PACKAGE-LESS AND REUSE SYSTEMS THROUGH POLICY INTERVENTION:

RETHINKING PACKAGING IN INTERNATIONAL TRADE

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Acknowledgements

Acronyms and Abbreviations

B2B	Business-to-Business
B2C	Business-to-Consumer
EPR	Extended Producer Responsibility
EU	European Union
GHG	Greenhouse gases
ISO	International Organisation for Standardisation
NTMs	Non-tariff Measures
SMEP	Sustainable Manufacturing and Environmental Pollution Programme
PET	Polyethylene terephthalate
TPR	Trade Policy Reviews
UEMOA	West African Economic and Monetary Union
UK	United Kingdom
UNEA	United Nations Environment Assembly
USD	United States dollar
VAT	Value-added Tax
WTO	World Trade Organisation

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EXECUTIVE SUMMARY

With quantities of waste steadily rising worldwide, packaging material and packaging waste have emerged as critical areas for action at various levels. Half of the global plastic production is for single-use products and less than 10% of all plastic waste has been recycled. The continued increase in waste production, in which single-use plastic shares a significant burden, is harmful to the environment, people and economies. Governments and businesses must consider political risks and ways to anticipate, understand and mitigate them in international trade.

Over the past decade, governments have continually prioritised waste prevention in theory. Based on the Circular Economy concept, they identified and proposed the following points on waste hierarchy: avoidance, reuse, recycling, recovery, and disposal. Avoidance has the highest ranking in the circular economy hierarchy. However, avoidance and recycling have limitations, and reuse can be a solution to lower waste generation and footprint-per-use.

Circular economy's solutions related to package-less and reuse strategies remain niche. Therefore, linear models based on "take-make-use-discard" approaches continue dominating business-as-usual trade activities. Lack of circularity defines the throwaway culture and results from the perception that it is more cost-effective to produce goods from virgin resources and then use and discard them instead of increasing their durability at their highest utility rate. Recently, governments worldwide are already implementing a broad range of circular economy regulations and resource efficiency initiatives that can affect trade and trade-related policies and measures.

In recent years, the world has seen a rapid increase in sustainable-packaging regulations beyond focusing on shopping bags and particular food-service items (i.e., plastic straws or plastic cutlery). France established a reuse packaging target law, which requires 10% of packaging placed on the market to be reusable by 2027. Chile introduced a plastic regulation that promotes and encourages the sale of reusable beverage containers. Portugal has amended its law that by 2030, 30% of all packaging put on the market, of any material, must be reusable. Hence, regulators are responding to address the public outcry.

Companies across the packaging value chain must be aware of the accelerating pace of regulatory development, as noncompliance could lead to the imposition of tax increases or penalties. However, understanding the developing regulations on a global scale is overly complex given the following factors:

- The lack of an established or aligned terminology in place globally; for example, the term reuse can have different meanings, leading to a variable intensity of impact for the industry.
- The lack of a standard scope; for example, some regulations are focused on multiple categories, applications, end products, and materials (e.g., design rules). In contrast, others focus on specific aspects (e.g., labelling), creating potential overlap with different rules covering a similar scope.

Packaging value-chain companies must follow the constant evolution of regulation to keep track of changes and remain compliant. They must develop capabilities to understand regulatory measures, scope, application, and implications for their business and customers.

Changing the throwaway culture requires significantly rethinking the decades-old regulatory approach of diverting plastic waste from landfill that has been applied to tackle plastic pollution. Waste diversion strategies could have focused more on waste prevention (e.g., package-less and reuse strategies). Focusing on diversion from landfill meant a focus primarily on recycling, and, in turn, the emphasis on recycling enabled a thriving and

ever-expanding environment for disposable products. Waste advocates, regulators, and policymakers have yet to prioritise the top tiers of the circular economy hierarchy (e.g., avoidance promoted by package-less products and implementation of reuse systems).

Most countries are moving toward setting up similar regulations around waste packaging, though at different paces and depths. There is a strong push towards regulatory convergence, for example, the regulatory harmonisation in the European Union through directives and incentives to its members. Regulatory focus and approaches may vary considerably by region and diverge even further when viewed at the country or state level. However, the heterogeneity of measures is decreasing and making the fast-changing regulatory landscape complex for businesses to avoid dealing with plastic waste.

Most regulations on plastic waste prevention cover packaging specifications, such as composition, size, and weight. Some of them cover packaging attributes, such as recyclability and biodegradability. Regarding primary packing, regulatory measures mainly address labelling and traceability to promote customer empowerment. There was no indication of reusing or package-less strategies being promoted.

Interestingly, taxes are the leading and preferred regulatory vehicle for change in the packaging industry. Hence, it is essential to shift taxes from labour to resources, such as taxes on fossil feedstock, virgin materials, and plastic pollution. However, taxation must be addressed as a toolkit, not a goal. Hence, it requires knowing the goal trying to reach before deciding what tax tools to use.

As interest in reducing plastic waste grows, it becomes increasingly important to ensure that trade policies minimise packaging waste and improve reuse strategies. Not doing so would be a missed opportunity, given the unique role of trade in scaling up solutions worldwide. Moreover, disregarding the need to align trade policies with waste pollution reduction risks reinforcing linear approaches over circularity. As a result, countries worldwide may forego the potential benefits of new opportunities to diversify trade and move towards a safe and efficient global circular economy, including higher productivity.

Key messages
- Focusing on diversion from landfill meant a focus primarily on recycling. In turn, the emphasis on recycling enabled a thriving and ever-expanding environment for disposable products.
- Developing countries are no strangers to reusing models, and uptake of such systems can be accelerated with policies incentivising their adoption while mandating a reduction of plastic production and use.
- The absence of definitional precision, in combination with specific weaknesses in the formulation of targets, leads to a problem in which companies talk about a circular economy while implementing a recycling economy.
- Companies prioritise recyclable packaging over package-less or reusable products, especially in the food sector.
- Companies must develop capabilities to understand regulatory measures, scope, application, and implications for their business and customers regarding plastic pollution. They must keep track of changes and remain compliant to thrive.
- Package-less and reuse systems must be designed with the local context in mind. They must guarantee affordability and accessibility for low-income communities.
- Package-less and reuse strategies need to be scalable. Thus, reuse models must consider consumer behaviour and address their needs.
- The reuse strategy promotes and encourages the sale of reusable containers, especially non-plastic containers, avoiding the problems associated with disposable plastics substitutes.
- Reuse strategies should have the potential to create jobs al local level. Therefore, the informal waste sector should be involved in the process of developing an efficient and well-managed packaging reuse systems, ensuring a fair and inclusive transition
- Reuse strategies should decrease public ad-

ministration spending on waste management.

- Standardisation of reusing packaging in B2B (i.e., pallets, crates, dunnage, drums, intermediate bulk containers, and big bags) allows for automatisation and cost reduction.
- Products that are trade internationally should

be designed to be reused and to use less raw materials in its life cycle. In this sense, eco-design and LCA are tools that can assess raw materials use and evaluate product environmental impacts.

