade between the EU and Vietnam. With the ever shifting geographies of waste trade, the broad conclusions and proposed framework in this research will continue to be pertinent for comparable waste trade scenarios globally.

## Conclusions

Our research has shed light on the contradictions between the shipment of European plastic waste for recycling and circularity, sustainability and justice. By focusing on the recycling process and its socio-ecological impacts, we have uncovered previously obscured aspects of plastic waste governance and its value chain. Our research in the EU-Vietnam plastic waste trade for recycling shows that downcycling without the highest value retention is a common practice, which causes harm to humans and the environment. We find a lack of consideration for the full waste value chain by exporters to shift waste management responsibility elsewhere cheaply. The absence of accountability among value chain actors, coupled with inadequate enforcement of both EU and Vietnamese policies and pervasive lack of transparency in practices, collectively form a breeding ground for exploitative loopholes. To address these challenges, we propose a multidisciplinary framework for governance towards just circular economy, guided partially by ecocentric ethics (*kyōsei*) to promote mutual well-being in the interdependent relationship between individuals, society and the environment. This framework diverges from the current narrow focus on material and environmental concerns within the circular economy and recycling discourse. Instead, it highlights the intricate interrelationships between actors in the value chain and the importance of upholding ethical, just and equitable practices. Moreover, it integrates principles of spatial justice and just sustainability often ignored in waste shipment practices. It

can serve as a blueprint for steering the ongoing EU-Vietnam plastic waste trade, as well as other resource and waste trades, towards a just transition to circular economy. We suggest future multidisciplinary and transdisciplinary research on the governance of diverse waste streams, resources and their significance in achieving a just circular economy transition using the lens of ecocentric ethics, justice and equity, which are often overlooked in mainstream discources.

Despite holding consumers responsible for separating plastic waste in Europe, only one-third of the total plastic waste is recycled, with half of it unaccounted for [29]. This increasing consumption generates more waste, leading to a longer and more complex value chain that can cause harm and exploitation. Therefore, we recommend reducing unnecessary consumption and waste generation. For the generated waste, we suggest a shorter, more transparent, accountable and ethical value chain. In developing future policies and practices in the EU, Vietnam and beyond, we recommend taking a collaborative and inclusive global waste value-chain perspective to promote social and environmental equity and justice globally or, at the very least, not contribute to inequity and injustice.

**Abbreviations** CE: circular economy; DoC: Department of Construction; DoNRE: Department of Natural Resources and Environment; DoSTE: Department of Science, Technology and Environment; EPR: extended producer responsibility; ISPONRE: Institute of Strategy and Policy on Natural Resources and Environment; LEP: Law on Environmental Protection; MARD: Ministry of Agriculture and Rural Development of Vietnam; MoC: Ministry of Construction of Vietnam; MoFA: Ministry of Foreign Affairs of Vietnam; MoF: Ministry of Finance of Vietnam; MoIT: Ministry of Industry and Trade; MoNRE: Ministry of Natural Resources and Environment of Vietnam; MoST: Ministry of Science and Technology; MPI: Ministry of Planning and Infrastructure of Vietnam; VEA: Vietnam Environment Administration

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**Author Contribution** Kaustubh Thapa: conceptualization, methodology, formal analysis, investigation, visualization, writing — original draft, writing — review and editing.

Walter J. V. Vermeulen: conceptualization, funding acquisition, project administration, supervision, resources, validation, methodology, writing — review and editing.

Pauline Deutz: conceptualization, funding acquisition, supervision, resources, validation, methodology, writing — review and editing.

Hồng Quân Nguyễn: conceptualization, resources, validation, methodology, investigation, writing — review and editing

Mo Ming De Waal: formal analysis, visualization, writing — review and editing.

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**Data availability** Please contact the corresponding author for the availability of data.

## Declarations

**Ethics Approval and Consent to Participate** Informed consent was obtained from all individual participants included in the study.

**Consent for Publication** The participants have consented to the submission of the case report to the journal.

**Competing Interests** The authors declare no competing interests.

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