



SUSTAINABLE
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New Business Models Cutting Back on Single- Use Plastic

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#break
free
from
plastic



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Abstract

Plastic waste can be described as a persistent problem: it is complex, long-term, and systemic. Single-use plastic (SUP) packaging is often found to be the most littered type of plastic waste, thus proposals for solutions have focused on this particular product. In the business sector, some pioneering start-ups that abide by the 'zero waste' philosophy, and which make an explicit commitment to avoid SUP, have emerged and shown a continuous growth trend, tapping into a growing zero waste customer base. However, this is still an emerging trend, and it is unclear if and how it can be scaled up; or to what extent these businesses constitute a change of paradigm with real potential to change the dominance of SUP products. This report looks at examples of successful business models that are effectively contributing to the reduction of plastic production, and asks key questions such as: what are some of the barriers and enablers that affect their replication and growth? How far are these initiatives going? Will they fundamentally change the way we produce and consume plastic? To answer them, the report analyses the current context around SUP waste through the theoretical framework of sustainability transitions research (Loorbach, Frantzeskaki and Avelino, 2017). Using the concepts of a multi-level perspective (MLP) and the transition X-curve, the report describes the current dynamics of change within the global plastic regime. In particular, I focus on business models whose main value proposition is based on the promise of plastic use reduction, and I describe the main innovative characteristics in this sector. Moreover, I look into a sample of five case studies of successful business models that have reduced the amount of plastic used, providing additional insights to the barriers and enablers faced by these emerging businesses.



Executive Summary

Plastic was once considered one of the most innovative and revolutionary human inventions; it was popular and a sign of progress. Today, while plastic is still recognised for its multiple merits and it still is a fundamental material in our society, it no longer enjoys its unquestioned reputation; and its production, consumption, and impacts are examined worldwide, especially when it comes to single-use plastic (SUP).

The debate around plastic has been partly triggered by the increased visibility of plastic waste and pollution. Severe impacts on the environment and public health caused by the 300 million tonnes of plastic waste generated globally each year have become mainstream images, creating a wave of campaigns and policies to address the issue as a result. A large proportion of plastic waste consists of SUP packaging, which is often found to be the most littered type of plastic waste; thus, proposals for solutions have focused on this particular product. Moreover, while recycling is still considered part of the solution, decreasing plastic production and consumption is increasingly accepted as a necessary step to address the root causes of the plastic waste crisis.

In recent years, a wide array of measures focusing on SUP manufacturing, trade, use, and waste have been developed and adopted across the globe. On the institutional policy side, a review of laws from around the world (ELAW Environmental Law Alliance Worldwide, 2020) found that at least 35 jurisdictions ban the manufacturing of at least some plastic products. Other types of laws tackling SUP focus on requirements to reduce toxins in plastic; taxes and fees on SUP products; deposit refund systems; and extended producer responsibility. Furthermore, momentum is growing internationally to create a global treaty on plastic pollution in the context of the United Nations Environment Assembly (UNEA), signaling an important appetite from governments, business, and civil society to remedy the plastic pollution crisis (Nielsen *et al.*, 2020).

On the side of the business sector, many of the world's leading companies are pledging to do better, while some pioneering start-ups are already delivering concrete change and showing there is a growing zero waste customer base into which to tap. Businesses that abide by the 'zero waste' philosophy - and, in particular, businesses that make an explicit commitment to avoid SUPs and replace them with reusable options as part of their business model - have emerged and shown a continuous growth trend. Businesses such as zero waste shops, packaging-free shops, refill stations, plastic-free services (among others), are growing and consolidating a new market sector on the basis of SUP avoidance and commitment to reuse. However, this is still an emerging trend and it is unclear if and how it can be scaled up; or to what extent these emerging businesses constitute a change of paradigm with real potential to change the dominance of SUP products.

This report aims to provide insights into the following research questions:

- 1. What are the examples of successful business models that are effectively contributing to the reduction of plastic production?**
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- 2. What are some of the barriers and enablers in legal and economic frameworks that affect their replication and growth?**
 - 3. How far are these initiatives going? Will they fundamentally change the way we produce and consume plastic?**

To answer these questions, I will first analyse the current context around SUP waste through the theoretical framework of sustainability transitions research, which emerged in the past two decades in the context of a growing scientific and public interest in large-scale societal transformation toward sustainability (Loorbach, Frantzeskaki and Avelino, 2017). Using the concept of a multi-level perspective (MLP), I aim to describe the current dynamics of change within the global plastic regime—that is, the context that maintains SUP as a primary and dominant material in models of consumption and production, and the emerging trends that question and aim at changing this paradigm. Primarily, I will identify the zero waste trend as one of the innovations (*niches*, following the MLP language) that questions the plastic dominance, providing an overview of the development and mainstreaming of the zero waste vision. In particular, I will focus on business models whose main value proposition is based on the promise of plastic use reduction or avoidance, and describe the main innovative characteristics in this sector. Moreover, I will look into five case studies as examples of successful business models that have reduced the amount of plastic used; and describe them through a sustainable business model (Boons and Lüdeke-Freund, 2013), providing additional insights to the barriers and enablers faced by these emerging businesses. The context of global plastic waste trade where these cases sit will be presented in detail, to provide the regional perspective and ensure understanding of the current political and environmental pressure in this region on the topic of plastic waste.

The findings show that the transition dynamics within the global plastic regime are in progress. However, while the unsustainability of the SUP regime is widely recognised, most of the activity focuses on the optimisation of the regime itself, addressing flaws in a reactive manner. On the other hand, the zero waste niche trends are found at different phases of the transition, with zero waste and plastic-free businesses spreading and becoming more popular. As illustrated by the case studies, plastic-free businesses prove to be highly transformative.

Regarding the barriers and enablers of this type of businesses, this study has found that increased media visibility of plastic pollution motivates zero waste lifestyle, and therefore creates a demand in the market for plastic-free products. Moreover, policies aimed at banning or controlling the SUP flux have definitely contributed to the legitimisation and mainstreaming of plastic-free options. Regarding the barriers, the dominance of the single-use regime itself involves a set of cultures, values, institutional structures, and legislation that maintain SUP as a dominant product.

This study argues that the transition to overcome the SUP regime requires an urgent transformative change and must consider plastic pollution as a multidimensional issue, involving different strategies on economies, social justice, and human and environmental health. From a systemic point of view, it's clear that single-solution techno-enthusiastic strategies or increased waste management capacity alone cannot stop plastic pollution.

This research report includes a set of concrete recommendations:

1. Ensuring a multidimensional approach to implementing solutions to plastic waste, with special consideration to issues around social justice and environmental health, challenging Western-biased conceptions of sustainability and recognising the contributions from Global South communities to environmental problems.

2. Setting global limits for virgin plastic production, i.e. halving the use of plastic packaging by 2030 and phasing it out altogether by 2050, which could ensure that CO₂ emissions targets are still met (Hamilton *et al.*, 2019). When it comes to SUP in particular, it would be necessary to reduce or eliminate the use of unnecessary plastics - i.e., eliminating all non-essential uses of plastic by 2035, following a peak in packaging and other single use plastics in 2025.

3. Supporting zero waste, plastic or packaging-free, reusable products businesses to be further developed and scaled up within a supportive network in the supply chain to ensure accessibility to the wider population and affordability. Key measures that would help this end include increasing environmental and public health education about the benefits of reusable alternatives to SUPs; implementing effective policies to make reusable options the most convenient and accessible options; creating globally aligned standards for commodity plastics to be reusable, practically recoverable and recyclable by design; and engaging in further development of key alliances and partnerships amongst suppliers of plastic-free businesses to create a solid and mutually reinforcing network, amongst others.

Lastly, the report points out further fields of research, such as assessing the effectiveness of SUP bans; deepening understanding of the social justice dimension within the zero waste niche; and, generally, elaborating further on the analysis of the current transition dynamics of the SUP regime. Most importantly, it contributes to the academic literature on sustainability practices in the Global South, a field that deserves much more attention in order to develop a sustainability agenda with social inclusion and diversity at its core.



1. Introduction: a global plastic waste challenge

Plastic waste can be described as a ‘persistent problem’. The concept of persistent problem refers to those types of problems that are complex, long-term, and systemic (Rotmans and Loorbach, 2009). Most of the acute and critical issues societies currently face fall into this category: climate change, biodiversity loss, racial inequality, poverty, etc. Persistent problems are complex and related to the system failures that are embedded in societal structures; thus, they cannot be corrected solely by the market or current policies (Rotmans and Loorbach, 2009); they need to be addressed from a systemic point of view. Most importantly, persistent problems are not necessarily unaddressed — they may have received significant attention and attempted solutions, yet the solutions proposed and implemented have often made them worse. Data is clear in this regard. Despite decades of work on sustainable development and socio-economic inequalities, the world today faces several extreme challenges that have never been worse (Steffen *et al.*, 2015).

Issues around plastic waste have gained visibility in recent years. The international coalition of environmental civil society organisations united under the umbrella of Break Free From Plastic had already started forming in 2015, with its first international gathering taking place in Tagaytay, Philippines in 2016. In 2016, the Ellen MacArthur Foundation warned that there would be more plastic than fish in the ocean by 2050 (EMF, 2016). In 2017, the debate was catapulted into the mainstream media. The BBC’s documentary *Blue Planet II* triggered a wave of interest on this issue after millions of viewers saw a whale carrying her dead calf across the ocean, suffering from ingested plastic waste and toxic chemicals. A retailer’s customer survey found that 88% of people who watched the programme had since then changed their behaviour as a result. Half of these people said they had “drastically changed” their behaviour, and half said they had “somewhat changed” it (Waitrose & Partners, 2018). Also in 2017, a report in *Science Advances* estimated that, worldwide, only 9% of plastics had been recycled, while 12% were incinerated and 79% were sent to landfills or leaked into nature (Geyer, Jambeck and Law, 2017), triggering further discussion on the root causes of, and sustainable solutions to, plastic waste. Overall, these reports and events had a big impact in mainstreaming concerns on plastic waste, leading not just to important changes in consumer behaviour, but also to legislative reforms and corporate commitments to reduce plastic waste.

However, while public concern around this issue may have reached new levels, the problem of plastic waste in the ocean is not new. The ‘Great Pacific Garbage Patch’, an area of ocean overwhelmed with plastic pollution, had been described in 1997 by Charles J. Moore (Kaiser, 2010; Lebreton *et al.*, 2018). In 2002, Bangladesh became the first country to ban some types of plastic bags that were worsening flooding by blocking urban drainage systems, closely followed by South Africa and India (Xanthos and Walker, 2017). In the following years, a rapid and widespread emergence of an anti-plastic shopping bag norm and associated regulatory policies took place around the world, following a South to North, non-networked and multi-scalar series of events that together represented a globally significant emergence of a new environmental norm, albeit with different policy outcomes (Clapp and Swanston, 2009).

The problem has been escalating since the 1960s, and in recent years it has become clear that no part of the world's oceans, no matter how remote, is free from plastic debris. Dumping millions of tons of plastic waste into the ocean has been deemed one of the hallmarks of the Anthropocene (Elias, 2018).

While the impact of plastic waste in the ocean may have been the most prominent to the public eye, further scientific research points at a wide spectrum of environmental, social, and economic impacts from plastic pollution throughout the life cycle of plastic (Lau et al., 2020). The extraction of fossil fuels, as well as the production of plastic and its disposal in incinerators, are highly polluting processes producing greenhouse gas emissions (Zheng and Suh, 2019) and other types of toxic emissions and hazardous byproducts (Qiao et al., 2008; Thanopoulos et al., 2020). By 2050, the cumulative greenhouse gas emissions from plastic production could reach over 56 gigatons – 10-13% of the entire remaining carbon budget (Hamilton et al., 2019). Vulnerable communities disproportionately bear the consequences of environmental degradation and the direct impact on wellbeing and health caused by plastic pollution, from production to its end-of-life. In particular, women have a higher exposure to plastics in household and feminine hygiene products, which in a context of gender inequalities places women at high risk of miscarriages and cancer, and further gender-related disparities (Calil et al., 2021).

Besides the marine environment, plastic pollution has been found in remote terrestrial locations, with growing evidence of plastic ingestion by organisms (Huerta Lwanga et al., 2017), and contamination of the soil ecosystem (Chae and An, 2018; de Souza Machado et al., 2018). Moreover, the widespread leakage of plastic in the environment and its persistency in the form of microplastics (<5 mm) has reached the human food system, with increasing evidence that humans are, in fact, eating plastic through food (Barboza et al., 2018; Peixoto et al., 2019).

Recently, scientific concerns have been raised about toxic food contact materials - the products that come into contact with food, such as food packaging, storage containers, predominantly made of SUP and its impact on human health. While the full extent of the threats posed by chemicals in food packaging remains largely unknown, in March 2020, 33 renowned scientists expressed significant concern by issuing a consensus statement on the impacts of food contact chemicals on human health (Muncke et al., 2020). They stated that many chemicals known to be hazardous to human health are being used in food packaging; and that many more hazards likely exist but are not being adequately evaluated due to poor regulation. Based on this statement, civil society/public interest organisations published a Declaration of Concern signed by over 200 organizations across the globe, calling for strong action from decision-makers (Zero Waste Europe, GAIA, Upstream, 2020). In 2021, a study undertaken by Czech NGO Arnika, in cooperation with the Health and Environment Alliance (HEAL), CHEM Trust, and 6 other non-profit organisations in Europe showed that the use of persistent and health-harming PFAS (per- and polyfluoroalkyl substances) chemicals in disposable food packaging and tableware is a widespread practice across Europe. Out of 42 samples sent for analysis, 32 samples -including packaging from major global fast-food chains such as McDonald's, KFC, Subway or Dunkin Donuts - showed an intentional treatment with PFAS. Results of this study also indicated that the PFAS present in some of the food packaging samples tested had the potential to impair thyroid activity (Strakova et al., 2021).

Furthermore, plastic pollution impacts human wellbeing by undermining the psychological benefits that blue and coastal environments provide (Wyles et al., 2016), blocking drainage systems in cities and thus worsening flooding (Fobil and Hogarh, 2006); as well as providing a breeding space for disease vectors (Wyles et al., 2016; Banerjee, Aditya and Saha, 2013). Economically, it is estimated that impacts of plastic pollution cost US\$13 billion per year in damage to fisheries and tourism, as well as time spent cleaning up beaches (Raynaud, 2014).

Today, the context of the COVID-19 pandemic has stirred the debate around SUP and plastic waste again, with increased consumption and wastage of SUP items such as personal protective equipment in health and social care (Adyel, 2020). Now more than ever, as the world tries to build sustainable paths to economic and social recovery, solutions to plastic waste are high on the public agenda, with environmental organisations, new business models, visionary practitioners, and policy-makers engaging with, and undertaking, solutions to these issues.

1.1 Key challenges contributing to the plastic pollution as a persistent problem

Despite all efforts, problems around plastic waste present key challenges that contribute to the persistence of its negative impacts and the difficulties to find appropriate solutions. Some of these key challenges are:

a. Ever-increasing trend in plastic production and plastic waste generation

Since the 1950s, global plastic production has grown by an average 9% per year, with a significantly increased production in the last two decades: half of all plastics ever manufactured have been made in the last 15 years (Geyer, Jambeck and Law, 2017). It has been predicted that, unless the trends are reversed, production of plastic will double again over the next two decades (Ellen Macarthur Foundation, 2017). This increasing trend in plastic production and plastic waste generation has been recognised as the most important obstacle to solving the persistent problem of plastic waste (Borrelle et al., 2020).