1. IS DITCHING PACKAGING A SOLUTION FOR PLASTIC WASTE?

Across the world, policymakers are responding to urgent calls to solve the plastic pollution crisis by banning throwaway – single-use – plastics. Plastics have harmful environmental effects and pose high risks to human health, with microplastic particles found in our food, water, drinks, and air, as recently shown in human blood [1]. Globally, we would be ingesting 74,000 to 121,000 plastic particles annually. Those numbers could be on the low side since the experts only looked at 15% of the United States citizens' total caloric intake [2]. This plastic comes from over 400 million tonnes of plastic annually produced worldwide [3]. Out of which 369 million tonnes take part of international trade and more than a third of this volume is single-use packaging for consumer goods [3, 4], resulting in about 40% of global plastic waste [5]. Latin America countries generated 231 million tonnes of waste, in 2016, with an average of 0.99 kilogram per capita per day, of which plastic waste comprises 12 percent [6].

Single-use plastic is still widely used in the food sector to package food and drinks and serve and deliver food on-site or on-the-go. On average the total lifespan for single-use plastic packaging is only six months [5]. In addition to food waste, which stands for 931 million tonnes per year globally [7], the food service sector is responsible for increasing greenhouse gases (GHG) emissions and plastic pollution resulting from packaging in food services (i.e., serving and delivering food and beverages in single-use plastic containers).

With quantities of waste steadily rising worldwide, packaging material and packaging waste have emerged as critical areas for action at various levels. Half of the global plastic production is for single-use products – packaging and non-packaging single use products – and less than 10% of all plastic waste has been recycled. The continued increase in waste production, in which single-use plastic shares a significant burden, is harmful to the environment, people and economies [8].

The expansion of plastic waste footprint is environmentally and economically unsustainable; governments recognise that wide-scale adoption of package-less and reuse strategies may serve as a major shift to circularity [8]. These strategies are attracting attention as a new form of sustainable consumption [9, 10]. Consumers are becoming increasingly concerned by the amount of waste they generate by unpacking goods at home and are seeking to address this issue [10, 11].

Several package-less businesses have been established worldwide, from Europe to Asia, passing through the American continent. These businesses are praised by the mainstream media and described in grey literature as a countermovement, a disruptive force, to single-use and disposable package practices. Much of the critique of packaging occurs around plastic, a material that has paved the way for multiple food and non-food products, effectively reconfiguring everyday consumption practices [10, 12]. Against this backdrop, consumers and retailers see shopping at package-less businesses as a waste reduction practice, especially single-use plastic waste. In this discourse,

package-less businesses are framed as sustainable practices that need to be increased or incentivised. Thus, package-less retail is an example of an increasingly pro-environmental behavioural change initiative focusing on removing unsustainable practices rather than "greening" existing products and objects [10].

Over the past decade, governments have continually prioritised waste prevention in theory. Based on the Circular Economy concept, they identified and proposed the following points on waste hierarchy: avoidance, reuse, recycling, recovery (e.g., energy recovery), and disposal. Avoidance has the highest ranking in the circular economy hierarchy. However, avoidance (e.g., package-less approach) and recycling have limitations, and reuse can be a solution to lower waste generation and footprint-per-use.

Reusable products or packages must be designed to be repeatedly reused for the same purpose for which they were created. In this sense, a report from Environmental Investigation Agency suggests some key issues that should be considered in a reusable packaging system, for instance [5]:

- The existence of infrastructure and reverse logistics for take-back, cleaning, refill, and redistribution of the packaging (operated by the producers and/or a third party)
- A suitable financial incentive to customers to return the packaging
- A minimum number of packing rotations
- A collection rate of at least 90% of the packaging

In 2021, Austria was the first European country to implement binding and enforceable reuse targets [13]. Since then, France established a reuse packaging target law which requires 10% of packaging placed on the market to be reusable by 2027 [14]. Portugal has amended its law that by 2030, 30% of all packaging put on the market, of any material, must be reusable [15]. Similarly, Romania has included a 5% annual reusable packaging increase reaching a minimum of 25% by 2025 [16].

The Spanish government recently approved new legislation in which retail stores in the food sector with an area of more than 400m^2 must allocate 20% of their facilities to products without primary[1] packaging from 2023 onwards [17]. In this way, it is intended to encourage the sale in bulk and the use of reusable containers that gradually leave behind the culture of plastic that prevails in the current consumption model.

A slowly growing number of businesses are moving to alternative retailing practices and reinventing package-less retail. Still, much of the information relies on developed countries like Sweden, the Netherlands, Belgium, France, Germany, and others. Little is known or disseminated about initiatives in developing countries. For example, in India, the government has banished since June 2022 single-use plastic plates, cups, and cutlery [18]. Banning disposable plastics does not change the reliance on throwaway products. It just shifts consumption to other disposable materials that affect the environment and human health differently. Motivated by the goal of tackling plastic pollution at its source, the Plastics Economy Global Commitment and Plastic Pact network connects businesses, governments, and organizations. Many packaging producers, brands and retailers joined the initiative behind a common vision to change how plastic is produced, used, and reused [19]. The initiative set 2025 targets, including that a 100% of plastic packaging is reusable, recyclable, or compostable. In 2021 the share of reusable, recyclable, and compostable plastic packaging achieved 65.4%. If we consider plastic packing reuse, for the second consecutive year, brands and retailers reported a slight decline in the proportion of plastic packaging that is reusable, from 1.5% in 2019, to 1.3% in 2020, to 1.2% in 2021. Reusable plastic packaging is part of the solution to eliminate plastic pollution, worth at least USD 10 billion innovation opportunity that can result in substantial user and business benefits [20].

Trading single-use plastics for disposable plastics substitutes (e.g., plant-based fibres) can sometimes result in more significant climate impacts, water and air pollution, loss of biodiversity, and

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[1] Primary packaging is the packaging that most closely protects the product. It can also be referred to as retail or consumer packaging

eco-toxicity levels depending on the specific products involved [21]. One positive example of a reuse strategy is the plastic regulation introduced by Chile. It promotes and encourages the sale of reusable beverage containers, avoiding the problems associated with disposable plastics substitutes. Hence, local suppliers must offer reusable bottles and must take back the returnable bottles [22].

Developing countries are no strangers to reusing models, and uptake of such systems can be accelerated with policies incentivising their adoption while mandating a reduction of plastic production and use. At the national level, these strategies based on package-less and reuse systems must be designed with the local context, affordability and accessibility for low-income communities as guidelines. These strategies should include reusable shipping and logistics for business-to-business (B2B) at the international level. Reusable B2B packaging options reduce the need for single-use materials. These innovations can efficiently reduce the environmental burden of plastics by the international trade community, allowing materials to move efficiently across the border and ensuring each container is used enough to account for the additional material and energy usage over its disposable options. Reusing packaging in B2B can result in significant long-term cost savings. As a result, many industries commonly adopt reusable packaging systems in the B2B market, such as pallets, crates, dunnage, drums, intermediate bulk containers, and big bags. Standardisation allows for automatisation and cost reduction, reaching more markets that are significant. Indeed, the globalised world of trade would be impossible without standardised containers [23].