SUP polymers are the largest segment of general plastics manufactured in many places around the world, with SUP packaging comprising the highest portion — 40% of SUP products, that is, the largest market sector for plastic (Chen et al., 2021). In the EU, 40% of plastic produced is single-use packaging, with around 17.8 million tonnes generated in Europe in 2018 accounting for about 60% of post-consumer plastic waste (Parker, 2018).

Moreover, estimates suggest that SUP packaging represents the major share of the plastics leaked into the ocean: at least 8 million tonnes per year (Ellen Macarthur Foundation, 2017). Similarly, SUP packaging has been found to be the biggest source of plastic litter on land. A survey in the UK found that plastic made up the majority of items categorised, followed by metal (8%) and glass (4%): plastic packaging (21%); plastic fragments larger than 2.5cm (10%); cigarette butts (9%); plastic bottles (9%); drinks cans [which contain plastic liners](7%); polystyrene/styrofoam

(6%); plastic bags (6%); plastic bottle lids (5%); fishing net, rope and pieces (5%); glass bottles (4%) (Benson, 2020).

Despite an overall trend towards lighter packaging in many types of packaging in the last three decades, there has been an overall increase in generated packaging waste. According to Eurostat, 89 million tonnes of packaging were placed on the EU market in 2017, compared with 81.5 million tonnes in 2007. The overall increase is due to a growing consumption of products with single-use packaging; excessive quantities of packaging; and growing online sales, which has been further aggravated during the COVID-19 pandemic (Klemeš *et al.*, 2020; Prata *et al.*, 2020).

b. Corporate interests of the plastic industry

The drive for increased global production capacity for conventional plastic comes from the planned large-scale investments in new production facilities and infrastructure by petrochemical companies, especially in the United States, Middle East, and Southeast Asia - in particular, China. These investments are mainly driven by cheap American shale gas following the “fracking boom” (CIEL, 2017) and the progressive decarbonisation of the transport sector, which has made plastic production an essential source of profit for the petrochemical industry.

Fracking shale gas produces a large amount of ethane, which is turned into ethylene – the building block for many hard-to-recycle plastic products like packaging films, sachets, and bottles. CIEL’s analysis projected that the production capacity for ethylene and propylene — the two most important plastic feedstocks — would grow by 33–36 percent by 2025 (CIEL, 2017). More recently, the petrochemical industry itself has announced over \$204 U.S. billion in investments driven by the shale gas boom, leading to a projected acceleration in virgin plastic production (American Chemistry Council, 2021).

The production of plastics is heavily invested in petro-chemistry and fossil feedstock — the raw materials used for producing plastic. For starters, the primary production of virgin plastics is typically co-located with petrochemical clusters and petroleum refineries, as plastics were originally a way for fossil fuel companies to make money from their waste streams. Even today, a total of 99% of feedstock for plastic production is fossil fuel-based, which accounts for approximately 8–9% of global oil and gas consumption (Nielsen *et al.*, 2020). The Plastic Waste Makers index has recently revealed the top 20% firms that produce 55% of the world's plastic waste, with ExxonMobil and Dow topping the list of SUP waste polluters in the world (Charles, Kimmant and Saran, 2021). These chemical and (fossil) energy industries have had decades of co-evolution in a ‘special relationship’ of material, knowledge, and economic synergy (Bauer *et al.*, 2018).

Today, plastic production is a profitable business in itself, and an essential source of profit for petrochemical companies. According to the International Energy Agency (IEA), petrochemicals powering plastic are set to comprise 45% of the growth for oil and gas mining from 2018 to 2040 (Fernandez Pales and Levi, 2018).

Another contributing factor is that, in parallel, fossil fuel companies have seen how electric vehicles and more efficient forms of public transport result in a decreasing demand for gasoline; so, plastics are seen as the market expansion to compensate for that loss of profit. Business-as-usual projections put plastic's share of global oil use around 20% by 2050, as the demand for gasoline and diesel will most likely not increase due to electrification and new fuels for vehicles (EMF, 2016).

Essentially, the oil and petrochemical industrial sectors are betting their future on the growth of plastic production. If the planned massive investments in plastic production materialise, they will perpetuate the current lock-in of cheap fossil-based plastics for decades to come (Charles, Kimmant and Saran, 2021). However, the backlash against plastic - leading to the market shifting away from plastics - represents a considerable risk for stranded 'plastic' assets (Bauer *et al.*, 2018; Planet Tracker, 2021; Kaskey, 2019). Consequently, it's clear that the plastic industry is heavily invested in maintaining an ever increasing production trend when it comes to plastic - particularly cheap, hard-to-recycle SUP.

c. Product specific challenges

Most plastics in use are difficult and/or too expensive to recycle. This difficulty is not the exception, but the rule (Zero Waste Europe, 2018). The low recyclability of plastic itself, particularly SUP packaging, is caused in part by the complexity and varieties in plastic products and packaging; the additives, colorants, and fillers used for plastic production; and contamination from consumer use, just to name a few.

SUP for food packaging in particular often consists of multiple layers that are made from several different plastic polymer types, posing big challenges for recycling - be it high costs; technological difficulties when separating the different plastic polymers; or the inability to recycle mixed polymers (Matthews, Moran and Jaiswal, 2021). To sum up, SUP packaging is the single largest source of plastic use, the most littered in the environment, and it can be the hardest to recycle. In this way, local recycling systems tend to focus on those post-consumer plastics that are easier to separate and process, like PET and HDPE bottles, which represent a minimum amount of total plastic use (Hopewell, Dvorak and Kosior, 2009).

As mentioned earlier, a recent trend of environmental advocacy has brought attention to the toxics included in food packaging SUPs, further questioning the recyclability of SUP packaging (ChemTrust, 2019; Maillot, 2020). SUP food packaging, also called food contact materials (FCMs), includes a wide array of chemicals used as additives to provide a number of characteristics, including flexibility (softeners and plasticizers); durability against heat or sunlight (stabilizers and antioxidants); and coloring; or as fillers which, according to a peer-reviewed scientific statement, have not been adequately tested for toxicity (Muncke *et al.*, 2020). These chemicals have the potential to migrate into food from food packaging.

Responding to this call, a revision of the EU legislation on FCMs was announced in May 2020 as part of the European Commission's Farm to Fork Strategy, aimed at improving food safety; public health (in particular in reducing the use of hazardous chemicals); and at supporting the

use of innovative and sustainable packaging solutions using environmentally-friendly, reusable, and recyclable materials, as well contributing to food waste reduction. This initiative is also expected to contribute to the Circular Economy Action Plan to promote the substitution of single-use food packaging and cutlery with reusable products.

d. Limitations of the recycling systems

Investment to increase the capacity of infrastructure for separate collection and subsequent mechanical recycling has been the usual answer to the increasing problem of plastic waste. The EU Circular Economy Action Plan places a great emphasis on this strategy, which is expected to boost job creation as well. However, it has been also pointed out that even improved and well-performing recycling infrastructures cannot keep up with the pace of plastic production — be it in the EU or at the global level (Beulque and Aggeri, 2016).

The relatively low price of oil and gas compared to recycling favors the use of virgin materials over recycled plastic (OECD, 2018). In the production of new packaging, the use of recycled materials is still limited, so there is low demand for recycled plastics - which, added to the uncertainties about market outlets, has hindered the development of the EU plastic recycling sector (Leal Filho *et al.*, 2019). All these reasons explain why, from the approximately 6,300 Mt of plastic waste that had been generated globally as of 2015, only around 9% had been recycled; 12% was incinerated; and 79% was accumulated in dumps, landfills, and waterways in the environment (Geyer, Jambeck and Law, 2017).

In most developing countries, the informal sector is responsible for the great majority of recycling, collecting up to 45% of the total waste stream; yet, informal recyclers can face significant social and health challenges in the absence of formalised unions and end up at risk of losing their livelihoods in modernisation processes (Linzner and Lange, 2013). Constituting between 0.5% and 2% of the global population (12.5 to 56 million people), the informal waste sector is an important stakeholder in existing waste management systems, and must be incorporated into the planning of system improvements to yield further beneficial social and economic outcomes (Linzner and Lange, 2013; Wilson, United Nations Environment Programme, and International Solid Waste Association, 2015; Dias, 2016). This would require rethinking the standard recycling business model —beginning with the inclusion, empowerment, and formalisation of wastepickers — before attempting to build up recycling plants (Circle Economy, 2021). Unfortunately, wastepickers are systematically marginalised, and thus few governments are interested in working with them, further hindering the potential of an inclusive recycling system.

e. Global scale and lack of coordinated governance

The limitations of recycling systems in developed countries have been further put to the test in the context of global plastic waste trade. In early 2018, the closing of Chinese borders to plastic waste shifted the trade flow towards Southeast Asian countries, further stressing existing infrastructure and amplifying the problems of plastic pollution in lower-income countries like Malaysia, the Philippines, Indonesia, Thailand, and Vietnam. Most of this waste has been

reported as not safely or economically recyclable, (INTERPOL, 2020), but rather illegally operated under a label of recyclable waste. This context is further elaborated later on in the report (Section 4), providing a more comprehensive context to the case studies in Southeast Asia.

Despite the global scope of plastic waste issues, there is no centrally recognised global scientific or political authority tasked with addressing the plastic problem, compared to other environmental problems (Nielsen et al., 2020). Plastic waste trade is now within the scope of the Basel Convention, and there have also been UN initiatives to tackle marine plastic pollution: e.g., the Global Partnership on Marine Litter (GPML) and the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP). Moreover, the United Nations Convention on the Law of the Sea (UNCLOS) is an international agreement that bans the dumping of waste in the sea. Also, recently the UN Food and Agriculture Organization (FAO) has carried out initiatives to address plastic waste from the fishing industry (FAO, 2021). Finally, plastic issues have been discussed at the recent meetings of the UN Environment Assembly, where a global plastics convention has been proposed as a potential solution. In this sense, global governance of plastics appears to be a large policy patchwork with significant gaps, where no one is tackling the global plastics problem consistently across the board, and which eventually turns into a collective action problem which fails to address the issue (Jagers *et al.*, 2020).

f. Increased rapid consumption and disposability of SUPs

Easy access to single-use packaging has shaped the experience of consumption across the globe. Today, consumption of food and drinks on-the-go, mostly delivered on SUPs while consumers are in transit, has increased enormously worldwide, driven by time pressure and price consciousness (Heider and Moeller, 2012), in addition to easy access with no equally convenient alternative being readily offered.

The case of sachets illustrates this point. Sachets are pocket-sized packaging that contain fixed amounts of everyday products like coffee, powdered milk, condiments, and shampoo. They are promoted as an affordable and convenient choice for low-income communities in the Philippines and other parts of Asia, and they are consumed widely — 60 billion sachets a year in the Philippines alone, enough to account for more than half of the residual plastic waste in cities (Global Alliance for Incinerator Alternatives, 2019b). While sachets are being marketed to poor households, these are also the communities that suffer the worst consequences of plastic pollution - from the threat of flooding due to plastic-clogged canals, to inadequate access to waste collection services. Moreover, the same households have indicated willingness to try non-sachet alternatives, which suggests that consumers are open to changing the *status quo* if given more choices (Liamson *et al.*, 2020). Similar points have been made in the UK (The Guardian, 2020).

1.2 Responses from the public and private sectors

The responses to the plastic waste crisis have been of different kinds. At the policy level, legislation to move away from disposable plastics and disposable products altogether, as well as to address overpackaging, has been developed across the globe with various degrees of success — and its development is still ongoing in many places. The Environmental Law Alliance Worldwide found that at least 35 jurisdictions have banned the manufacturing of at least some plastic products (ELAW, 2020). The UNEP, in collaboration with the World Resources Institute, also provides extensive guidance on legislation to regulate SUP products, looking at requirements for less toxins in plastic; taxes and fees on SUP products; deposit refund systems; and extended producer responsibility (UNEP and WRI, 2020).

In Europe, the EU adopted a European strategy for plastics in January 2018. This strategy is part of the EU's Circular Economy Action Plan, and it aims to reduce plastic waste with strategies, amongst others - such as ensuring that by 2030, all plastic packaging placed on the EU market is either reusable or can be recycled in a cost-effective manner. As part of the EU Plastic Strategy, the Single-Use Plastic (SUP) Directive will ban SUP cutlery and plates from July 2021.

The development of these policies has raised several questions about the definition of plastic. For example, the European Commission has been under strong pressure to define plastics in a way that excludes viscose and cellophane from the scope of SUP Directive, creating loopholes that would allow single-use viscose wet wipes to go unregulated; and which would also lead to regrettable substitutions, notably towards cellophane straws, cutlery, and food wrappers (Papineschi and Molteno, 2020; Rethink Plastic Alliance *et al.*, 2021). Also, loopholes around the regulation of microplastics in related policies have been called into question (Rethink Plastic Alliance *et al.*, 2021).

In parallel, the European Commission is also currently assessing options to review the Packaging and Packaging Waste Directive (PPWD) to revise the essential requirements for packaging - with a view to, among other things, improving design for reuse and promoting high quality recycling, as well as strengthening their enforcement. This work is crucial to ensure that, by 2030, all plastic packaging placed on the EU market is either reusable or can be recycled in a cost-effective way. Similarly, the Sustainable Product Initiative will revise the Ecodesign Directive and propose additional legislative measures as appropriate, aiming to make products placed on the EU market more sustainable, and incentivising producers and actors along the supply chains to make their products more sustainable.

Other relevant policy initiatives included bans of single-use packaging (e.g. Denmark); taxing of single-use packaging systems (e.g. Belgium, Denmark, Finland); or compulsory deposit systems (e.g. Germany) (Coelho *et al.*, 2020). Further research is needed to assess the effectiveness of these policies, as their degree of success appears to vary significantly.

In most cases, legislation aiming to reduce the use of plastic has been heavily contested by plastic manufacturers and global retailers — a situation that has been further exacerbated by the COVID-19 pandemic in 2020. Falsely claiming that the so-called sanitation and safety qualities

afforded by SUPs outweigh those of reusables, the plastic industry in the US has actively lobbied against bans on SUP bags, and it has achieved a repeal in several states (Tabuchi, 2020). In the EU, plastic industry lobbyists asked the European Commission to postpone the implementation of the SUP Directive (EUPC, 2020), a call that was rejected (Simon, 2020). The industry made similar requests in Turkey (Milliyet, 2020), Germany (Federation of German Industries, 2020), and Italy (Il Fatto Quotidiano, 2020).

Another important debate that has arisen in the SUP policy arena concerns the definition of reusable and recyclable plastic. Environmental advocates claim that plastic with resins #3-7 is virtually impossible to recycle (Greenpeace US, 2020), with PVC being a clear example of unrecyclable plastic. However, companies advertise products with these resins as recyclable anyway, often taking advantage of gaps in legal definitions for recycling and send these plastics to landfill or incineration processes. There are ongoing lawsuits against Walmart (Greenpeace USA, 2020 b) and Keurig Green Mountain (Waste Dive, 2019), making the case that these companies have violated US Federal Trade Commission guidance by presenting plastic items as recyclable. The corporate giants have defended themselves against the allegations and emphasised their commitment to sustainability (CBS News, 2020).

The private sector has also seen the emergence of new business models transforming their production and consumption models to replace single-use packaging items and packaging in general. Businesses that make reduced SUP use a key element of their business proposition have flourished and become very popular. These new types of businesses respond to the increased general public awareness of the impact of plastic waste, which has contributed to the emergence of lifestyle choices based on zero waste principles - without the use of SUP and other single-use products. Innovative companies such as Loop have created new ways of consuming reusable packaging, with great growth and expansion results in the U.K., France, and the US among numerous large brands. In Europe, the packaging free shop sector is growing strongly, with an increasing number of shops, jobs, and sales turnover achieved over the past 5-10 years. Long-term forecasts, whilst speculative, present a mid-estimate EU market for bulk goods of €1.2 billion in 2030, with its best-case potential being significantly greater (Eunomia, 2020).

During the COVID-19 pandemic, while there has been an increase of SUP use, companies that prioritise low-waste or zero SUP use have reported an exponential growth. For instance, Blueland, a company that creates cleaning products without SUPs, saw an increase in demand of more than 300% in the first few months of the COVID-19 pandemic's arrival in the US; overall, the company has grown 800% year over year. These eco-friendly companies predict this growth will continue (Chang, 2021).

Environmental NGOs working to end plastic pollution allied around the Break Free From Plastic (BFFP) banner—launched in 2016, and uniting more than 11,000 organizations and individual supporters from across the world — have increasingly put the focus on waste prevention, particularly in reducing the use of SUPs and plastic production in general to address the root causes of the plastic waste crisis. According to Zero Waste Europe (ZWE), one of the founder organisations, addressing this crisis through an end-of-life perspective by trying to find technical solutions to properly treat plastic will not provide a solution, as it eludes all the adverse impacts

linked to extraction, production and use (including greenhouse gas emissions; toxic emissions; and microplastics losses, among others) of plastic itself (Friends of Europe, 2021). Most importantly, recycling, upcycling, and other technical or end-of-life solutions cannot make up for ever-increasing plastic production and consumption, with the current progress of material extraction being 2-3 times faster than recycling (Friends of Europe, 2021). In this sense, Zero Waste Europe, the Global Alliance for Incinerator Alternatives (GAIA), and other allies within Break Free from Plastic put a strong emphasis on the need to decrease plastic production and promote reusable packaging systems, which have demonstrated environmental and potential economic benefits over single-use packaging systems (Coelho *et al.*, 2020). This position prioritises the regulation of plastic production, in stark contrast to the position taken by the plastic industry and some governments, which tends to focus on consumer behavior and improvement of recycling systems, thus individualising the problem and protecting corporations from further scrutiny and reform (Lerner, 2019).

The increase and expansion of plastic-free, zero waste business models illustrates how the field of zero waste and circular economy has been progressively consolidated as a forward-looking evolution from conventional waste management. The circular economy, as defined in EU policy, aims to maintain the value of products, materials, and resources for as long as possible by re-inserting them into the product cycle at the end of their use, while minimising the generation of waste (EC, 2015). The logic of this approach stands on the idea that the fewer products we discard and the less materials we extract, the better for our environment. In this sense, zero waste and the circular economy show a conceptual overlap, and they are sometimes used interchangeably. Further research could be developed to thoroughly understand the commonalities and differences between these two concepts.



1.3 Overview of the report

In the light of the points raised in this introduction, the subsequent sections of this report pursue further understanding about the emerging plastic-free trends within the business sector.

- **What are the key innovations within the business models committed to reduce SUP usage?**
- **What are the enablers and barriers that can propel or hinder their replication and growth?**
- **And, most importantly, are these the signs of a paradigm change within our dominant model of production and consumption, which currently relies on SUP as a key product?**

After a brief explanation of the research goals and methodology in Section 2, Section 3 analyses the current situation on plastic waste through the theoretical framework of Transition Studies; and it describes the global plastic system, within which the SUP Regime is the dominant subsystem, maintaining plastic as one of the most ubiquitous man-made materials. Within the global plastic system, the zero-waste movement - and in particular zero waste business models - emerge as a niche, an innovation trend that is progressively becoming popular and mainstream, as the literature review will show. Within this niche, the main transformational aspects of zero waste business models are identified.

In Section 4, I present five case studies about successful businesses which are effectively contributing to the reduction of SUP production; and which serve as a basis to identify enablers and barriers within their legal and economic frameworks that allow their replication and growth. The examples chosen are all located in Southeast Asia, the global area most negatively impacted by global plastic waste trade. A description of the recent events and current situation in this region regarding global waste trade is provided to ensure a contextual perspective and understanding of the political pressures. By focusing on this geographical area, this report aims to provide a deeper understanding of how much these initiatives are flourishing in this area, which remains understudied and prone to biased stereotypes. The business case studies are analysed using a sustainable business model (Boons and Lüdeke-Freund, 2013).

The findings are discussed in Section 5, with conclusions following suit in Section 6, in which I identify several avenues for further research.



2. Research goals, scope and methodology

In line with the goals of the Simon Fellowship, the aims of this project are twofold. On the one hand, it aims to build knowledge on, and expertise in, innovative business models engaging with sustainable consumption - particularly those working on zero waste strategies to reduce the use of virgin plastic and providing insights about the enabling conditions and barriers that are most likely to allow their replication and growth. On the other hand, it has been an opportunity to establish a working space for collaboration between the Sustainable Consumption Institute at the University of Manchester and relevant civil society organisations working within the zero waste movement - namely Zero Waste Europe (ZWE), Global Alliance for Incinerator Alternatives (GAIA), and Break Free From Plastic (BFFP).

The research questions that have been pursued are:

- **What are the examples of successful business models that are effectively contributing to the reduction of plastic production?**
- **What opportunities and barriers can we identify for their scale up and replicability?**
- **How much are these business models changing our dominant model of production and consumption, which currently relies on SUP as a key product?**

The research focused on a small sample of successful business models that have introduced alternatives to SUPs and, thus, lowered overall virgin plastic use. In this sense, the report prioritises businesses that have changed the way they provide their services in order to avoid plastic disposability (i.e. SUP products), rather than businesses that have changed the material of a single-use application (ie. replacing SUP with single-use paper, for example). The working assumption here is that businesses that have effectively cut back on plastic consumption will be those that approach products and waste from a systemic perspective, not only a material-specific one. These will be, in turn, the most effective in tackling plastic pollution and reducing use of virgin plastic. The sample of successful businesses has been selected from a wider collection of case studies (see 2.1 Overview of the research process), following criteria related to the successful replacement of SUP with a reusable option, and whether they had overcome the economic impacts from the COVID-19 pandemic.

By having successfully replaced SUP products with reusable options, these businesses also provide a very valuable insight into what could be described as “unnecessary single-use plastic”. Indeed, a key recommendation of this report is to reduce the production of unnecessary single-use plastic; in doing so, the need to define what is necessary or not becomes imperative. This is an active discussion at the heart of, for instance, EU plastic packaging policy, where SUP which does not protect the product could be deemed unnecessary and, therefore, banned. The discussion then turns onto whether a particular type of SUP packaging is necessary to protect the product (i.e. vegetables and fruits), and can therefore reduce food waste - an idea that has been extensively debunked by environmental organisations (Schweitzer et al., 2018).

The development of the concept of necessary plastic through the various contexts where this is being currently debated goes far beyond the scope of this report, but it is nevertheless important to point at it as an avenue for future research. In the present text, a successful business model that has achieved to replace a SUP item is understood to be proof that such a SUP item was unnecessary. That said, plenty of SUP products could be deemed unnecessary despite not being successfully replaced with a reusable option due to the SUP regime dynamics. Ultimately, SUP replacement is a design and innovation challenge, both at the product and system level; therefore, the concept of necessary SUP should be in itself under question and in constant evolution to pursue a reduction of plastic production and consumption as a primary sustainability goal.

The scope of research for the case studies has been limited to businesses flourishing in Southeast Asia, for various reasons. First of all, South East Asia has been identified as the epicenter of marine plastic pollution, and therefore put in the global spotlight (Jambeck *et al.*, 2015). Global waste trade trends have made countries in this area the top importers of plastic waste, a situation that has negatively affected their already fragile recycling and resource recovery systems; and therefore, it's particularly relevant to analyse the way these countries are able to respond to these crises.

Second, even without the impact of the global waste trade, the market for SUP packaging in Southeast Asia is expected to grow in the coming years, even if this area is particularly vulnerable to the impact of plastic pollution in the environment, and to rapidly growing cities with infrastructure challenges. Fast moving consumer companies are flooding the region with sachets, marketing them as pro-poor. Some products are only available in sachets - for example, *3-1 coffee*, a popular powder with coffee, milk, and sugar. Although these sachets allow daily wagers to afford small portions of the product, they are more expensive in the long run.

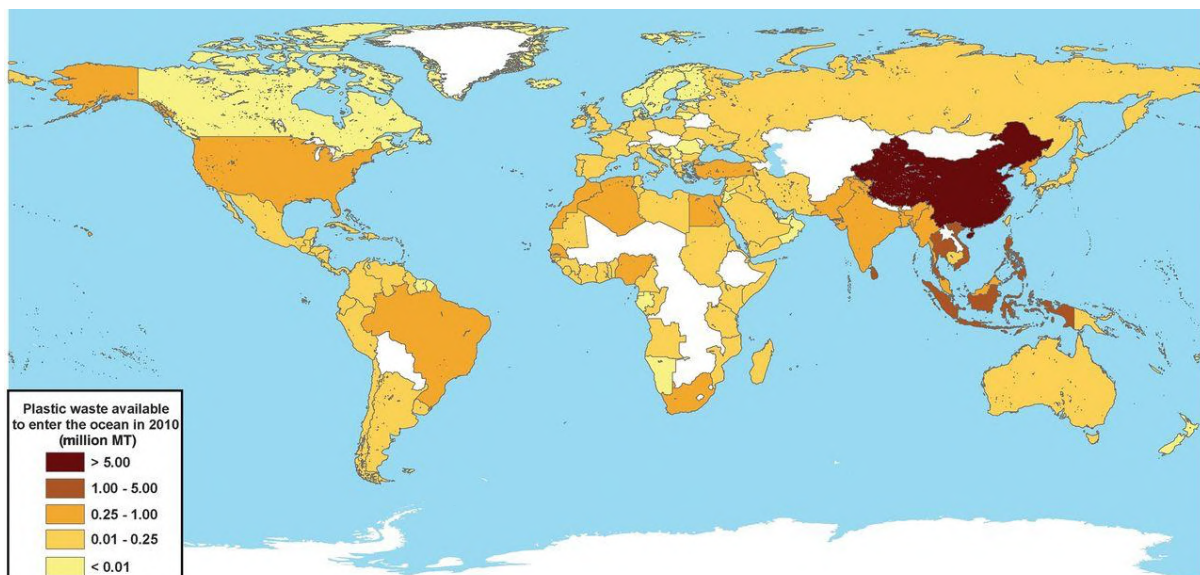


Figure 1. Global map according to the estimated mass of mismanaged plastic waste [millions of metric tons (MT)] generated in 2010 by populations living within 50 km of the coast. (Jambeck *et al.*, 2015).

Third, while most of the media and research attention is given to reusable options in the Global North, there is a lack of attention towards initiatives in the Global South - in this case, in Southeast Asia, where the zero waste trend is growing strong and where these solutions can play a critical role in responding to the growing pressure from SUP production and trade. The gap in the public debate on reusable options initiatives to replace SUP undertaken in the South is critical, as we need to understand that key emerging new environmental norms around SUP with international impact have followed a South to North trajectory, e.g. the emergence of the anti-plastic shopping bag (Clapp and Swanston, 2009).

Most importantly, prioritising the study of emerging trends on sustainability in the Global South is crucial for improving sustainability practices within Western societies, where inward migration is often stereotyped and unfairly blamed for environmental problems. In fact, the lack of informed understanding of how environmentally significant knowledge and practices exist in, and are imported from, the Global South to Western contexts arguably leads to imposing Western assumptions on, and misjudging the lifestyles of, racialised, minority migrant people (MacGregor, Walker and Katz-Gerro, 2019). It is, thus, paramount to address this gap in the public debate to improve sustainability practices and policies in the Global North.

Ultimately, research on sustainability practices in the Global South contributes to the theories of the environmentalism of the poor (Guha and Martínez Alier, 1997; Martínez-Alier, 2002), which involve impoverished populations struggling with, and responding against, the state; or against private companies that threaten their livelihood, health, culture, and autonomy with a disproportionate use of environmental resources and services. In other words, these are ordinary women and men that strive to find solutions to environmental and social damage. In doing so, they contradict the Brundtland report and its view that environmental damage is caused by poverty (MRCGP, 1988).

2.1 Overview of the research process

To achieve the goals of the research, the following steps were taken:

- **A literature review** was conducted following key words such as “zero waste” “business model” “plastic reduction” in Google Scholar.
- Several **interviews with researchers** specialising in business models at the Sustainable Consumption Institute contributed to the conceptual shaping of the report.
- The **participation in a two-day training session** with scholars from the Drift (Dutch Research Institute for Transitions) on Transition Studies in February 2021 contributed with the systems thinking and transition management theory to the Theoretical Framework. This training was organised by BFFP Europe for all member organisations of BFFP’s Transition to Reuse TaskForce, whose mission is to collaborate to promote reusable options.
- The **analysis of successful case studies** was done in collaboration with the GAIA Asia Pacific team, based in Quezon City, the Philippines. A first phase on research and

identification of successful zero waste business models was carried out by the GAIA team using various research techniques: **crowdsourcing through social media; direct consultations with member organisations of the GAIA network in Southeast Asia; desk research; and in-depth interviews.** A first compilation of successful examples was included in the report *The Sachet Economy* (Liamson *et al.*, 2020), which was presented at the Discard Studies Twitter Conference in November 2020, and further developed in the report *Unusual Business* (Benosa *et al.*, 2021), which looked at 21 case studies of successful zero waste business models from all over Asia. Building upon this research, I **selected key examples** according to specific criteria related to successful SUP replacement with a reusable option; and to whether the business had been able to adapt and overcome the economic disruption caused by the COVID-19 pandemic. Following this selection, I conducted **interviews with representatives of each business** in March 2021.

- The reviewing team for early drafts included several ZWE, GAIA, and BFFP team members, as well as selected staff from the Sustainable Consumption Institute.
- A draft of the report and main findings were presented at a SCIResearch Seminar in April 2021, an opportunity which provided valuable feedback. An online workshop was held in June 2021 with the Circular Economy Working Group of the Sustainable Consumption Institute on the topic of 'Zero Waste and Circular Economy', which furthered the analysis of the report.
- Insights from both workshops were included in the final draft.

Conducting Research

01

Literature review

02

Interviews with SCI researchers specialised in business models

03

Participation in a two-day training session with DRIFT scholars

04

Analysis of successful case studies in collaboration with GAIA Asia Pacific team

05

Selection of key examples and interviews with representatives of each business

06

Review & implementation

3. Theoretical framework

3.1 The dynamics of transition within the global plastic system

The field of Transition Studies provides the theoretical framework to analyse the innovative role of plastic-free business models from a societal point of view (Boons and Lüdeke-Freund, 2013). Here, transition is defined as the “process of change from one system state to another via a period of nonlinear disruptive change” (Loorbach, Frantzeskaki and Avelino, 2017). The type of change involved in transitions is understood to be systemic, and involves a variety of elements that interact and result in a fundamental change within a societal system - for example, the mobility or energy system, which can be analysed on different geographic scales.

In order to analyse a transition or process of systemic change, Transition Studies propose the conceptual framework of the Multi-Level Perspective (MLP), which has the concept of regime at its core. It was initially introduced by previous scholars to explain path dependency and lock-in of existing socio-technical systems (Geels, 2002; Geels, 2005; Geels, 2011). A regime is the dominant order in a societal system (e.g., dominant technologies, institutions, routines, cultures) which is challenged by new innovations in the wider landscape (Loorbach, Frantzeskaki and Avelino, 2017).