Companies across the packaging value chain must be aware of the accelerating pace of regulatory development, as noncompliance could lead to trade barriers. Hence, this report offers an overview for practitioners and policymakers seeking to adopt or expand package-less and reuse strategies in their activities. The findings, interpretations and conclusions expressed herein result from a systematic literature review and collaboration with key stakeholders facilitated by the Quakers United Nations Office (QUNO). Still, results do not necessarily represent its views.

2. PACKAGE-LESS AND REUSE SYSTEMS, A CONTEMPORARY TREND FROM A LONGSTANDING TRADITION

Package-less and reuse practices are no novelty. They are based on ancient practices. Before today's plastic use, people used cloth bags and jars for their shopping, just as the zero-waste-driven consumers do today. One could not forget to take bags or containers to stores. Buying in bulk for better price value was the norm in the past, resulting in less shopping and packaging. Plastics were the disruptive force that changed this longstanding tradition.

Before today's plastic wrapping, people bought their fresh food directly from the supplier. This meant nutritionally more wholefood and less processed food. It also implied the support of local businesses over multinational conglomerates. Many groups advocate that going without packaging is not reverting to an outdated lifestyle; it is embracing the future and moving closer to a more sustainable world we all want to live in. However, like many other forms of sustainable consumption, package-less practices require consumers to rethink their way of shopping, get new competencies, break unsustainable habits and set up new ones, often forsaking the personal convenience of standard shopping practices [6]. It is essential to highlight that package-less and reuse differ from sustainable shopping. Still, the two approaches

consider the exclusion of a problematic environmental element – package waste. However, these strategies do not involve the type of product (i.e., sustainable, organic, or fair-trade good) being acquired. Thus, they are two of many needed strategies supporting responsible consumption and production.

Packages serve many functions, such as safety, freshness, stowage, information, and marketing. Removing packaging from shopping results in a set of problems and complexities. So, what is needed for package-less or reuse to happen?

Currently, there are several studies [24-27] in marketing about decision-making processes and consumers' intentions to buy green products. These studies have offered valuable insights into green product marketing, shopping, and consumption. Still, little has been done about alternative modes of shopping or buying products, for example, package-less retailing [10].

All practices involve specific competencies, and the practice of shopping is no different. It involves what counts as a good product, such as shopping for ripe tomatoes. It involves meanings such as shopping for pleasure or being a good provider; either way, it corresponds to more than shopping for ripe tomatoes [10]. Thus, shopping practices consist of intentions, attitudes, and values. It is also important to mention that shopping is routine, like all practices. This does not mean, however, that shopping is unimportant. On the contrary, everyday shopping is meaningful but often unreflective and routinised. Changing routines is complex, which makes changing shopping practice challenging because it involves changing habits that have become established over time [10].

Packaging-less stores rely on the support of consumers. By making conscious purchasing choices, consumers can contribute to reducing environmental impacts but require a trade-off, usually detrimental to convenience. Thus, packaging-less

retail depends on reuse as a sustainability strategy. These two strategies go hand-to-hand despite varying applicability and scalability.

Before pursuing packaging-less retailing, it is necessary first to define reusability and the various related terms like "refillable[2]" and "returnable". For example, some brands have used the term "refillable " as a synonym for "reusable" when it is distinct. Other brands may call their packaging "reusable" even though it has not been intentionally designed for reuse. They may use a broader term like "reusable" when a more specific term like "returnable" would be more accurate. Still, other brands may note that their packaging can be "repurposed" or "up-cycled" for other uses. Key definitions are presented below.

A report recently published by the Environmental Investigation Agency defines reuse as *"any operation by which a product or packaging is used again for the same purpose for which it was conceived and is an important measure to reduce resource and energy consumption as well as waste generation"* [5].

Reusable packaging is designed to accomplish within its lifecycle multiple uses for the same purpose for which it was originally used (e.g., water bottle). As a rule of thumb, reusable packaging or product must be non-toxic. It should be used at least the minimum number of times[3] so that its environmental impact is less than the disposable item it is replacing. A system can also be reusable. Any supporting structure, process, or enabling technology that facilitates the circulation of reusable packaging or product can be defined as a reusable system.

To be efficient and well-managed a packaging reuse system should be based on the following principles [5]:
- Define a reuse and regulating labelling
- Establish reuse targets create a safe environment for investments in the associated technology and infrastructure.

- Develop and strength standardisation and managed pooling systems, where participants use a shared supply of a certain packaging type.
- Consider financial incentives and the development of favourable economic structures to support the transition from single-use business model into a reuse model.
- Consider the material composition, free from pollutants and toxicity.

While reuse strategies concentrate more on items (e.g., packaging or product), refilling strategies look more at systems.

Pre-fill systems require that brands retain ownership of the product packaging, which is designed to be returned for cleaning and refill. It is the most common and used system. In these systems, consumers typically are charged a refundable deposit to cover the cost of the packaging, which will be returned to the brand for cleaning and refill. Pre-fill models have long been used in the beverage sector via traditional delivery services and local supermarkets. Historically, in the Business-to-Consumer (B2C) market, deposit systems for bottles and other containers represent the significant B2C experience with reusable packaging, for example, beer bottles, especially in countries regulating single-use containers [23]. The pre-fill systems rely on return schemes and can be divided into [20] i) a return-on-the-go system, in which users return the packaging at a store or drop-off point (e.g., in a deposit return machine), and ii) a return-from-home system: in which packaging is picked up from home by a pickup service (e.g., by a logistics company).

Typical benefits are [20]:
- Businesses can improve brand loyalty by incentivising the return of the packaging through deposit and reward schemes.
- Businesses can improve brand loyalty and obtain user insights through subscriptions to auto-replenishment services.
- Users do not need to worry about keeping track of stock and reordering in a subscription service.
- Businesses can optimise operations by standardising packaging or shared drop-off points, logistics, and cleaning facilities across brands, sectors, or wider networks. This can happen in combination with a third-party packaging/service provider.
- Users can benefit from improved convenience as a higher density of drop-off points can be obtained through network collaboration.
- Businesses can gather intelligence via smart packaging and drop-off points that recognise the user and collect data on preferences.
- Users can have a better experience through improved packaging functionality or aesthetics.

Potential challenges are [20]:
- Establishing a local reverse logistics, cleaning, and refilling infrastructure to ensure economic and environmental feasibility.
- Developing a suitable deposit and reward scheme. The scheme needs to incentivise packaging returns without scaring customers away with a remarkably high initial deposit.
- Developing a system to keep track of deposits and handle payouts.
- Reducing the risk of theft of high-value packaging when sitting on the doorstep upon delivery or return.
- Scaling quickly to maintain affordable prices for customers.
- Ensuring ease of return for users, for example, by increasing the number and density of drop-off points
- Establishing a take-back infrastructure and storage of empties; for example, retailers need to buy into this from the outset.