The dominant regime can be broken down into three dimensions: the prevailing cultures, structures, and practices of a system that emerge and evolve over time (Loorbach, Frantzeskaki and Huffenreuter, 2015). These three regime dimensions reinforce and stabilise each other, leading to a degree of path-dependency and lock-in in societal (sub-)systems. The dominant culture (worldviews, paradigms, discourse, and guiding values) in a particular regime maintain the structural elements (institutions, rules), which in turn organise and guide the practices and behavior of actors.

This dynamic creates a path dependency, or ‘lock-in’, within which actors by definition seek to improve the existing dominant regime and are unable to fundamentally change course. What then happens is that the optimisation of incumbent regimes within a changing societal context leads to increasing tensions and pressures such as the recent economic crisis. Rather than addressing the root causes, initial responses from the regime will seek to re-stabilise and further optimise the existing regime. In transition research, this is referred to as ‘persistent unsustainability’: efforts to address unsustainable practices reinforce regime structures and thereby become part of the problem instead of driving change.

The specific characteristic of this MLP is that the regime is in interaction with both the landscape level (macro-level factors) and the niches level (micro-level innovations and alternatives) (Figure 1). While actors embedded within regimes seek to sustain the *status quo*, other actors within the niches start to develop and experiment with alternatives, which initially may be dismissed (labelled ‘idealist’, ‘not practical’, or ‘too expensive’), but over time can mature and develop. Niches are more vulnerable, but also more flexible, than regime players; and they often anticipate, or play into, broader societal trends and changes to which regime actors are less able to respond. Landscapes are wider trends such as climate change, changing demographics or

(geo) politics, among others. As these wider changes lead to increasing pressures on regime structures, the niches develop; and, through diffusion by people, businesses, and organisations, these niches are increasingly recognised as viable and possible. As a result of this interaction, and combined with the inevitable and problematic lock-in tensions created by the regime itself, regimes are pressured to change and, eventually, a systemic reconfiguration may occur. A multiphase model establishes four phases for a transition: pre-development, take-off, acceleration, and stabilisation (Rotmans, 2001); and conceptualises it as a process of innovation (Loorbach, Frantzeskaki and Avelino, 2017).

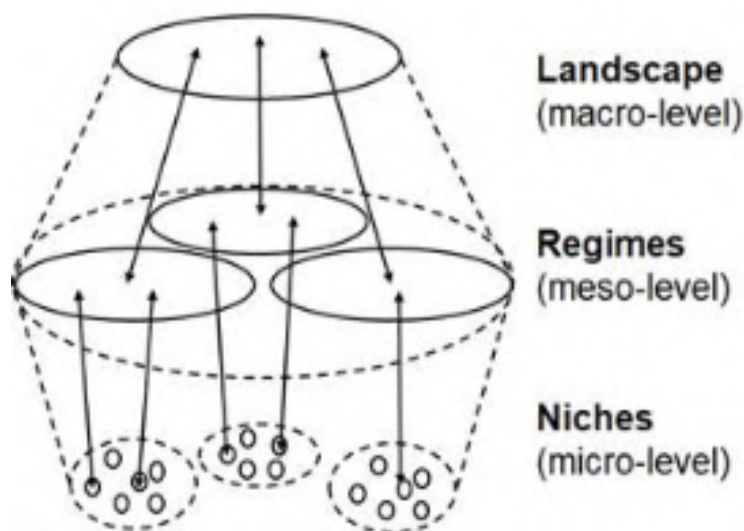


Figure 2: Multi-level Perspective (Loorbach, Frantzeskaki and Avelino, 2017). In a transition, the flaws in the current regime are challenged by niche developments and exacerbated by landscape pressures, usually over a period of several decades. During this time, an alternative system gradually matures in the margins.

Such transition dynamics can be visualised in further detail using the X-curve (Figure 2). Following an ideal typical S-curve, niches move along a pathway of experimentation, acceleration, emergence, institutionalisation and stabilisation, replacing the old regime. Conversely, the existing regime follows a downward S-curve from optimisation, via destabilisation and disruption, to a breakdown and phase-out.

In reality, these transition pathways are, of course, more chaotic and less-clear cut, with actors moving in different, and sometimes opposed, directions. Moreover, it is not necessarily a conscious process where those involved are aware of the ongoing transition.

In other words, societies develop specific regimes within sectors and regions that are path dependent, and that they naturally optimise. But, over time and following the specific pattern of transitions, regimes can experience increasing destabilisation and external pressure and competition, leading to a deep systemic reorientation.

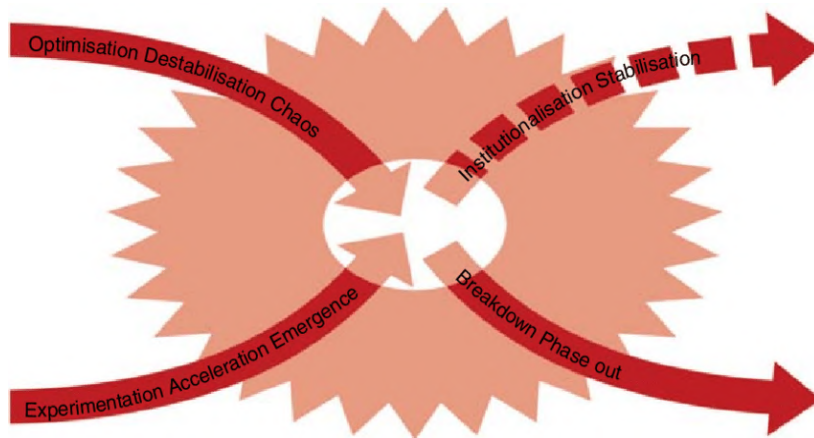


Figure 3. The X-Curve. The X-Curve describes the dynamics of societal transitions in terms of iterative processes of building up and breaking down (Loorbach, Frantzeskaki and Avelino, 2017). The X-Curve features two main lines: a line moving up which represents “innovation” as a process of emergence and building up; and a line moving down which represents “exnovation” as a process of breaking down and phasing out. The interaction between these two patterns takes place within the context of large-scale societal developments in e.g. demography, technology, economy, and (geo) politics. These patterns often take decades to evolve.

Following this transition model, transition governance aims to influence, accelerate, and help guide emerging transition dynamics, which is useful to further understand how niches can thrive in a transition dynamic. It provides a governance logic and framework to start influencing the speed and direction of desired transitions through a range of tools and instruments (Kemp, Loorbach and Rotmans, 2007). In order to drive a desired transition, it is necessary to build an enabling environment (i.e., policy, institutional, regulatory, infrastructure, and cultural). The value of transition governance lies in its ability to open up space for transformative experiments; new discourses and agendas; social learning processes; and institutional changes (Loorbach, Frantzeskaki, & Avelino, 2017). The transition governance process identifies several elements to create the conditions necessary to seize the momentum for transitions (Loorbach, Frantzeskaki and Lijns Hufferreuter, 2015), such as:

- A strong and shared narrative that includes a framing of persistent unsustainability and revolutionary long-term direction;
- A diverse frontrunner network of individuals from both niche and regime that are able to diffuse, translate, and operationalise the narrative within their own contexts;
- A diverse set of alternative practices, technologies, business models, and initiatives that can be presented as building blocks for the transition;
- An open-end reflexive process of engagement, knowledge development, and learning in which adaptation, exchange, and selection takes place.

In the current report, the MLP concept has been applied to define the global plastic system with a dominant regime that maintains SUP use as one of the main products of production and

consumption¹. This regime can be named as the SUP Regime, and it's maintained by dominant cultures, structures, and practices presented in Table 1. The Plastic Regime is influenced by the Landscape level, which includes the following autonomous trends and slow changes. Moreover, the Plastic Regime is also pressured by the Niches level, where we find emerging alternatives, projects, new organising systems, and frontrunners. While the SUP Regime does not cover the total production and use of plastic involved in the global plastic system, the fact that SUPs are the largest share of plastic products and the primary driver of growth means that any transition in the SUP Regime would necessarily have huge implications for the overall global plastic system.

Looking at the Niches level, the zero waste innovations are described and categorised by dominant cultures, structures, and practices, with specific examples to further illustrate the description. It's worth noting that the different elements within the niche are also at different stages of the institutionalisation path; for example, legal bans on plastic bags are partially institutionalised and dominant, even though they belong to the niches level as they are not yet dominant for the majority of products. In this sense, the MLP provides a static description of the relationship between the different elements in the system; thus, it will be necessary to apply the X-Curve model to identify the elements that are further up in the institutionalisation path than others.

In the following sections, further exploration of the zero waste niche is presented including detailed descriptions of successful zero waste business models already existing. The full application of the X-Curve onto the zero waste niche is developed in the Discussion section, further analysing what capacity do zero waste business models have to disrupt the SUP regime and establish a new regime based on reuse and avoidance of SUP plastic.

¹ This analysis was developed during the training with Drift (Dutch Research Institute for Transitions) for BFFP's Transition to Reuse TaskForce, so the results were co-developed with civil society organisations included in this TaskForce.

The global plastic system according to an MLP model

Landscape (influencing the system)

Reinforcing the SUP Regime: systemic racism, patriarchy, power of linear economy, capitalist fossil-fuels based economy - which maintain a social system based on exploitation and oppression.

Challenging the SUP Regime (thus reinforcing the niches): anthropocene, climate change, resource depletion, biodiversity loss, marine pollution;

The Global Plastic System (including the SUP Regime and the Niches)

The SUP Regime

Cultures (discourses, principles, shared views, values):

The discourse of convenience of single-use plastic for consumers, the narrative of presumably providing better hygiene and lengthening shelf life of food; discourse of affordability of plastic, cheap, needed for poor populations (i.e. sachets), culture of throwaway, quick consumption justified by fast-paced lifestyle, discourse of recycling the main solution; values of economic profit and convenience.

Structures (institutional, economic regulations, physical infrastructure, technologies, laws and regulations):

Fiscal policy that maintains subsidies to fossil fuels, price of virgin plastic, externalisation of pollution costs, limitations to recycling infrastructure and technologies, global waste trade, waste colonialism, precarious conditions of the labour market, economic interests from petrochemical industry, prevalence of incineration and landfill.

Practices (routines, behavior, ways of doing, actions):

Widespread practice of consumption based on takeaway, on-the-go, single-used packaged food. In the case of goods sold in sachets, the consumption is based on periodic, one-off purchases to satisfy an immediate need, even if it's on a regular basis.

Niches

Cultures (discourses, principles, shared views, values):

Values of sustainability, environmentalism, social and environmental justice, solidarity, zero waste culture, circular economy vision, systemic thinking, cooperation and partnership in order to create change, interdisciplinarity.

Structures (institutional, economic regulations, physical infrastructure, technologies, laws and regulations):

SUP bans and regulations, e.g. plastic bag bans; reuse and refill systems, e.g. packaging-free and zero waste shops; deposit return schemes, e.g. Germany national DRS scheme; reverse logistics, e.g. second-hand business; service economy, e.g. reusable nappies laundry business; cities committed to zero waste goals, e.g. Penang, Kerala, San Fernando. All these examples are described in more detail in the following section.

Practices (routines, behavior, ways of doing, actions):

All practices related to zero waste lifestyle such as avoiding SUP and using reusable options, ensuring source separation of household waste, composting, reducing consumption and use of natural resources; circular design of products; innovative design and production of toxic-free, recyclable, reusable products.

3.2 The emergence of a zero waste trend

Following the MLP model of transition for the SUP Regime, the zero waste trend can be identified at the niche level, conforming the innovations that aim at destabilising the dominant regime for long-term and systemic change. In this section, an overview of the evolution of this niche at various levels at conceptual and practical level is presented. Moreover, a brief literature review was conducted to reflect on how much attention it has received academically.

While the first mention of the concept zero waste (ZW) has been traced back to the 1980s in Urban Ore, a second-hand shop in Berkeley, California, which promoted the idea of Total Recycling and Zero Waste (Connett, 2013), this concept has increasingly attracted attention and spearheaded a new trend in the field of waste management over the last 40 years. While the concept of zero waste was initially disdained as an idealistic and unrealistic goal promoted at the margins, it has progressively become a mainstream concept. In fact, the label has acquired enough social value that it has been co-opted by some waste management companies that claim "zero waste to landfill" processes or include Waste-To-Energy incineration in their zero waste goals — which are considered greenwashing practices and outside the boundaries of a zero waste strategy (Zero Waste Europe, 2019).

Some of the key events that have elevated the widespread use of this concept include the zero waste goal for 2020 established by the city of San Francisco in 2002 and the adoption of the first peer-reviewed, internationally accepted definition of zero waste by the Zero Waste International Alliance in 2004 (Zaman, 2015). In the European context, key events include the European Commission's Roadmap to a Resource Efficient Europe (COM (2011) 571), which was put forward to "move towards a lifecycle-driven 'circular' economy, with cascading use of resources and residual waste close to zero". In 2014, a communication from the European Commission was titled 'Towards a circular economy: A zero waste programme for Europe' (COM/2014/0398), which would set the direction of the comprehensive revision of waste management policies that would later define the Circular Economy Package and the Circular Economy Action Plan. Today, these are progressive policies that have increased the ambition to prioritise the upper tiers of the Waste Hierarchy and, thus, move legislation and implementation closer to a zero waste vision. In this sense, there has been an evolution towards a different approach to waste management, resource efficiency, and sustainable consumption and production.

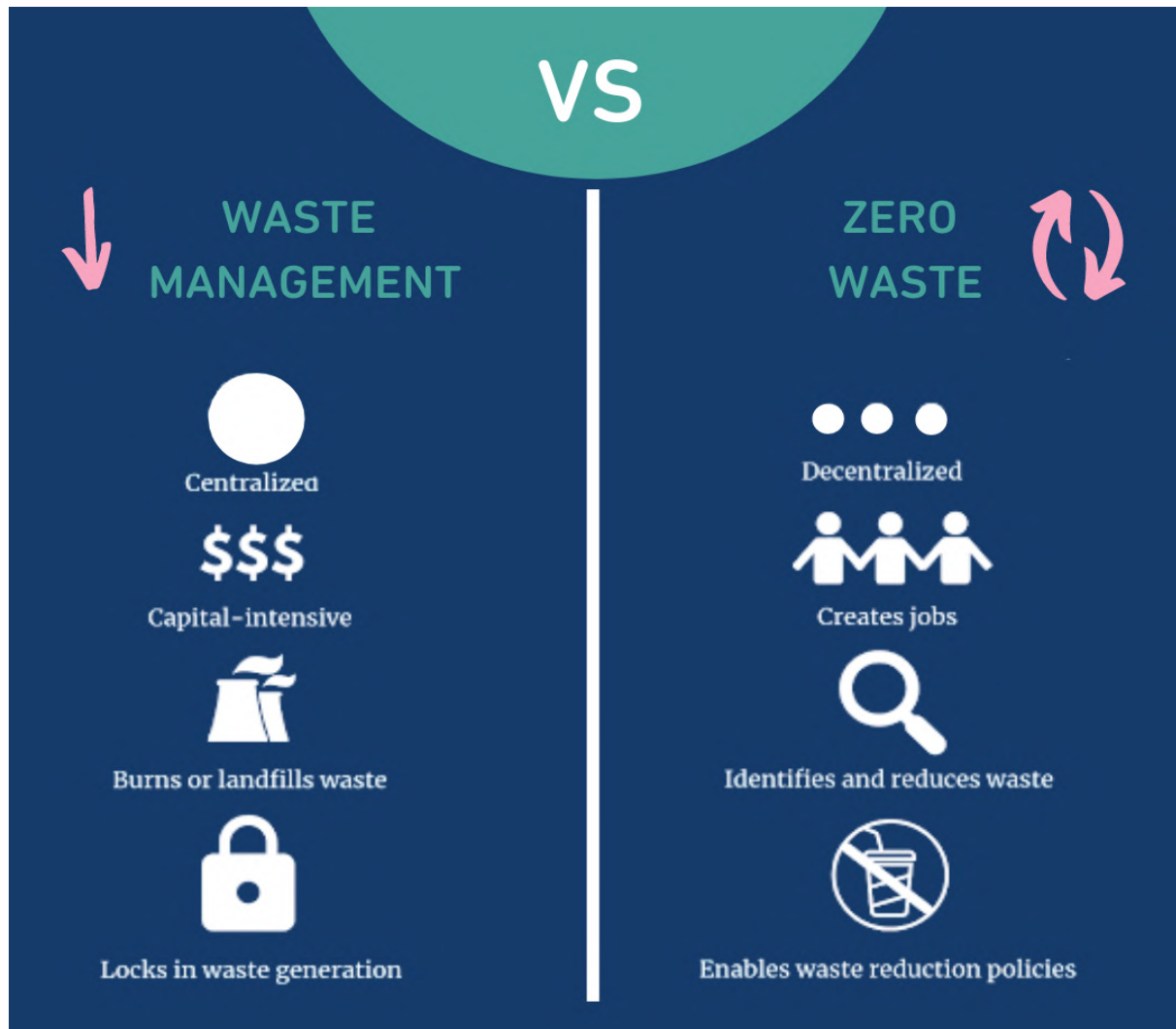
This change of approach is described in the recently published UNEP-led guidance and state-of-play analysis which places the main focus on addressing waste at its source, instead of putting attention in the waste management downstream - that is, on waste after it has been discarded (Wilson, et al, 2015). While the specific language of 'zero waste' is not used, the emphases are very similar: developing systems that design out waste, preventing its generation; reducing both the quantities and the uses of hazardous substances; minimizing and reusing; and, where residuals do occur, keeping them concentrated and separate to preserve their intrinsic value for recycling and recovery, and to prevent them from contaminating other waste that still has economic value for recovery. Overall, the explicit goal of the guidance is to support a trend towards 'waste and resource management' and 'resource management', as part of the 'circular economy'.

In 2018, the updated version of ‘zero waste’ by ZWIA reads as follows: “Zero Waste: The conservation of all resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning and with no discharges to land, water, or air that threaten the environment or human health” (ZWIA, 2018). Recently, the concept of zero waste has been described as ‘the sixth wave’ and the most holistic innovation in waste management, capable of achieving a truly sustainable WMS (Zaman and Ahsan, 2019).

Civil society organisations such as ZWE and GAIA have promoted the uptake of the zero waste vision at the city level, following the creation of the Network of Zero Waste Municipalities in Europe (www.zerowastecities.eu). Other examples of zero waste cities can be found in Latin America, the US, and Asia (www.zerowasteworld.org). Key examples in Asia include Penang (Malaysia), Kerala (India); Kamikatsu (Japan); Bandung (Indonesia); and several city regions in the Philippines, such as Fort Bonifacio in Taguig City; Tacloban City; and San Fernando City, Pampanga, which have committed to zero waste goals, explicitly using this language and vision. These cities describe their commitment to ‘zero waste’ like ‘the continuous and ongoing commitment to minimise waste’. These zero waste advocates promote the achievements of cities committed to ‘zero waste’ goals such, for example:

- The state of Penang, Malaysia, is host to various zero waste initiatives and it boasts the highest recycling rate in Malaysia at 43%, more than the double of the national average (21%) (Sangaralingam and Nagappan, 2019).
- The city of Thiruvananthapuram in Kerala, India, has put forward a zero waste program, which resulted in 40% of households segregating their wastes and managing their own kitchen and garden waste through at-home composting. Moreover, in 2015, Thiruvananthapuram put forward a comprehensive program to reduce SUP called Green Protocol, which applied a blanket ban on plastic bags; banners; bottled water; food containers; and Styrofoam decorative materials; and replaced single-use cutlery with stainless steel materials in festivals and events (Ramachandran, 2019).
- The City of San Fernando (the Philippines) implemented a zero waste program and has increased waste diversion from landfills and incineration from 12% in 2012 to 80% in 2018. They plan to increase that to 91% by 2025 (Dayrit, Larracas and Cruz, 2019).

The concept of zero waste, either referring explicitly to ‘zero waste’ or just using the same perspective, is today a widespread idea included in a variety of settings; and increasingly understood as a cross-cutting issue impacting many aspects of society and the economy, with strong linkages to a range of other global challenges such as health; climate change; poverty reduction; food and resource security; and sustainable production and consumption. Waste management is no longer viewed as an end-of-pipe intervention to handle post-consumption waste, but as an entry point to address a range of sustainable development issues, many of which are difficult to tackle (Wilson, United Nations Environment Programme, and International Solid Waste Association, 2015).



Infographic 1: Waste management versus zero waste. Credits: GAIA , www.no-burn.org

Looking at the academic literature, there is significant attention given to the ‘zero waste’ concept, with a few scholars providing definitions and comprehensive literature reviews in different disciplines such as urban development, manufacturing, and waste management (Hannon and Zaman, 2018). Zaman offers a critical review of the development of the zero waste concept in available academic journals (Zaman, 2015). Using the Scopus and Google Scholar databases, Zaman identifies 96 peer-reviewed zero waste studies published between 1995 and 2014, noting that studies of zero waste have increased over time, covering a wider range of topics and spreading across disciplines. Furthermore, Zaman highlights that the concept of zero waste is in constant development and being implemented in distinct sectors - such as waste treatment and management; mining; manufacturing; and urban development. Moreover, Zaman identifies an important gap in literature related to zero waste design and production in order to implement effective zero waste practices, in the understanding that designing and manufacturing products applying a cradle-to-cradle principle will enable the recovery of all resources and materials. Ultimately, on the basis of the literature review undertaken by Zaman, the absence of reference to zero waste businesses is notable.

In this sense, it's worth mentioning that the various definitions of zero waste show a significant overlap with the concept of the circular economy. Zero waste and the circular economy have in common the promotion of moving away from the current linear mode of production ("extract-produce-use-discard" model) and towards a model of production and consumption with durable goods that can be easily repaired, with components that can be reused, remanufactured, and recycled. The circular economy promote systems based on restorative and regenerative production and consumption systems (Heyes *et al.*, 2018) to keep products, components, and materials at their highest utility and value for as long as possible within technical and biological cycles (EMF, 2012; EMF, 2013; EMF, 2014). This definition corresponds very much to the definition of zero waste.

3.3 Zero waste business models: definition and key trends

Zero waste business models can be defined as a subset of sustainable business models; that is, a business that includes environmental objectives in their organisational strategy or value propositions (Lüdeke-Freund and Dembek, 2017). The concept of sustainable business model (SBM) stems out of the original business model framework, a tool to describe and explain how a firm creates and captures value (Boons and Lüdeke-Freund, 2013). The SBM concept adds social and environmental value to the Business Model Canvas, which is commonly used in business models research even though there are many different definitions of sustainable business models (Dijkstra, Beukering and Brouwer, 2020). In order to assess how the plastic-free businesses are successfully innovating in the sustainability agenda, here I use Boons *et al.*'s (Boons and Lüdeke-Freund, 2013) basic framework, which also comes with a set of normative standards, as follows:

1. The value proposition, which will reflect "a business-society dialog concerning the balance of economic, ecological and social needs".
2. The supply chain will involve "suppliers who take responsibility towards their own as well as the focal company's stakeholders." Here, a business actively engages suppliers into sustainable supply chain management, which includes, for example, materials cycles that avoid/reuse wastes.
3. The customer interface motivates customers to take responsibility for their consumption as well as for the focal company's stakeholders. The focal company does not shift its own socio-ecological burdens to its customers.
4. The financial model reflects an appropriate distribution of economic costs and benefits among actors involved in the business model, and accounts for the company's ecological and social impacts.

Furthermore, Transition Studies provide another useful framework with normative standards to assess the transformative power of the plastic-free businesses (Beers, 2016). From a transition governance perspective, a transformative business model will adopt a broad conception of value, not only in an economic or monetary sense, but also ecologically and socially. Also, not only it assumes value at the present time, but also changing value in the future; and not only it assumes

positive value, but also takes negative value into account (from externalities to damage). Finally, it is able to grasp new potential value resulting from a changing environment as a development opportunity, as a result of a flexible attitude towards changing social ideas; external relations; laws and regulations; and new practices. This has been conceptualised as reflexive development (Beers and van Mierlo, 2017).

Looking at the particular value proposition that defines a zero waste business model, that is an explicit commitment to avoid or minimise the production of waste. In this sense, there is an interesting overlap between zero waste and circular economy businesses, as long as circular economy businesses aim to restructure the supply chain to ensure that resources do not flow linearly from usage to disposal, but are perpetually cycled instead (Dijkstra, Beukering and Brouwer, 2020). Both types of businesses have in common the goal to eliminate waste and close resource loops. A Review and Typology of Circular Economy Business Model Patterns includes a typology of business that would fall under the category of zero waste businesses following our above definition; typically, business dedicated to repair and maintenance; reuse and redistribution; refurbishment and remanufacturing; and recycling (Lüdeke-Freund, Gold and Bocken, 2019).

The present research is focused on a particular subset of zero waste business models: those whose value proposition is the avoidance of SUP products, aiming to reduce the use of virgin plastic altogether. This responds to the understanding that the plastic waste crisis requires, first and foremost, a reduction of plastic production and consumption. Given that plastic packaging is the biggest source of plastic waste, market sector proposals to avoid this type of products are assumed to be a catalyst for long-term change.

A literature review was conducted using keywords on Google Scholar ('zero waste', 'business model'), with a very small amount of results. Notably, a systematic review of the literature on business models and sustainable plastic management (Dijkstra, Beukering and Brouwer, 2020) was focused on a subset of sustainable business models dealing with sustainable plastic management (SPM), defined as an intervention to minimise the environmental damage of plastic material; so, only looking at businesses that focus on recycling and creating value from waste, as well as the development of bioplastic. Applying a keyword search, a total of 23 articles came up, looking at a wide variety of topics such as product design and business model strategies for a circular economy (Bocken *et al.*, 2016); specific national level analysis in Sri Lanka (Conlon, 2021) in the Mediterranean (Koundouri *et al.*, 2021), and in the UK (Gong *et al.*, 2020); a specific industrial sector such as textile industry (Hussain, 2018); or the implementation of single use plastic policies in key cities such as Vancouver (O'Neil, 2019) and New York (Lugo, Ail and Castaldi, 2020). Our literature review shows that zero waste business models committed to avoiding plastic are understudied in the academic literature. Further research should be devoted to make a comprehensive analysis of zero waste business models in general, and not only connected to plastic reduction.

Following the definition of zero waste business as a business that makes waste avoidance or minimisation one of its main value propositions, the ZWE and GAIA networks have been continuously following and identifying best practices in this field as part of their advocacy work

on zero waste strategies. As a result of this practice, and combined with a literature review on the specific topic of zero waste businesses, I have observed a number of trends and distinct features of zero waste businesses, which are presented below. Some of these overlap with characteristics and trends also observed in circular economy businesses (EMF, 2016). In both cases, they are defined in opposition to linear businesses, which are based on the paradigm of 'extract-make-dispose'. Each of these trends is further illustrated with a specific example of a zero waste business that shows how this trend works in practice.

1. A zero waste business is organised to recover high-quality materials, i.e., their post-consumption products. While linear businesses are not concerned with a product after it is sold, a zero waste business is designed to control and not lose track of it, so that the product can be easily taken back for reuse or to serve as feedstock in the production process. In this way, companies are also motivated to ensure the delivery of high-quality, long-lasting products supported by design for durability and reparability. Ensuring that the product can be repaired, upgraded, refurbished, remanufactured, or remarketed is an essential added-value. Examples of this model involve deposit return schemes (DRS) or leasing.

Example

eReuse in Catalonia (Spain) is a project that expands the life of electronic devices while incorporating blockchain traceability technology. It has created 1 job for every 300 items reused. The eReuse project creates value from refurbishing, upcycling, reusing, and tracking electronic goods. It uses an innovative traceability system that prolongs computer life; creates local jobs; gives people and organisations access to high functioning electronics at lower prices; and guarantees recycling (Simon, 2018).

2. Zero waste businesses are made possible through collaboration along the supply chain: while linear businesses are based on downstream cost reduction and competitive relationships with suppliers, a zero waste business benefits from the joint work of all the actors all along the supply chain, because the added value is the joint process of assembling and disassembling, delivering, and recovering. This is especially important for reusable packaging systems: collaboration amongst customers, businesses, staff, logistics providers, and the cities is key to success (Closed Loop and Ideo, 2021). For example, online refillable/reusable delivery models offer an alternative to take-out SUP dining and operate in a closed-loop system of reuse and redistribution. Customers utilise these services by downloading sustainable apps to directly order food delivery, or to locate pick-up restaurants that have sustainable container reuse and return models in place.

Example

Phenix, France. The Phenix Connect platform puts businesses with food surplus in contact with structures able to use this supply, moving forward to create a complete support service (Martin, 2019).

3. Often, zero waste businesses sell a service rather than a product. While linear businesses sell products, zero waste businesses often sell a service. This development is also known as 'servitization' – providing access to products to satisfy user needs without needing to own physical products. These types of services are often run through local networks of similar businesses on a subscription or membership basis. Many companies have developed mobile apps or website maps to help customers identify participating businesses.

Example

ReCircle replaces over 50,000 single-use food containers every day through its 1,360 partners in Switzerland and in Germany. Partners include cities, schools, companies, meal services, cafes, and restaurants. Each participating entity pays an annual subscription fee of 160 Swiss francs for 20 reusable containers and cutlery. Customers pay around 10 Swiss francs as a deposit for each container, being fully refunded after use (Rosa, 2018).

The Lavanda project by Eta Beta, Bologna (Italy). The project provides a collection and washing service of used cloth nappies to the local community, as well as delivering clean ones in return. Currently, the project works with public administrations, organisations, and cooperatives that manage nurseries. In the future, Lavanda wants to gradually open their services to families.

4. Zero waste businesses enhance innovation and redesign of products. The commitment to reduce or avoid waste involves an element of innovation, also inherent in Sustainable Business Models in general (Boons and Lüdeke-Freund, 2013). These can include new owner platforms, or a pay-per-use system where the producer remains the owner. The redesign of products becomes a fundamental step to provide a zero waste product or service - whether it is redesign of the product itself to ensure better repairability, reusability and recyclability, or the redesign of the composition of materials to ensure high-quality and avoid toxic components. In this sense, it is important to note that this is a field in constant development.