Refill-at-home systems consider that consumers keep a reusable container refilled with a new product as and when needed. Hence, these systems can have returnable or throwaway packaging. These systems are typically used by soft beverage and home and personal care sectors. Examples include bulk buy and standard-size refill pouches and compact-size refills, including pods, tablets, and concentrates, which can be diluted with water at home. They can work for both online and traditional brick-and-mortar[4] retail. When unrestrained

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[4] The term brick-and-mortar refers to a traditional street-side business that offers products and services to its customers face-to-face. The local grocery store, central markets, and the corner bank are examples of brick-and-mortar retailers.

by shelf space, brands can take the opportunity to provide more options and greater customisation for customers and can offer products as part of a subscription service to build brand loyalty and encourage repeat sales. Refill packs will be subject to the same coding and marking requirements as traditional consumer products. Using refillable containers and refill pouches results in significant reductions in material use and transport costs. For example, cleaning products are sold in solid tabs to dilute in water. These options reduce transport costs drastically since around 80% of the standard product is water, and the overall weight and space during transport are reduced, as well as the volume of packaging material, becoming a less impactful and cheaper alternative. Experiences with such systems vary, as many factors determine their success [23].

Typical benefits are [20]:
- Businesses can reduce transportation and packaging costs by supplying products such as refills, concentrates, tablets, etc.
- Users can benefit as refills are cheaper to buy and easier to carry and/or store than products sold in standard packaging.
- Users' individual needs can be accommodated with refill systems that allow them to mix flavours, add the desired fragrance or personalise the primary packaging.
- Businesses can improve brand loyalty through refill subscriptions delivered directly to users.
- Users can benefit from higher convenience with automatic reordering.

Potential challenges are [20]:
- Attracting customers to the smaller or less impressive refill packs when placed next to everyday full-sized products on shelves.
- Communicating to users the benefit of buying, for example, 6 in 1 in concentrate format.
- Ensuring that refills come in reusable, recyclable or compostable packaging.

Refill-on-the-go systems include any model where consumers can bring their container into the store to refill it. These systems include in-store dispensing platforms and packaging-less retailers adopting "buy by weight" strategies. They can be used for fast-moving consumer goods, from food and beverage to home and personal care. The system can accommodate customers' needs by providing the option only to buy what you need, helping to avoid product waste. These systems may also be subject to coding and marking requirements, such as allergen labelling for food and beverage products. Some refill-on-the-go systems may necessitate a consumer buying an initial container designed for reuse. Permanent labelling of the container can be used to ensure that containers are refilled with the correct products and to deliver pre-measured quantities to avoid overfilling, which could create waste, damage pack integrity, or lose appearance.

Typical benefits are [20]:
- Users' individual needs can be accommodated with dispensing systems that allow them to choose desired quantities and personalise content.
- Businesses can obtain user intelligence through dispensing systems that recognise the user and collect data on preferences.
- Businesses can reduce transportation and packaging costs by supplying products as concentrates to be mixed with water on the spot in the dispensing machine.
- Users can benefit from improved product access if mobile dispensing systems are placed in public spaces.

Potential challenges are [20]:
- Motivating users to carry and clean their containers.
- Ensuring the dispensing system is easy, safe, and mess-free and lives up to the expected brand experience.
- Ensuring brand protection, for example, which branded dispensers are filled with the right products.
- Building up the required distribution network, including integrating dispensing systems at retailers.
- Complying with product safety standards, policies, and regulations specific to bulk sales.

Modern bulk stores are not new and can be found around developed countries, with rare examples in

other countries such as Indonesia, Brazil, Chile, Colombia, or South Africa. However, these are still a niche in retailing and usually have a limited variety of brands available. Some retailers in the United Kingdom (e.g., Waitrose and Asda) have been offering mainstream brands in bulk dispensers. Reusable packaging for perishables is often limited to dry products such as cereals, nuts, and candy in-store bulk dispensers can also be found in regular supermarket chains. These systems allow consumers to reuse containers and bags, although, in some countries, standard plastic bags are still offered [23].

In Chile, Algramo sells basic necessity products (e.g., cleaner, detergent, cleaning bleach, or liquid hand soap) in bulk in a dispensing machine and reusable containers. The brand is intended for areas of low-income families to have access to these products, making it possible to buy only the quantity needed without paying for the packaging [23]. In the United Kingdom (UK), Algramo designed compact machines for the supermarket chain Lidl, located on-shelf in the store's laundry detergent section. They take up space equivalent to 66 standard single-use bottles of detergent but have the potential of filling over 245 individual pouches, increasing capacity by 300%. Algramo's innovative technology means that the detergent pouches contain a special chip that allows the machine to distinguish between new and reused refill pouches. Hence, customers get their savings from not buying a new single-use bottle after their first use. The technology also helps Lidl and Algramo understand how many times each pouch is refilled and how much packaging has been saved through the trial [28].

In Brazil, the Coca-Cola Company is unifying the design of their reusable polyethylene terephthalate (PET) bottles across its soda brands as part of their ambition to substantially increase their reusable packaging by 2030. Per year, the reusable bottle will replace 200 million single-use bottles, which in average will last up to 25 cycles and can be recycled at the end of their useful lives, along with their labels. [20].

Nestlé Brasil, worked with *FutureBrand* to create "Re", a platform that unites Nestlé's initiatives to rethink the environmental impact of its packaging. Re is a brand, with its own logo and visual elements. Initially created for the Brazilian market, Re has been adopted by other Latin American countries. It communicates the developed technological innovations and the ones that will arise. It invites consumers to engage and contribute on sustainability causes. The name Re is a prefix to words like rethink, recycle, reduce, reuse, and recreate and each variation represents a different stage of Nestlé's packaging evolution.

In the Philippines, Unilever Philippines created the *All Things Hair Refillery*, which is a pioneering model that launched three refilling stations in key areas of the metro, where consumers refill their clean, matched containers from product pumps in three steps: refill, weigh and pay. Products are priced per gram, the payment for the purchase is based on the weight of the refill. The stations also function as an upcycling hub, where consumers can drop off their used plastic sachets/bottles, contributing to create a full circular economy for plastic packaging. The initiative encouraged the Philippines government to create industry standards for sustainable refilling models, that can be used by the whole industry [20].

In Indonesia, *Hepi Circle,* a refill delivery network, sell household cleaning products, in reusable bottles, through a local family-owned convenience store. Once customers have used the product, the empty bottle is exchanged at the store for the purchase of a full bottle. The empty bottle is cleaned and refilled at a central location, and then distributed, to local stores by women on bikes. As a reward, every time a *Hepi Circle* bottle returns customers receive a *Hepi point* that can be used to purchase products in reusable packaging or food. The pilot project has demonstrated financial feasibility and long-term potential impact [20].

The reshaping of retailing through home delivery also offers new ways of rethinking packaging. For example, a detergent and cosmetics manufacturer in Italy provides home delivery of detergents using a refillable container that can be filled at a mobile dispenser [23]. However, retailers usually avoid bulk dispensers due to the high maintenance and

hygiene demands. For example, ISO[5] 22000 Food Safety Management, a common industry standard, demands risk assessment, management, and communication of dispensers to follow a systematic methodology to protect health [29]. Taking away from retailers the responsibility of cleaning and manipulating the food, a company in the Czech Republic developed an innovative dispensing system. The producer seals the dispensers, cleans them, and reassembles them. The containers are registered in a mobile app, which allows consumers to pay for the product and to obtain information such as the expiration date and its traceability to the producer [23].

Packaging-less strategies have a limited reach due to their niche, such as interpersonal relations with suppliers. A package-less store requires much more planning than a regular shopping trip because consumers need to plan what bags, jars, and other containers to bring to the store. They need to consider the amount they can carry home. Overcoming the convenience of regular shopping and establishing new routines turns unreflective actions into, at least for a time, more reflective Changing habits is complex; consumers must remember to bring their reusable containers [9].

Without clear parameters, packaging-less strategies based on refill-on-the-go systems may inadvertently greenwash efforts or confuse consumers. The development of packaging-less systems is not a de-materialisation strategy but a re-materialisation strategy. Removing the packaging leads to adopting other items to compensate for that loss [30]. For example, a study from the Sustainable Manufacturing and Environmental Pollution Pro-

gramme (SMEP) shows that replacing plastic shopping bags in Bangladesh with jute bags requires being reused for at least three years to show environmental gains [21]. However, the embedded socioeconomic impacts are much higher from jute production than from plastics, and a process lifecycle analysis does not internalise them.

Packaging-less strategies require redesigning stores to accommodate dispensers and compensate for the loss of the package as an information device. Removing a package that facilitates self-service and accomplishes several tasks – from quality assurance to storing facilitation – means others must assume those tasks. Packages have agency. When a package is removed from a product, the tasks it accomplishes must be performed by others, re-distributing the agency to retailers and consumers [10]. In addition, packaging-less strategies compete with other sustainability strategies, such as choosing more environmentally friendly packages like plastic substitutes or alternatives[6].

A package-less and reuse policy requires a clear definition and criteria[7] for what is **reusable** and **non-reusable**. For reusable, reusable packaging or product must be non-toxic and is expected to be used at least the minimum number of times so that its environmental impact is less than the disposable item it is replacing. Lifecycle Analysis (LCA) is the most common tool for assessing environmental impacts. Still, it only evaluates some of them, excluding marine plastic pollution and the impacts of microplastics and chemicals on human health [1, 2]. To ensure that all environmental impacts are considered and that, the benefits of reusables exceed rather than merely break-even essential to adopt a

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[5] ISO stands for International Organisation for Standardisation, which is a worldwide federation of national standards bodies. ISO is a nongovernmental organisation that comprises standards bodies from more than 160 countries, with one standards body representing each member country.

[6] Plastics substitutes is a non-polymer natural material from mineral, plant, marine or animal origin, that have similar of the properties of fossil fuel-based plastics. They should have lower environmental impact along their life cycle (e.g., natural fibres, agricultural wastes, and other forms of biomass). Depending on the case, they should be biodegradable/compostable or erodible, and should be suitable for reuse, recycling, or sound waste disposal as defined by national, regional regulations or in internationally agreed definitions. They can include by-products. Plastic substitutes should not be hazardous for human, animal, or plan life. Plastic alternatives: they can include bioplastics or biodegradable plastics. Bioplastics usually means polymers materials produced from renewable biomass sources (e.g., as vegetable fats and oils, corn starch, straw, woodchips, sawdust, and recycled food waste) and should be subject to material recycling. Biodegradable usually refers to the end of life of plastics indicating that they are compostable in the natural environment. They can include their by-products. Plastic alternatives should also not be hazardous for human, animal, or plan life.

[7] The same can happen to plastics substitutes and plastic alternatives.

[8] The break-even point is the level of environmental impacts at which the single-use plastic option equals the environmental impacts of a reusable substitute.

factor higher than the average break-even points[8] for disposables. For example, comparing disposable versus glass cups, a factor of 25% or higher than the average break-even point between these two options would be the minimum usage of 125-252 disposable cups versus one single glass cup [21, 31]. For non-reusable, terms like "throwaway", "disposable", and "single-use" are often used interchangeably. However, there can be a vast difference between "single-use" and "throwaway". Two uses, or five or even below the average break-even point, would not meet the definition of reusable, but it could be classified as throwaway. Thus, any item not meeting the definition of reusable should be referred to as non-reusable, especially in policies or regulatory guidelines, to avoid potential confusion for the regulated industries regarding what is reusable and what is not [31].

In short, consumers' perception of and willingness to pay for alternatives to conventional plastic packaging reveals an ambiguous picture. On the one hand, consumers are said to be neither willing to change their consumption behaviour nor to pay for alternatives. On the other hand, there is evidence that consumers have an increasing environmental awareness and a positive willingness to pay for packaging alternatives (i.e., package-less, reuse,

recycling plastic or plastic substitutes). In fact, consumers are willing to pay for packaging that they perceive to be sustainable or more environmentally friendlier and are not willing to pay for packaging that they perceive to be non-sustainable or uncertain about their environmental impacts (e.g., marine pollution) [32].

Consumers are primarily dissatisfied with the current packaging situation, even though they enjoy the convenience of single-use plastic packaging. The recent general disagreement on what kind of packaging is sustainable and the lack of a clear definition and criteria for it – including what is reusable and non-reusable – result in companies and governments disagreeing on the sustainability of different types of packaging strategies.

Only five companies are adopting reuse strategies, among the largest ten companies reporting their plastic packaging footprints. Transparency is critical; in this case, it reveals how reticent companies are to adopt package-less and reusable systems. Table 1 shows that Danone has the highest percentage of reusable packaging at 4.8%, the Coca-Cola Company at 1.7%, Nestlé at 1%, L'Oréal at 1%, and FrieslandCampina at 0.4% [19]. Companies are picking the low-hanging fruit of recycling over reusing.

COMPANY	PLASTIC PACKAGING WEIGHT (METRIC TONS/YEAR)	PERCENTAGE OF CIRCULAR STRATEGIES (E.G., REUSABLE, RECYCLABLE AND COMPOSTABLE)	PERCENTAGE OF REUSABLES
The Coca-Cola Company	2,961,000	99.0%	1.7%
PepsiCo	2,350,000	77.0%	0.0%
Nestlé	1.267,000	61.0%	1.0%
Danone	717,000	67.0%	4.8%
Unilever	690,000	52.0%	Not reported
Mondelez International	189,500	5.0%	0.0%
Mars, Incorporated	179,382	22.0%	0.0%
L'Oréal	138,000	41.7%	1.0%
FrieslandCampina	68,676	28.0%	0.4%
Kellog	64,806	14.0%	0.0%

Table 1: Recycling versus reusing based on figures from 2020

It is essential to distinguish the percentage of circular strategies from reintroduction and recovery rates[9]. Having a 100% target of products that can be reusable, recyclable and compostable is fantastic. However, it does not mean that all plastic waste generated will necessarily be recycled. It is not enough to set a target of making 100% of our waste recyclable or compostable [33]. One of the challenges with reporting on plastics is that there are different types, each with different properties, uses and recovery rates. For example, polyethylene terephthalate (PET) – a higher-value plastic used in soft drink bottles – presents a recovery rate of less than 5% and a reintroduction rate of around 20% [34].