Example

Self-service refill machines, Slovenia. The first automated liquid-refill station for dispensing ecological cleaning products in Slovenia was set up at a Depo store in Vrhnika in 2017. The public utility company, KP Vrhnika, provided the space; and NMC, an automation company (dairy and wine dispensers), provided the innovative technological solution for refilling. By offering plastic and packaging-free refills for cleaning products at the Depo store, the municipality wanted to bring Vrhnika's zero waste strategy closer to their customers and make zero-waste living more feasible for residents. The business model is based on customers being able to refill reusable packaging with arbitrary amounts of cleaning products and other liquid supplies, with each customer bringing reusable packaging items and reusing them each time. The weight of the packaging and the volume of liquid dispensed are calculated together to decide the fee paid by each customer. After the transaction, a sticker is produced and acts both as an invoice and as a product declaration. The machines themselves are also an example of reuse and recycling practices, as their frames are typically made of secondary materials. The use of these machines has since spread to the capital of Slovenia, Ljubljana. The machine can be found in several locations around the city, and the one operated by the waste management company, Snaga, is called Bert. Euromonitor International selected the Bert vending machine as the most innovative retail concept of 2019 as part of its annual global retail market research. Moreover, the machine has also reached Croatia and is now present in Rijeka, as well as continuing to be implemented across other Slovenian cities.

5. Zero waste businesses are based on ecological and social values that complement overall business culture and philosophy. Zero waste businesses are regenerative and restorative by design, keeping resources in use at their highest value for as long as possible; along with ensuring social-economical returns with better inclusive livelihoods, giving priority to local economies. They seek to replace the linear economy based on take-make-throw away, which assumes our planet has infinite resources. In this sense, the value proposition of a zero waste business model is the direct engagement in improving the sustainability of the overall system, going beyond the conventional eco-consumerism. That said, zero waste businesses may show different approaches to ecological and social values, and further research would be needed beyond the scope of this report to elaborate on the intersection between zero waste business models and justice and equity values; and how this evolves with further expansion and growth of these types of businesses.

Example

Hasiru Dala in India: a social enterprise whose vision is to integrate the generation of wastepickers into the mainstream circular economy and enable its accelerated adoption by consumers and producers, creating better livelihoods for wastepickers through inclusive businesses that have an environmental impact. Their current services include organisation and provision of zero waste events where all SUP is replaced by compostable or recyclable options. It also provides brand owners with Extended Producer Responsibility (EPR) compliance and export PET plastic to be used in manufacture of new PET bottles.

4. Case studies: examples of successful zero waste business models in Southeast Asia

The case studies compiled in this report illustrate the particular type of zero waste business that focuses on replacing SUP products with a reusable option. The method by which these case studies were selected is described in the Methodology section. All of them are placed in Southeast Asia, so an overview of the context in this geographical area is provided.

4.1 The plastic waste context in Southeast Asia

In early 2018, China enacted its "National Sword" policy, effectively banning the import of most waste plastics and materials heading for the nation's recycling processors in an attempt to stop the wave of soiled and contaminated materials. The contamination limit was changed from 1.5% to 0.5% within months of the ban, a sharp decrease from the 25% global average contamination rate for plastic materials collected for recycling (Bell, 2018).

Up until 2018, China had been the world's most frequent destination for low-grade plastic waste. In 2012, it accepted more than half of the plastic generated by the entire planet that year (Greenpeace, 2017). The shipments were mostly from Europe and North America. Only high-value materials such as PET and HDPE were deemed suitable for domestic recycling in developed countries, while the remaining hard-to-recycle waste found its way to China and other countries with low environmental standards and cheap labour (Greenpeace USA, 2019). Many developed countries relied on plastic waste exporting in order to meet their recycling targets.

As a result, many Southeast Asian countries became new destinations for exporting countries, further stressing existing infrastructure and amplifying the problems of plastic pollution in lower-income countries like Malaysia, the Philippines, Indonesia, Thailand and Vietnam, which are already overwhelmed with domestic generation of plastic waste (Liamson *et al.*, 2020). In particular, Malaysia and Thailand were among the top importing countries in 2018, showing drastic increases compared to the previous years, according to the UN Comtrade Database (Vilella, Condamine and Sangaralingam, 2021). The amount of imported plastic waste also more than doubled in Indonesia, South Korea, and Laos, while imports in China fell by over 90% in the same time period. Hong Kong was still one of the biggest importers in Asia as of 2019, after Malaysia saw a spike in 2018 and tightened its requirements in the same year. Hong Kong is also the biggest re-exporter in the region, as some importing businesses re-routed waste bales to Southeast Asian countries through Hong Kong to skirt import limits, which poses a new threat of increased landfilling and environmental burden to the region (South China Morning Post, 2019).

These countries have been receiving waste that is not safely or economically recyclable, under the pretext of "recycling" (INTERPOL, 2020). This is typically a mix of recyclable and non-recyclable plastic waste and composite materials, often significantly contaminated and containing toxic additives which make safe recycling extremely difficult. Those shipments can often be illegal, as they are operated under a label misleadingly saying that the waste is

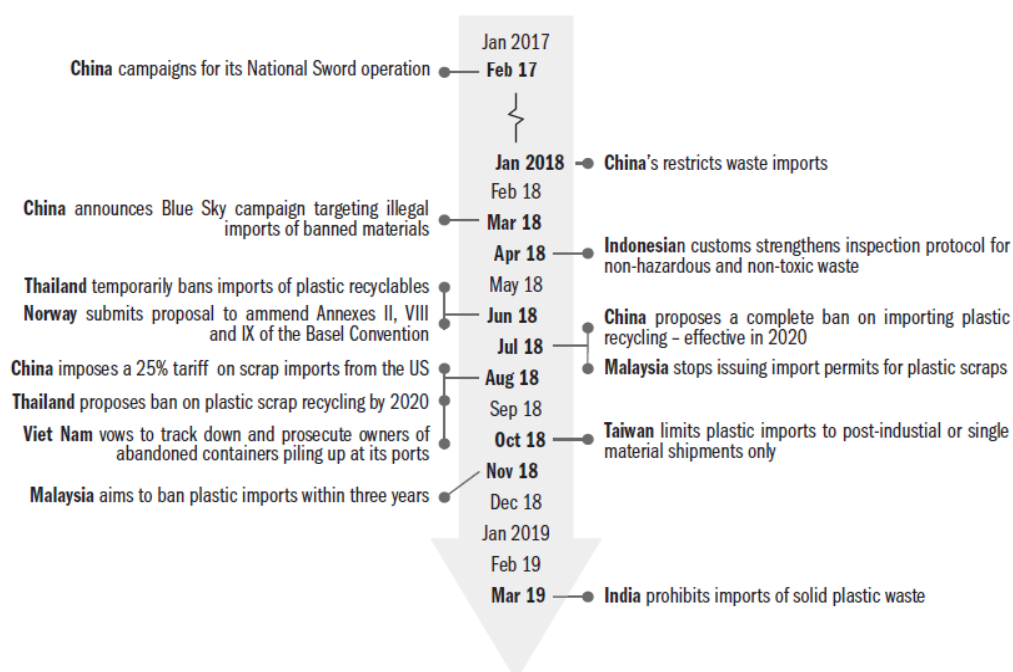
recyclable and of good quality. In fact, a considerable increase in illegal waste shipments from Europe and the United States has been reported since 2018 (INTERPOL, 2020).

These overwhelming amounts of plastic waste have led to a sudden rise in unauthorised recycling operations in the receiving countries. In Malaysia, nearly 40 unregulated recycling facilities popped up in Jenjarom, a town southwest of the capital Kuala Lumpur, burning unrecyclable plastic and releasing toxic wastewater into waterways (Global Alliance for Incinerator Alternatives, 2019a). Although rigorous community action successfully called for an official investigation and shut down many of the illegal operations in Jenjarom, more facilities spread across West Malaysia to repeat the polluting operations, which also caused at least 12 fires between 2018 and 2020 (Pui Yi, 2020).

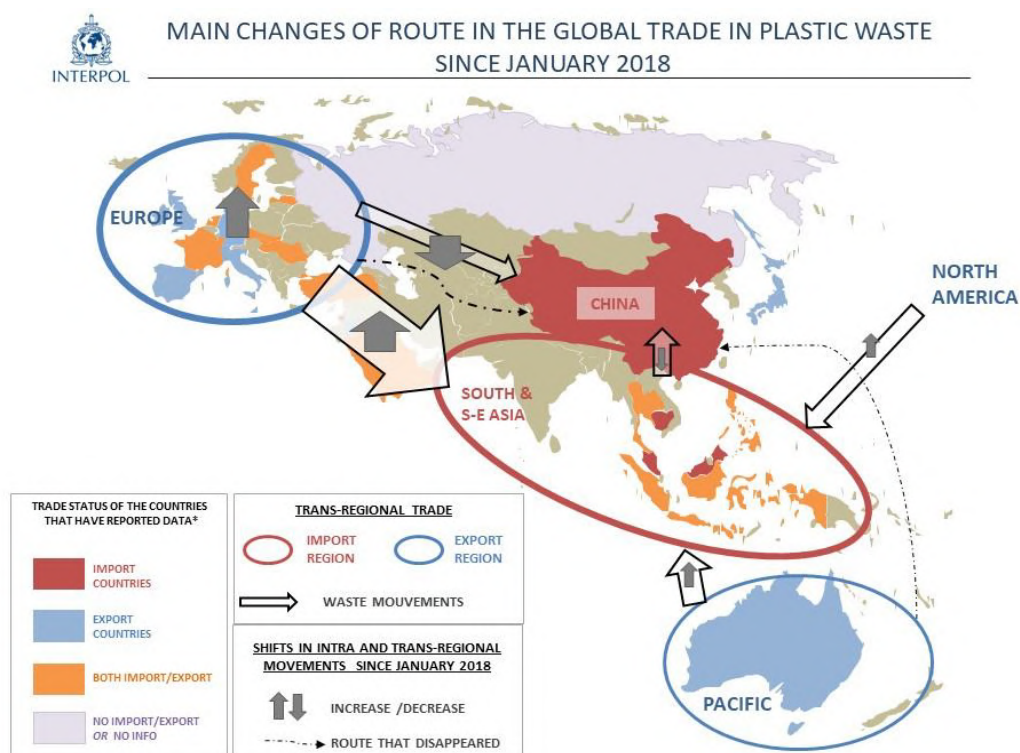
In an attempt to protect vulnerable countries from the social and environmental problems related to plastic waste trade, the Basel Convention was amended in May 2019 to include new rules. These new rules require exporters to secure Prior Informed Consent (PIC) from importing countries for all shipments except a narrow set of non-hazardous plastic wastes. PIC is a consent system used in UN global policy. In the case of the Basel Convention, it makes it mandatory for plastic waste exporters to inform the receiving country and obtain an explicit permission from them before sending their plastic waste. These new international rules came into force in January 2021 for all shipments involving countries that are parties of, and have ratified, the Basel Convention — this currently includes 186 states and the European Union, while Haiti and the United States have signed the convention but not ratified it and, thus, are not bound by it.

National authorities have taken similar regulatory actions to restrict or ban imports of plastic waste. In 2018, Thailand, Malaysia, India, and Vietnam announced that they would phase out imports of plastic waste by 2021 (Global Alliance for Incinerator Alternatives, 2019a). Sri Lanka and Maldives announced a plan to ban the import of plastic products and packaging, rather than just plastic waste, to protect their wildlife (Staub, 2020). Countries like the Philippines, Malaysia, Indonesia, Cambodia and Sri Lanka have also been dealing with illegal plastic waste hidden in the bales of recyclables. While some governmental agencies have sent back the waste to its countries of origin - such as the U.S., the U.K., Canada, South Korea, Hong Kong, Australia, Spain, France and Germany - the issue of illegal waste shipments remains a recurring concern for many communities in Asian countries.

In the light of the above, environmental advocates have denounced these measures as insufficient, pointing out that the waste collection and recycling systems in Asia are far more fragile than the ones in the Global North and, therefore, bolder policies and actions are needed. While these countries have been suffering from health risks associated with treating low-grade plastic waste in precarious working environments, pressure from the Waste-to-Energy (WTE) industry in countries such as Indonesia, the Philippines, and Vietnam to build waste disposal infrastructure is acute and highly problematic, posing a threat to undermine the local opportunities for zero waste strategies and circular economy; and risking to lock these countries into a linear model for decades.



Infographic 2: Calendar of relevant events on global plastic waste trade. Source: INTERPOL Strategic Analysis Report: Emerging Criminal Trends in the Global Plastic Waste Market since January 2018



Infographic 3. Main changes of route in the global trade in plastic waste since January 2018. Source: INTERPOL Strategic Analysis Report: Emerging Criminal Trends in Global Plastic Waste Market Since January 2018. August 2020.

4.2 Case studies

The series of case studies in the following section are studied using a basic sustainable business model framework based on four basic business model components - i.e. value proposition, supply chain, customer interface, and financial structure - together with normative requirements to be successfully identified as sustainable innovations (Boons and Lüdeke-Freund, 2013). Moreover, this is combined with the characteristics of a transformational business model as proposed in Transition Studies and presented in the earlier Theoretical Framework (Section 3).

4.2.1 barePack: reusable containers for food meal deliveries in Singapore

Value proposition: barePack facilitates the purchase of food from restaurants in reusable containers through an app. It's a membership-based service that works across several delivery platforms like Foodpanda, Deliveroo, and Grab. The app shows the restaurants that are enrolled in the network and reusable container options. Customers return the used containers to the restaurants, where they are cleaned and made ready to be used again.

Its value proposition is based on the promise of convenience without negative impacts on the environment and health, particularly SUP ones. barePack's vision is "a world where reusable culture is the norm, for everyone, everywhere, creating a kinder community", and its mission statement reads "to put an end to disposables, replacing them with reusables that save our planet and future without compromising on convenience." Moreover, barePack wants to "empower consumers to change their habits for a healthier and more sustainable life without having to give up on the things they enjoy such as food on the go and late-night delivery", adding a strong emphasis on values when the founder says "We believe in kindness: to each other, the planet, our partners, our customers."

Supply chain: barePack's key infrastructure relies on phone application software and reusable containers. The remaining infrastructure comes from partners in the supply chain, restaurants, and the delivery services. The reusable containers are returned to the network of restaurants to be washed in their premises.

Customer interface: barePack communication platforms - that is, website, software application, and social media; as well as their partner's communication, the network of restaurants, and delivery services. There are currently more than 100 restaurants where food can be ordered using barePack containers.

Contact:

<http://www.barepack.co/>

<https://web.facebook.com/barePack.co/>

<https://www.instagram.com/barepackapp>

Financial structure: consumers pay a monthly fee or a one-off payment, while restaurants are not charged to be part of the network. The number of customers increased when the company introduced a rewards system and formed a partnership with Deliveroo, with whom they have

established a deposit mode for customers who did not want to become members yet. Membership fees and ad-hoc fees from customers comprise the main income sources. As of the date of this report, 2000 people have downloaded the app, and 400 registered people pay a regular fee - either \$2.99/month or \$17.99/year. Customers also enjoy a free one-month trial. In terms of staff, barePack started as a team of four full-time employees who were supported by interns. Eventually, they added another full time worker to the team. barePack has recently expanded to Paris, where the platform is in the process of being set up.

Challenges: culture and beliefs around convenience, safety, and hygiene have been important challenges for barePack according to the founder, Roxane Uzureau: *“Some people feel that reusables are less hygienic than single-use containers”*. But she argues that customers cannot be too sure that single-use is cleaner or safer than reusables. *“We did a lot of education on the safety of reuse versus disposables to really show how there is no science to back the safety of single-use, and to crush that perception”*. Roxanne also mentioned that, in the beginning, it was difficult to change the mindset of restaurant owners, especially those that have been in business for a long time. *“Getting the first restaurants on board was challenging”, she recalled, “so we made it completely free for them to be part of the network”*.