Changing the throwaway culture requires significantly rethinking the decades-old regulatory approach of diverting plastic waste from landfill that has been applied to tackle plastic pollution. Waste diversion strategies could have focused more on waste prevention (e.g., package-less and reuse strategies). Focusing on diversion from landfill meant a focus primarily on recycling, and, in turn, the emphasis on recycling enabled a thriving and ever-expanding environment for disposable products. Waste advocates, regulators, and policymakers have yet to prioritise the top tiers of the circular economy hierarchy [31]. Even if circularity is not the final goal, it should be part of an ongoing process to achieve greater resource efficiency and effectiveness. In this sense, companies' fundamental challenge in implementing circularity is to rethink their supply chains, and therefore the way they create and deliver value through their business models [35].

3. REGULATORY DEVELOPMENTS ON PACKAGING

Worldwide, 90% of regulatory measures regarding plastic waste target primary packaging alone or together with other packaging types (i.e., secondary and tertiary packaging[10]) [32]. However, regulatory maturity across countries remains extremely heterogeneous despite the increasing pressure to reduce plastic packaging waste.

In recent years, we have seen a rapid increase in sustainable-packaging regulations beyond focusing on shopping bags and particular food-service items (i.e., plastic straws or plastic cutlery). As mentioned previously, France established a reuse packaging target law which requires 10% of packaging placed on the market to be reusable by 2027 [14]. Chile introduced a plastic regulation that promotes and encourages the sale of reusable beverage containers [22]. Portugal has amended its law that by 2030, 30% of all packaging put on the market, of any material, must be reusable [15]. Hence, regulators are responding to address the public outcry.

Companies across the packaging value chain must be aware of the accelerating pace of regulatory development, as noncompliance could lead to the imposition of tax increases or penalties [36]. However, understanding the developing regulations on a global scale is overly complex given the following factors [37]:

- The lack of an established or aligned terminology in place globally; for example, the term reuse can have different meanings, leading to a variable intensity of impact for the industry.
- The lack of a standard scope; for example, some regulations are focused on multiple categories, applications, end products, and materials (e.g., design rules). In contrast, others focus on specific aspects (e.g., labelling), creating potential overlap with different rules covering a similar scope.

Packaging value-chain companies must follow the constant evolution of regulation to keep track of

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[9] Recovery rate is the quantity of recycled products collected and sorted as a proportion of the total waste generated in a particular locality and reintroduction is the proportion of the recycled products that is sent back to production systems as feedstock for new products.
[10] Secondary packaging is used for the branding and display of the product. Tertiary packaging is used for the protection and shipping of a product. Any company that ships any kind of good uses tertiary packaging in the distribution process.

changes and remain compliant. They must develop capabilities to understand regulatory measures, scope, application, and implications for their business and customers [37].

A. Regulatory vehicle for change

A study with 30 countries worldwide reveals that financial penalties (i.e., taxes, fines, and fees) represent the leading and preferred regulatory vehicle for change in the packaging industry [37]. These regulations tend to focus on primary packaging, but Asia. China, India, Vietnam, and the Philippines propose regulatory measures concentrating on sec-

ondary and tertiary packaging [36, 37], indicating a change in the B2B shipping and logistics driven by international trade requirements. China and India increasingly focus on regulations around e-commerce packaging to minimise waste and leakage. However, little is discussed about reuse packaging, and most measures look at labelling, waste control, recycling and return schemes, including standards and plastic substitution [38].

The study covered the last three years and found 177 measures, of which 83% focus primarily on plastic packaging [38]. Figure 1 illustrates the selected countries' identified measures related to sustainable packaging.

26%	24%	21%	16%	13%
Collecting, sorting, and Extended Producer Responsibility (EPR)	Waste reduciton and limitation	Packaging design and safety	Recycling and reuse	Labeling and traceability

Figure 1: Measures related to sustainable packaging (2019-2021) in 30 selected countries

Most countries are moving toward setting up similar regulations around waste packaging, though at different paces and depths [37]. There is a strong push towards regulatory convergence, as demonstrated by the regional trend in Figure 2. For example, 85% of countries analysed [37] cover the same regulatory measures in Europe. One explanation is the regulatory harmonisation through directives

and incentives that European Union promotes amongst country members. Regulatory focus and approaches may vary considerably by region and diverge even further when viewed at the country or state level. However, the heterogeneity of measures is increasing and making the fast-changing regulatory landscape complex for businesses to avoid dealing with plastic waste.

	Waste reduction and limitation	Packaging design and safety	Labeling and traceability	Collecting, sorting, and Extended Producer Responsibility (EPR)	Recycling and reuse	Regional Trend
Asia (7 countries)	6	7	5	6	4	**80%**
Europe (8 countries)	7	6	6	8	7	**85%**
Latin America (4 countries)	3	2	2	4	1	**60%**
Middle East (7 countries)	5	5	4	7	4	**71%**
North America (3 countries)	2	2	2	3	1	**67%**
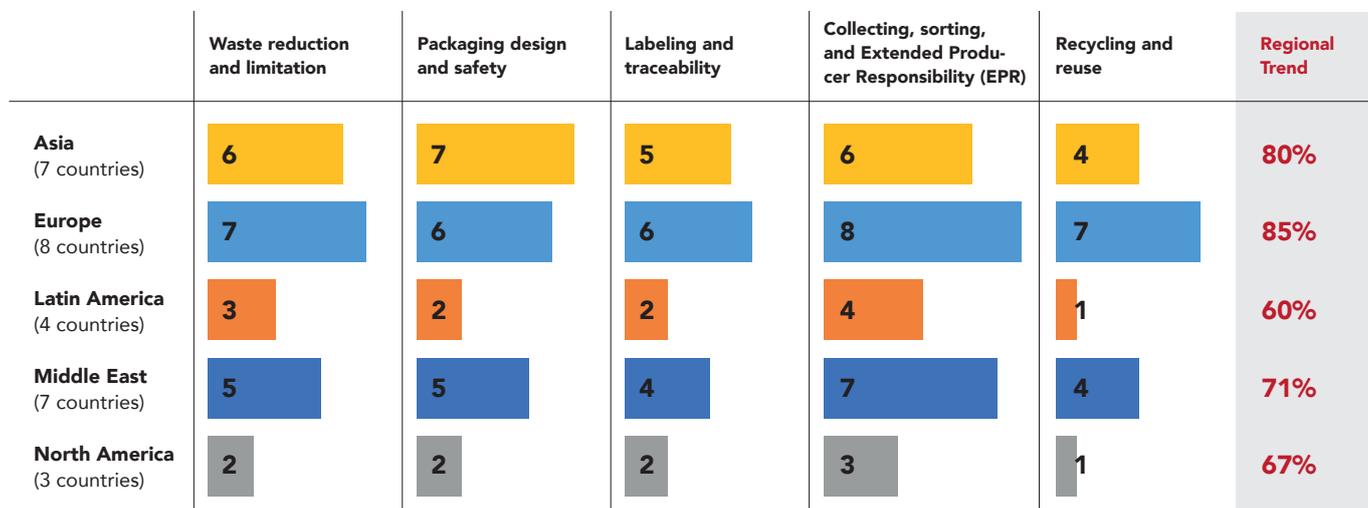
Figure 2: Regional trending indicator

Figure 3 shows the distribution of these measures amongst countries. Almost all countries (e.g., 28 out of 30 countries) present measures regarding waste management control (e.g., collecting and sorting), but only 12 have Extended Producer Responsibility (EPR) schemes [37]. Therefore, there is a growing concern about waste control, and most of these measures will create targets for reusable, recyclable and compostable products. However, as mentioned previously, only some plastic waste will be recycled. Recycling and reusing packing are the least adopted measure.