Key to success: Roxanne mentioned the need to be a very agile team - always willing to test, change, and adapt, with very proactive communication with customers and leveraging strategic partnerships.

4.2.2 NUDE: a refillables shop in Malaysia

Value proposition: self-identifying as a zero waste store, NUDE presents itself as a modern, minimalist, plastic-free zone, with a large offer of package-free items. Their motto is: “Just the Good Stuff—Package Free, Harm Free, Guilt Free.”

Co-founders Cheryl Anne Low and Wilson Chin conceptualised NUDE as a lifestyle store catering to customers who care for the environment and want to minimise their plastic and food waste. Supplies are mainly sourced locally and come in bulk, reusable, and returnable packaging. Store products are sold by the gram and placed in refillable reusables, which are available for rent in-store or preferably brought by the customers themselves. *“Our first proposition was to give the consumers the choice to have everything they need without the unnecessary plastic packaging”, Cheryl said. “Secondly, we wanted the consumers to have the choice of buying as much or as little as they actually need, rather than having to buy predetermined sizes, weights, or packages [...because] how often have we found bags at the back of our fridge with food that has expired and had to be thrown out?”*.

The value proposition is not only a packaging-free shopping experience. It is also an advocacy experience in itself, as the founders created this company to promote a plastic-free, zero waste lifestyle. In this sense, the company is a tool to educate more people on the impact of SUPs and make alternatives possible.

For Cheryl, the ‘lightbulb moment’ happened when watching a video of a plastic straw being painstakingly removed from the nostril of a sea turtle. *“Being a scuba diver, it affected me so much that it set me on a frenzy of fact-finding; why and how it could happen. That opened my eyes to what human activity is doing to the world, and who suffers the most from it”,* she said. She considers their customers to be “co-passengers” in the zero waste journey.

Supply chain: apart from the shop, they have refill stations and consider their relationship with suppliers to be a key element of their infrastructure. According to Cheryl, finding quality products that do not harm the Earth at reasonable prices requires a lot of research and patience, as well as discussing their advocacy with their suppliers. *“Making the suppliers understand the reasons why we would like to buy package-free from them and coming up with workable realistic solutions for both parties is important,”* she said, adding that these conversations are important to ensure product quality. The difficulties with the supply chain are further explained under challenges.

Customer interface: the main space for interface is the physical shop, which was a self-service structure before the COVID-19 pandemic and where customers were free to browse and make use of the weighing machines to refill their own containers (with guidance and assistance provided when needed). The pandemic required a change in the system to ensure the safety of customers.

“Expect the unexpected”, says Cheryl, referring to the “backbreaking” labor of the past two years, including ensuring the safety of their customers during the COVID-19 pandemic. *“We take their orders and sanitize and refill their containers. Before this, it was [all] self-service, customers were free to browse and make use of the weighing machines to refill their own containers with our guidance and assistance when they needed it”.*

Financial structure: a refillables shop can follow the same financial structure as any other shop or supermarket; in this sense, it does not necessarily involve innovative practices. The main income sources are twofold:

- 1) The items available in the physical shop — with the Recommended Retail Price (RPP) being on par with or lower than that of supermarkets. It is important to source good quality items that can be purchased in bulk;
- 2) Bulk supply to restaurants/small businesses made in returnable storage vessels to provide solutions to reducing their plastic waste. Small businesses have reached out for advice and solutions, which are always provided for free. The annual turnover is about \$250,000 USD /year; and the team comprises four founders, two of whom are directors and play an active role in operations. They also have two full-time staff and one part-time employee on weekends.

Challenges: the main challenge is finding suppliers who are willing to embark on package-free supply solutions. Cheryl said: *“It requires a lot of research to find them, test out their items and, once we determine it is a good product that we would like to offer to our customers, the discussions and negotiations begin. We understand their nature of business and the nature of the product, and come up with workable and realistic solutions for both parties. Be it returnable containers/sealable packaging, or swappable containers, the result is usually a positive one. Once they understand our mission, they too want to be a part of it. Of course, not all suppliers agree*

to this, as it would deviate too far from their usual operations, so we move on to the next willing supplier. We have been blessed to find wonderful and understanding suppliers. It requires a lot of research, education, and discussions to finally reach a solution. It is possible. It takes patience. Our supply chain is also zero waste and we are strict [in ensuring] that it stays that way. We are constantly on the lookout for good vendors, good products, innovations in the plastic-free sphere; and then go out/online to look for those."

NUDE has also faced some challenges around specific products, as the founder explains: *"Some beauty care and skincare items do need to be packaged due to humidity and hygiene sensitivities. We understand this, so the discussions are different when it comes to them. We align [with suppliers] that their bottles/jars are returnable (we do not accept plastic-packaged beauty items), and they will reuse/recycle them once the clean empties are returned. The incentive is passed back to the customer — they receive a refund for clean jar/bottle returns. In this small way, we teach them to take good care of the jars, because resources have gone into making them. This way, we also support and encourage the circular economy"*.

Key for success: Cheryl explains that the zero waste lifestyle is a growing trend in Malaysia: *"Malaysians are now actively searching for plastic-free and locally produced/manufactured options — they're reading more, researching more, looking for zero waste/bulk stores, and looking for refill options. The activism surrounding this is seeing results. We now see certain supermarkets selling loose local produce and adding to the education of customers on plastics. We also see customers visiting local night/morning markets with their baskets and containers instead of using plastics provided by the vendors."*

Cheryl also expresses her deep passion for her work and offers some tips: *"[I] Never forget my motivation and my passion continues to drive me; every successful discussion with a new vendor is a cause for celebration. We celebrate the small victories. It means that we are closer to normalising zero waste supply chains here — we just need more people asking for it. Make our voices heard and follow through; good relationships with vendors and suppliers is necessary"*.

Finally, she adds: *"As a consumer, I started off being plastic-free, and then zero waste, and everyday I am learning new things. Ignorance is not an option in this day and age when information is at our fingertips. My mind is filled with zero waste/plastic-free options - if a vendor sells items in plastic packaging, I request compostable/reusable packaging. I have found that they will always allow it, which means we need more people to request it. Many people get stuck in the 'Oh, it comes that way. They've already packed it. There's nothing I can do about it.' This needs to change. No, we don't have to accept it — we always have a choice. Our voices are louder than we realise. Every purchase decision is voting with my hard-earned ringgit. We can choose to vote for change."*

4.2.3 Toko Organix: a refillables shop in Indonesia

Value proposition: Toko Organix is a shop selling everyday products without relying on sachets and other SUP packaging. It started in 2012 as an initiative of the non-profit organisation YPBB, a zero waste advocate in Indonesia. The pricing of products is affordable, making it an important

element of its value proposition to ensure the zero waste shopping experience is accessible and not niche - a critique that has been directed at other zero waste shops.

The purpose of the shop is to reduce SUP consumption, following research conducted by YPBB on the waste generated by households in the community. They found that plastic sachets and other plastic packaging made up a significant fraction of inorganic household waste. To address this, YPBB decided to pilot a shop that would sell basic needs without using plastic, on the assumption that this shop would enable sachet consumers to change.

Initiated as part of YPBB's Zero Waste lifestyle program, Toko Organik serves as a disruptive business model to promote a zero waste lifestyle. Aside from selling products, the store offers waste management tools to help customers expand zero waste in their respective households. They have organic management tools like takakura composting boxes and biopore drills — used for making biopori holes for composting —, as well as refill bins.

Supply chain: extensive connections with local vendors.

Customer interface: Prior to the COVID-19 pandemic, Toko Organik consisted of a physical shop, which had to close for two months during lockdown. Toko Organik eventually reopened, putting in place all the necessary health protocols, which have shifted most of their activities into an online setting.

Financial structure: Similar to a shop or supermarket. It is worth noting that the customer base has expanded and it's still growing.

Challenges: Preconceptions of zero waste shops as elitist.

4.2.4 Refillables Hoi An: a packaging free shop in Vietnam

Value proposition: Refillables Hoi An is the first refillable concept shop in Central Vietnam, founded by Alison Batchelor, a zero waste lifestyle practitioner that moved from Canada to Vietnam and missed the option of shopping in packaging-free shops in her new setting. The shop proposes a packaging-free experience with affordability, targeting low-income families.

Its engagement with the community on increased waste prevention is also part of its value proposition: the founder points that suppliers are seeing increased patronage from startups; there are three different spots in Da Nang that are doing refills; and newly opened shops take their cue from Refillables Hoi An in terms of their product offer.

Alison keeps a count of all the refills done in her shop: as of March 2020, the shop had done 13.360 refills since its opening in 2018, which is equivalent to the same amount of plastic containers being avoided.

Supply chain: Refillables Hoi An has a very strong alliance with suppliers, as this collaboration is important to ensure both the minimisation of plastic waste and affordable prices. Some of the suppliers have provided discounts on wholesale prices, which are facilitated by bulk purchases.

One of her first suppliers, Minh Hong from nearby Da Nang, understood that Alison wanted to target a low-income demographic and so provided discounts on wholesale prices. These discounts were offset by minimised packaging costs. Minh Hong's team took back their containers, and even picked up the unreturned receptacles of other suppliers for refilling. A small shop in Hanoi called Ekoko adapted their packaging to be able to supply Alison with not only mineral salt deodorant, but also with refill shampoo, conditioner, and body wash. Similarly, a supplier of coconut oil soap called Nude made their packaging plastic-free. *"They used brown paper but there was like a plastic wrap around the soap on the inside. It can't look eco on the outside and then not be on the inside, so they worked with me to realign their packaging,"* Alison shared.

Customer interface: physical shop, website and social media.

<https://refillableshoian.com/>

<https://web.facebook.com/refillableshoian>

<https://www.instagram.com/refillableshoia/>

Financial structure: it was founded with an investment of CA \$6,000. Its financial structure is that of a conventional shop, with the advantage of having very low overheads in the context of Vietnam. *"I know that in Canada opening a shop requires a much higher capital", says Alison. "Here, my shop is on the ground floor of my own house — like most shops in Vietnam — so I don't pay extra rent, and the cost of extra electricity is minimal, which allows me to maintain very affordable prices".* When it comes to Refillable's Hoi An's team, Alison is the only full time staff person, with another Vietnamese-speaking part-time staffer to help her. It now serves a roster of 30 local businesses and receives an average of 5 -20 individual customers per day. Alison reckons that the clientele is 35% Vietnamese, and the rest is composed of foreign migrants from the Global North. According to Alison, the fastest growing demographic in the zero waste market in her context is the younger generations, which are very ecologically-minded.

Recently, Refillables Hoi An received a UNDP grant, financed by the Norway Government, to establish a refill delivery system across the city. She is also engaging in another partnership with the local government to set up a mobile refillable shop (following a common way of selling goods from motorbikes) in the city of Ha Noi.

Challenges: Finding suppliers willing to collaborate without compromising on affordable, good-quality, refillable, and eco-friendly products. Another challenge is finding effective dispenser units. Alison explains that she buys all soaps (dishwasher, handwash, detergent and floor washing) in 30L containers, which are reused throughout the supply chain. She then puts this in 5L containers and reuses them as well — serving the soap to customers in their own jars.

Key to success: Alison explains that there is a huge expansion of zero waste/plastic-free shops in Vietnam, to the point that there is a sense of competition and potential lack of cooperation amongst the different initiatives, which are trying to target the same audiences. A next step would be further the organisation between the shops to build a network structure.

4.2.5 WorkingMum Periods: a redesigned product in the Philippines

Value proposition: WorkingMum Periods provides reusable, washable sanitary pads to replace their disposable counterparts in Manila, the Philippines. This is a way to contribute to waste prevention and healthcare, so the shop works as an advocacy tool, as Cecille Guevarra, the founder, expresses: *“The buyers share the advocacy of personal and environmental care. I will not do the math anymore. I’m humbled for being an instrument in avoiding disposable pads on the minefield of plastics.”* The mission of the business is clear, states Cecille: *“We ensure quality to help keep women and girls comfortable while keeping conventional period products out of landfills”*. She added: *“I consider WorkingMum Periods as a small step to a zero waste lifestyle – a small step from each of the women who purchased from us.”*

The trigger for launching the business originated in health concerns. Medical advice not to use disposable sanitary pads for their potential connection to cervical cancer was the main prompt. This brought Cecille to design and start selling reusable sanitary pads made of cloth, as well as linking up with other environmental advocates to sell her products.

WorkingMum Periods is also supportive of community development. *“As I manage my own business, I am happy to provide livelihood to a single mother,”* Cecille said,, as she subcontracts a seamstress from her province.

Other important values promoted as an important feature of the business are creativity and DIY culture, as the founder designs the pads herself. She explains that the designs and the materials of the washables have evolved as they’ve found better types of clothes and upgraded their products without increasing the price of the reusable pads.

Supply chain: WorkingMum Periods is a family business operated from a workshop in the back of a goods shop managed by Cecille. In this way, this is a business operated within another business. It involves a team of three people: the founder Cecille, her husband, and another woman that works outside the city. They all work from their own houses, so the overheads are very low. Cecille and her husband do the first cut on textiles, which are then taken to the sewer in the countryside using the already existing transport platform of the family shop. As part of her network of support, other organisations such as Mother Earth Foundation and GAIA have been instrumental in promoting her work and supporting her educational efforts.

Customer interface: WorkingMum Periods works as an online business, so there is no physical space. Customers can contact them directly via phone, email, or social media.

<https://www.facebook.com/bengworkingmum/>

<https://www.instagram.com/clothpadslinerph/>

Financial structure: The business sells a product for a price, so it’s a traditional setting. The overheads are very low, as explained above.

Cecille reckons she sells an average of 30 sanitary pads per week, both to other retail stores and as individual purchases, but this is not giving her a lot of profit.

Challenges: Slow-paced sales. *“Our sales may be slow-paced at times; yet, they are consistent and I am not giving up”*. Also, Cecille points out the lack of education on environmental matters and the health benefits of using plastic-free hygiene products.

Key for success: When asked about what would help her business grow, Cecille emphasises educational aspects, calling for more awareness of environmental values and health principles without toxics and plastics.



Advertising and images from the case studies in this report: WorkingMum, Hoi An Refillables, Toko Organik, Nude and barePack.

5. Discussion

In this section, I identify the innovative elements put forward by the case studies - understanding innovative elements as those that support long-term change in the market *versus* looking only at new technologies (Pinkse, 2021), and following the criteria developed by Boons (Boons and Lüdeke-Freund, 2013). I also highlight the enablers and barriers identified by the interviewees; finally, I discuss how much these initiatives can disrupt the Plastic Regime and contribute to a full transition towards a setting where SUP is not a dominant type of packaging.

Looking at the innovation capacity for sustainability of these businesses, they all appear to have very high value.

- **Value Proposition:** (which should reflect “a business-society dialog concerning the balance of economic, ecological, and social needs”). All of the businesses listed above have a strong commitment to a zero waste vision and mission, reflecting a deep engagement with their context, to the point of conceiving the business as an advocacy tool.
- **Supply chain:** all of the businesses described in the case studies actively engage suppliers into sustainable supply chain management. Moreover, Refillables Hoi An has managed to change their suppliers’ practices to avoid waste along the supply chain.
- **Customer interface:** all of the case studies are purposely educational when it comes to their zero waste mission, and “walk the talk” with their practices.
- **Financial model:** the case studies describe well balanced small business and entrepreneurs.