28	24	22	19	18
Collecting, sorting, and Extended Producer Responsibility (EPR)	Waste reduciton and limitation	Packaging design and safety	Labeling and traceability	Recycling and reuse

Figure 3: Number of countries per type of adopted measure

Most regulations across selected countries cover packaging specifications, such as composition, size, and weight. Some of them cover packaging attributes, such as recyclability and biodegradability. Regarding primary packing, regulatory measures mainly address labelling and traceability to promote customer empowerment [37]. There was no indication of reusing or package-less strategies in the measures.

Taxes can be essential in reducing plastic waste and is the leading and preferred regulatory vehicle for change in the selected countries to increase sustainability in the packaging industry [31]. These tend to be introduced at a national level, and there are often significant differences in the approaches taken. Using the tax system to change behaviour is often a carrot-and-stick approach. Regarding environmental taxes, the stick is taxing undesirable behaviour (e.g., plastic waste) or the extraction of resources (e.g., fossil feedstock). The carrot usually forms incentives, such as government subsidies for establishing return schemes. Such incentives can be made through the tax system, lump-sum payments, or rebates because higher earners typically benefit more from tax reliefs than lower earners [39]. There may be incentives to invest in research and development of package-less products and processes, such as Algramo, MIWA, RePack, Loop, and other experiences [20].

It is essential to shift taxes from labour to resources, such as taxes on fossil feedstock, virgin materials, and plastic pollution. However, taxation must be addressed as a toolkit, not a goal. Hence, it requires knowing the goal trying to reach before deciding what tax tools to use [39]. For example, improving circularity can adopt low value-added tax (VAT) rates for sustainable products and services. Allowing consumers to choose between two otherwise similar goods or services, even a moderate VAT difference, can effectively nudge consumers to purchase the circular option rather than the linear one [39].

B. Regulations in South American Countries

Peru produces nearly 20 thousand tonnes of waste daily, of which nearly 35% is recyclable. Its solid waste management legislation established the following waste hierarchy: avoidance, reuse, recycling, recovery, and disposal, based on principles such as the circular economy, recovery, and recycling of waste, EPR, shared responsibility and protection for the environment and human health.

In 2018, Peruvian government passed a law regulating the manufacture, import, distribution, and consumption of single-use plastics, such as bags, straws, and other non-reusable plastics [40]. However, it does not mention reusing or package-less strategies.

Looking towards Circular Economy, Peru government signed with the private sector the Clean Production Agreement (CPAs) to foster businesses to eliminate, reuse, and recycle plastic packaging and to promote innovation in packaging or product design.

Colombia produces approximately 32 thousand tonnes of waste per day, or 0.68 kg/capita per day. Over one-third of this volume is generated in the big cities Bogotá, Cali, Medellín and Barranquilla. In 2016, Colombia set a legislation establishing the obligation to formulate, implement and keep updated a Program of Rational Use of Plastic Bags. Two years later, in 2018, the country approved a legislation regulating the environmental management of paper, cardboard, plastic, glass and metal packaging waste. Producers are obliged to formulate, implement, and keep updated an Environmental Management Plan for Packaging Waste. The principle of EPR is strengthened through the collection and process of at least 10% of the products placed on the market.

Government, academia, public institutions, non-governmental organizations, and productive sectors are collaborating to create the right conditions to implement public policies, regulations, and technical instruments. In this sense, in 2021, the National Plan for the Sustainable Management of Single-Use Plastics was launched, incorporating eco-design in the manufacture of plastic products based on life-cycle analysis, utilization processes, strengthening of recycling production chains and responsible consumption. The lines of action for single-use plastics are the gradual substitution of single-use product materials, the strengthening of the recycling chain, the promotion of reusable products in commercial establishments, among others [41].

In Chile, around 2 million tonnes of packaging waste are generated annually, comprising five materials cardboard, metal, paper, plastic, and glass. The majority end up in landfills and approximately 27% are recycled. In 2018 the Chilean government, working towards plastic reduction, approved a law banning the delivery of plastic bags in retail establishments [22].

In 2021, the country set a legislation limiting the delivery of single-use plastic products, establishing conditions on the composition of plastic bottles to improve their return-ability, encouraging the reuse and recycling of plastics by the food and beverage industry, including restaurants, coffee shops, supermarkets, hotels, bars, and other similar establishments. Under this legislation, establishments that fail to comply with the Law will be subject to financial penalties such as fines.

In the same year, another legislation established collection and recovery targets and other associated obligations related to containers and packaging, like EPR applicable to producers, responsible for the introduction of packaged consumer goods into the national market. Recovery and recollection of plastic packaging targets were set to increase gradually each year, ranging from 3% by 2023 achieving 45% by 2034 in households, and 13% in other establishments different than households, achieving 55% [41].

Besides regulations and laws, the country adopted non–binding policies and voluntary initiatives for instance [41]:
- Roadmap for a Circular Chile by 2040, aiming to accelerate a circular economy transition, establishing recyclability goals for municipal solid waste, including plastics, with a 65% goal by 2040.
- Chilean Plastic Pact, launched in 2019, consisting of a public private partnership to rethink and redesign the future of plastics, through the establishment of different goals, by 2025: eliminate unnecessary single-use plastic packaging through redesign and innovation, ensure 100% of plastic packaging is reusable, recyclable, or

compostable, ensure 1/3 of all plastic packaging is effectively reused, recycled, or composted, incorporate 25% recycled content into plastic packaging.

- National Strategy for Marine Waste and Microplastics Management, launched in 2021, with the objective for a sustainable plastic waste management throughout their life cycle, preventing and reducing the discharge of plastic waste in aquatic ecosystems and reducing environmental impacts of certain activities.

In Brazil, around 93 million tonnes of waste were generated in 2020, a substantial amount, considering the country's population of over 200 million people. Out of this total, 67,6 tonnes were collected, but only 1.66% were recycled [42].

Data from the Brazilian Packaging Association points that Brazil reached a gross value around USD 21 billion in packaging production in 2021, a growth of 31,1% over the previous year [43].

Brazil produced 6.67 million tonnes of plastic goods. Out of this volume, 44% consisted of single-use plastics, of which 87% packaging waste and 13% disposable products [44]. Regarding plastic waste, a total of 3.8 million tonnes of post-consumer plastic waste was generated in the country in 2020, which includes locally produced and imported goods. The amount recycled in the same period was 1 million tonne or 26% [45].