Furthermore, plastic-free businesses prove to be highly transformative following the set of normative standards from Transition, as they all adopt a broad conception of value with high priority given to ecological and social values. Most importantly, the value is conceived using a long-term perspective, with profit at the present time but creating value for the future. Finally, they all include an understanding of negative value and try to minimise that by, for instance, applying sustainability standards throughout the supply chain, rather than externalising them or delegating the responsibility. Finally, from the information gathered in the interviews and within the scope of this report, it’s not possible to say whether, or to what extent, these businesses are able to grasp new value in their changing environments. However, it can be said that they were all born out of the precise identification of an opportunity for change, jumping on board of an emerging trend in their contexts - the zero waste culture and lifestyle - and therefore demonstrating a high degree of flexibility, adaptability, and innovation capacity.

Some of the enablers mentioned by interviewees are linked with the increased media visibility of plastic pollution that motivates zero waste lifestyle and, therefore, creates a market demand for plastic-free products. As a consequence, the increased number of plastic-free businesses,

refillables shops, and their turnover does give a sense of momentum and resilience in this field of business. Moreover, it can be added that the policies seeking to ban or control the flux of SUP products have definitely contributed to the legitimisation and mainstreaming of plastic-free options.

Regarding the barriers, the dominance of the SUP Regime itself as a set of cultures, values, institutional structures, and legislation - and also specific habits and practices that maintain single-use plastic as a dominant product - is based on a complexity of barriers to change. Just to name some of the key elements of this complexity: the convenience and affordability of SUP; the overreliance and limitations of the recycling system; and the fossil fuels economy and its financial incentives to SUPs.

One of the most important barriers pointed out in the case studies is the cultural mindset which assumes that SUPs are safer and more hygienic. barePack in particular, but also WorkingMum Periods, NUDE, and Hoi An Refillables, highlight changing the mindset of partners, clients, and the supply chain in regards to the benefits of a plastic-free business as the most effort-intensive and time-consuming part of their business. While these small businesses struggle in their local contexts to overcome the mainstream narrative of the SUP regime, plastic producers actively promote and maintain it. The extent to which plastic producers go to maintain the dominance of the SUP regime has been illustrated in the context of the pandemic, where plastic producers took advantage of the initial chaotic situation to falsely promote higher hygiene and safety standards via SUPs (see this point in Section 1 Introduction). This was an important challenge for the plastic-free businesses in general, but the case studies analysed showed how they managed to adapt the practicalities of their business and educate their clients and public with the relevant facts, showing reusable options could be as safe as SUP products. To sum up, the narrative and arguments around the safety and hygiene of plastics are one of the key battlegrounds within the SUP regime.

In this sense, another interesting point raised in the interviews was the difficulty of finding suppliers engaged in waste prevention and willing to adopt the new practices (i.e. bulk selling). Again, the educational aspect around the benefits of the reusable alternatives is brought up here, when plastic-free business representatives recognise they've had to spend significant time convincing partners, suppliers, and clients about what's possible.

Also, the reputation of elitism has been something that most of the refillable shops interviewees have had to address. In most cases, such as Refillables Hoi An and Toko Organics, they found ways to both respond to this criticism and ensure the prices would be accessible. In fact, most of the refillables shops designed their business model proposition with an explicit element of accessibility and affordability, which is coherent with their *ethos* and social change aspirations.

The case studies illustrate the market trend of zero waste and plastic-free business that are proliferating in Southeast Asia, mirroring a trend that is happening around the world. This is definitely an emerging trend, a niche that is growing and questioning the dominance of the SUP Regime. The growing trend is a positive sign showing resilience and profitability. The fact that many of these businesses have been able to adapt to the new circumstances created by the

COVID-19 pandemic is also a positive sign that speaks of their capacity to remain stable in such an extraordinary state of affairs.

Still, it may be asked what capacity do these business models have to disrupt the SUP regime and establish a new regime based on reuse and SUP avoidance?

The development of plastic-free or zero waste business as a niche within the Plastic Regime is, in itself, a process of innovation and contributes to a transition (Loorbach, Frantzeskaki and Avelino, 2017), at least in a growing minority of the population. Following the multiphase X-Curve model for a transition (Figure 2), it can be further assessed where these business models stand within the transition beyond the SUP Regime. In the ideal typical S-Curve, niches move along a pathway of experimentation, acceleration, emergence, institutionalisation, and stabilisation, replacing the old regime. Conversely, the existing regime follows a downward S-Curve from optimisation, via destabilisation and disruption, to a breakdown and phase-out.

The application of the X-Curve to the global plastic system shows the dynamics of this transition. Starting in the existing regime downward S-Curve, the dynamic is at the early stages of transition because there is a lot of activity on optimisation, improving the *status quo* through efficiency measures and efforts to minimise flaws in the regime. The largest consumer-facing goods firms, responsible for bringing the vast majority of SUP into the market, are pledging improvements but their focus is not to inspire fundamental change in the way the system functions. For example, seven of the top waste plastic polluter companies as identified by the BFFP brand audit in 2020 — The Coca-Cola Company; PepsiCo; Nestlé; Unilever; Mondelez International; Mars, Inc.; and Colgate-Palmolive — have joined The New Plastics Economy Global Commitment (Break Free From Plastic, 2020). Yet, they have reduced their use of virgin plastic by only 0.1% from 2018 to 2019 (EMF, 2020). Similarly, Coca-Cola's announcement to make PET bottles entirely from recycled content still needs to use virgin plastic to deal with contamination issues, while not really changing the disposability of the bottles themselves. Coca-Cola keeps investing in clean-up operations while not closing the SUP tap (*Packaging Insights*, 2021). Essentially, in parallel to these pledges, the plastic industry just keeps growing and operating within the same model it has used for decades, showing that the sustainability efforts of the industry are largely reactive because they focus on reducing risks to "business as usual".

Following the curve, some key destabilisation incidents have revealed the unsustainability of the regime and increased the urgency for change - i.e. the effect of Blue Planet II; while the effects of the 'National Sword' policies in China in the global plastic waste trade could be seen as signs of chaos and disruption that further reveal the incoherences within the SUP regime. Lastly, some elements appear to be closer to a phase-out stage: for example, some of the legislation tackling plastic pollution, in particular SUP bans.

Continuing in the upward S-Curve for niches, there are different signs of experimentation, acceleration, emergence, and early institutionalisation without really establishing a stable new regime. Niches within the global plastic system have been extensively described in previous sections; the plastic-free business models identified in the case studies have gone beyond the experimentation phase, given they are stable businesses with growing projection; and, in at least

one case, are moving into the mainstream - i.e., barePack, which is partnering with Deliveroo and other big delivery companies. Moreover, there is significant investment in accelerating the transition (acceleration phase), with several processes pushing for changes that can have a large disruptive element; yet these are still open-ended - i.e., the SUP Directive, and circular economy policies. As signs of the emergence phase, the implementation of new solutions and structures have surfaced in some places - i.e., zero waste cities, DRS schemes, and refill station networks. However, the transition tipping point is yet to happen — the structures of the SUP regime are yet to be abolished and its practices unlearned. Institutionalisation renders the change to the new system irreversible; new rules and structures emerge and new power relations form. In this phase, the change becomes self-evident; and, gradually, a new stability - the abolition of SUP plastic and the establishment of reuse as an affordable, convenient, and inclusive option as the new norm - may be created.



6. Conclusions

This report has presented an analysis of the global plastic system, which holds the SUP regime at its core as a dominating subsystem. Following the MLP model, emerging trends that question the dominant regime have been identified and extensively described. Five case studies from plastic-free business models have been analysed through innovative sustainability criteria. Moreover, the report has done an initial analysis of the transition dynamics within the global plastic system.

The transition dynamics within the global plastic regime indicate that this process is ongoing and in progress. The unsustainability of the SUP regime is widely recognised, with episodes of chaos and elements of phase out, i.e., SUP bans. Still, most of the activity here is the optimisation of the regime itself, where we find the worst polluting companies still trying to sort out flaws in a reactive and non-transformative way (Break Free From Plastic, 2020).

On the other hand, the niche trends are found at different phases of the transition with signs of experimentation, acceleration, emergence, and institutionalisation. Indeed, the world is responding at impressive scale to the SUP regime, with grassroots action, national-level product bans, innovative reusable alternatives in the business sector, and greater accountability in global plastic waste trade.

As part of the emergence phase, zero waste and plastic-free businesses are spreading and becoming more popular all over the world, led by a public reaction to the increasingly visible impacts from plastic pollution in the ecosystems and to public health. As illustrated by the case studies, plastic-free businesses prove to be highly transformative: they adopt a broad conception of value with high priority given to ecological and social values with a long-term perspective, with profit at the present time but creating value for the future. Moreover, solutions to replace SUP, such as packaging-free or refillables businesses, have reinvented the model of traditional food purchase that was reliant on SUP packaging. The redesign of specific products, like reusable sanitary pads, show the novelty of these new initiatives. The five case studies discussed in this report show that this is a growing trend which has overcome the challenges of the COVID-19 pandemic, proving their resilience and long-term projection.

When it comes to the barriers and enablers of this type of businesses, this study has found relevant insights (see section 5. Discussion). In the first place, case studies point out that increased media visibility around plastic pollution has been an important enabling condition for the growth and expansion of the zero waste lifestyle, which in turn creates a market demand for plastic-free products and alternative systems to the SUP regime. The public debate around the impact of plastic pollution and policies aiming to ban or control the SUP flux are definitely contributing to the legitimisation and mainstreaming of plastic-free options. In this context, the case studies further illustrate how setting up strategic alliances between the plastic-free businesses and other suppliers or partners to reach out to the wider audience is a critical leverage point.

In addition, when analysing barriers, the dominance of the single-use regime itself involves a set of cultures, values, institutional structures, and legislation that maintain SUP as a dominant product. One of the most important barriers pointed out in the case studies is the cultural mindset which assumes that SUPs are safer and more hygienic - which is an important challenge for the plastic-free businesses in general. The case studies analysed showed how they have been able to adapt the practicalities of their business during the COVID-19 pandemic and educate their clients and public using relevant facts, showing that reusable options could be as safe as SUP products. To sum up, the narrative and arguments around safety and hygiene of plastics are one of the key battlegrounds within the SUP regime.

Furthermore, finding suppliers who are willing to embark on package-free supply solutions is another important challenge. Several of the plastic-free businesses analysed mentioned how much effort it took to find suppliers willing to collaborate without compromising on affordable, good-quality, refillable, and eco-friendly products. Overall, this shows that this field is growing, but is yet in the margins of the SUP regime. Finally, another important barrier mentioned pertains to the preconceptions of zero waste lifestyle and shopping as an elitist choice, which has been addressed by most of the plastic-free businesses interviewed by making sure the prices of their products are affordable and accessible; and by being explicit about their aspirations to reach out to low-income families.

On the basis of the barriers and enabling conditions pointed out, and in addition to the transition dynamics described in the Discussion section (Section 6) and the context analysis presented in the Introduction (section 1), this report presents the following recommendations and points out at further research avenues.

1. Ensuring a multidimensional approach to implementing solutions to plastic waste, with special consideration to issues around social justice and environmental health, challenging Western-biased conceptions of sustainability and recognising the contributions from Global South communities to tackling environmental problems.

The completion of the transition from the SUP regime to an alternative regime with reusable options as the mainstream norm requires an urgent transformative change and must consider plastic pollution as a multidimensional issue - involving different strategies on economies; social justice; and human and environmental health. From a systemic point of view, it's clear that single-solution, techno-enthusiastic strategies cannot stop plastic pollution. For example, technologies like WTE incineration (and similar technologies like gasification, pyrolysis, or plasma) are promoted as a solution, but they may cause health impacts from hazardous byproducts; create social and environmental justice issues; and contribute to climate change with their greenhouse gas emissions (Borrelle *et al.*, 2020). The multidimensional perspective is necessary to avoid creating perverse outcomes and break through the lock-in of the SUP regime.

2. Setting global limits for virgin plastic production and reducing or eliminating the use of unnecessary plastics, following a peak in packaging and other single use, disposable plastics.

It's clear that increased waste management capacity alone will not keep pace with the projected growth in plastic waste generation. The ever-increasing trend in plastic production and use needs to be reversed and reduced, which will require the fundamental transformation of the SUP regime into a zero waste circular economy, where production and use of single-use disposable products is limited to the minimum.

Key policies to support this transition include reducing or eliminating the use of unnecessary plastics with specific targets - ie. eliminating all non-essential uses of plastic by 2035, following a peak in packaging and other single use, disposable plastics in 2025. Moreover, setting global limits for virgin plastic production - e.g. halving the use of plastic packaging by 2030 and phasing it out altogether by 2050 - could ensure that the Paris Agreement CO₂ emissions targets are still met (Hamilton *et al.*, 2019).

3. Supporting zero waste, plastic- or packaging-free, reusable products businesses to be further developed and scaled up within a supportive network in the supply chain to ensure accessibility and affordability to the wider population.

As part of a multidimensional approach to tackling the plastic pollution crisis, the zero waste, plastic- or packaging-free, and reusable products businesses are currently illustrating some of the needed changes with groundbreaking results. This growing trend should be supported and scaled up to ensure it is accessible to the majority of the population in an affordable and convenient manner.

Some leverage points that would help plastic-free businesses and enhance the dynamics of the transition away from the dominance of the SUP regime are:

- a) increasing environmental and public health education about the benefits of reusable alternatives to SUPs, which has been pointed out as one of the key factors in the development of these businesses;
 - b) the implementation of effective policies that can make reusable options the most convenient and accessible - e.g. economic incentives to reusable options that would recognise that those choosing reusables are preventing waste and public spending on waste treatments; public access to refill options (for instance, drinking water fountains); bans of SUP products;
 - c) the creation of globally aligned standards for commodity plastics at the product level - ensuring they are reusable, practically recoverable and recyclable by design -, which would set quality standards and minimise the fraud and greenwashing from plastic producer companies;
 - d) the further development of key alliances and partnerships amongst suppliers of plastic-free businesses to create a solid and mutually reinforcing network and businesses sector.
-

Looking at further research avenues, this report has opened up several lines of enquiry that could be pursued. First, each of the recommendations could be further expanded and developed. It's been stated that the use of the multidimensional approach to resolve the plastic waste pollution crisis is necessary to avoid creating perverse outcomes and break through the lock-in of the SUP regime. In this regard, the theoretical framework used in this report from Transition Studies has been very useful and effective to show both the high-level and the micro-level elements surrounding the SUP regime, as well as the transition dynamics through the X-Curve concept. This analysis could be further expanded to show further detail and ask:

- **What have been the systemic leverage points within the ongoing transition that have advanced the growth of the zero waste niche?**
- **What made a difference in a given context?**

Indeed, the leverage points may be different according to each geo-political context, so a regional perspective would be pertinent.

On the recommendation to reduce the production and consumption of virgin plastic, it would be interesting to assess the effectiveness of SUP bans in the various jurisdictions around the world and identify the elements for success and failure. Also, a development of future scenarios would be relevant to set global targets to ensure that policies are set to comply with global commitments such as the Sustainable Developments Goals and the Paris Agreement on climate change.

Last but not least, the recommendation to support zero waste, plastic- or packaging-free, reusable products businesses brings up several questions that could be addressed. Most importantly, deepening understanding of the social justice dimension within the zero waste niche would contribute to the academic literature on sustainability practices in the Global South - a field that deserves much more attention in order to develop a sustainability agenda with social inclusion and diversity at its core. Looking at the specific leverage points needed for intervention to ensure the mainstreaming of zero waste options with inclusion and diversity, while maintaining the same quality standards, would be a required avenue for further research.

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