The Brazilian legislation on Solid Waste Management established a waste management hierarchy, with the highest priority given to waste prevention and reuse, followed by waste recycling, recovery, treatment, and environmentally sound waste disposal. Waste management is based on the following principles recovery, reuse, and recycling of waste, eco-efficiency, EPR, shared responsibility for the product life cycle, reverse logistics system for specific sectors. Among those sectors, the General Packaging National Sectorial Agreement signed in 2015 sets a 22% target for general packaging reverse logistics.

Summing up, several initiatives have been introduced to tackle the plastic recycling, while effective measures for plastic waste prevention and/or reuse are hardly considered or implemented by government and the private sector in the above countries. It was possible to notice that those countries have generally prioritized the selective collection and the recycling of plastic waste, focusing on diversion from landfill instead of waste prevention (e.g., package-less and reuse strategies).

From a regulatory perspective, even though Latin American countries have established a waste management hierarchy, that gives higher priority to waste prevention and reuse, the emphasis so far has been on plastic recycling and actions banning the use of single-use plastic. As noticed, usually, policies do not consider the environmental and societal benefits of prevention and reuse. Besides, effective measures for prevention and reuse were hardly introduced.

C. Current trends that will shape regulations in the years to come

Five key trends will shape the packaging industry and related investable themes over the next few years [36]:
- First, consumers are highly aware of sustainability issues (e.g., ocean plastic pollution and microplastics), with their concerns accelerating and growing, but they need clarification.
- Second, in response to public outcry, governments are designing increasingly ambitious regulations for packaging and plastic waste (e.g., China Waste Ban [46] and the Basel Convention Plastic Waste Amendments), influencing beyond their national borders. This, aligned with accelerating consumer sentiment, creates a complex landscape for corporations to navigate and plan reliably.
- Third, across regions, there are critical gaps around waste collection, recycling systems, and technology, limiting significant changes in the packaging value chain over the near term. It takes time to alter a production line, around

two or more years, for a company and its suppliers to adapt to new systems. In addition, a package-less and reuse policy requires a clear definition and criteria for what is reusable and non-reusable, which remains unclear at the policy level.

- Fourth, leading fast-moving consumer goods companies and retailers remain committed to transforming their portfolios (e.g., there are initiatives from Nestlé, Unilever, and Danone, among others), but large-scale market adoption of innovations (e.g., Algramo, MIWA, RePack, and Loop) remains slow and niche oriented.
- Lastly, until further notice, plastics are here to stay, with an emerging green premium on recycled raw material. However, there are technical limits to circularity. The current recycling chain for plastic packaging in the Netherlands is one of the more advanced systems globally, it is still far from an optimal material circularity, and its recycling system is still highly dependent on fossil feedstock [47].

These trends open investable opportunities. One of them is the package-less and reuse strategies. For example, the rise of e-commerce specifically can lead to an increase in reusable and returnable packaging (e.g., RePack), pivoting from the primarily one-way flow of packaging currently in use to a circular model [20, 36]. Even though package-less and reuse strategies are a proven concept historically, scalability is yet to be established for many of these models, especially in international trade, where these strategies are in their infancy.

The time for package-less and reuse strategies is now. These strategies represent an untapped business potential. Replacing just 20% of single-use plastic in packaging with reusable alternatives offers a USD 10 billion opportunity in business. Moreover, reuse models can benefit users and companies significantly, including brand loyalty and cost savings [20].

Moving from single-use to package-less and reuse not only helps eliminate plastic waste but also, if done well, offers significant reductions in greenhouse gas emissions[11] [21] and other negative externalities, such as microplastics and marine pollution [20].

D. Non-tariff measures (NTMs)

A strong and harmonised market is key to fostering the investments and innovation needed to drive the circular economy, especially for package-less and reuse strategies. Despite governments decreasing the heterogeneity of measures, the lack of an aligned terminology creates non-tariff measures (NTMs) for trade.

The fragmentation of terminology, for example, the term reuse, can have different meanings. When associated with the overlap of different rules covering a similar scope create administrative burden and barriers to the free movement of goods.

Countries use NTMs as an economic strategy to control the level of trade they conduct with other economies. When deciding on the NTMs to implement in international trade, countries base the barriers on the availability of goods and services for import and export and the existing political alliances with other trade partners. Countries may elect to release other trade partners from being subjected to additional taxes on imported or exported goods and create NTMs with a different monetary effect. NTMs may take the following forms [48]:

- Protectionist barriers are designed to protect specific sectors of domestic markets. The restrictions make it difficult for other countries to compete favourably with locally produced goods and services. The barriers may take the form of licensing requirements, allocation of quotas, antidumping duties, import deposits, etc.
- Assistive policies protect domestic companies and enterprises but do not directly restrict trade with other countries. They implement actions that inhibit free trade with other countries, such as custom procedures, packaging and labelling requirements, technical standards

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[11] In the Democratic Republic of the Congo, replacing single-use expanded polystyrene cup for a glass cup reduced global warming impact by Factor 10 in just one year of use. In Zambia, replacing single-use high-density polyethylene bags for single-use paper bags reduced global warming by Factor 5.

and norms, and sanitary standards. In addition, governments can help domestic companies by providing subsidies and bailouts so local products can be competitive in the domestic and international markets.

- Non-protectionist policies are not designed to restrict the import or export of goods and services directly, but the overall outcomes may lead to free trade restrictions. These policies primarily aim to protect the health and safety of people and animals while maintaining the environment's integrity and assuring non-discriminatory practice. One example of non-protectionist policies includes import bans.

Table 2 summarises examples of NTMs, which are an avenue for influencing trade [48].

Type	Description	Potential application	Classification
License	A license system allows authorised companies to import specific commodities included in the list of licensed goods.	Requiring a license to import products based on single-use plastics.	Protectionist barrier
Quotas	Quotas are quantitative restrictions imposed on imports and exports of a specific product for a specified period. Countries use quotas as direct forms of administrative regulation. It caps the number of goods that can be imported or exported at any given time.	Imposing a limit for single-use product imports. However, it cease to exist when applied also to local companies.	Protectionist barrier
Embargoes	Embargoes are total bans of trade on specific commodities and may be imposed on imports or exports of goods supplied to or from particular countries. They are considered legal trade barriers, and governments may implement such measures to achieve specific economic and political goals.	Banning single-use plastics.	Non-protectionist policy
Import deposit	A deposit required by a government of a specific sum, usually corresponding to a certain percentage of the value of the imported products. It is held without interest, sometimes for many months – from when an order is placed until after the import transaction is completed – and represents actual costs to importers.	This deposit is held by the government could be used to create a guarantee fund for investment in local package-less and reuse strategies	Protectionist barrier
Standard	Technical regulations, standards and conformity assessment procedures have different policy objectives, including environmental protection, human health and safety, and prevention of deceptive practices.	Defining a cap for virgin material use in the composition of a product.	Assistive policy

Table 2: NTMs examples and potential applications

NTMs can have a significant impact on package-less and reuse strategies. They can affect price and product availability. Another important finding is that the adoption of NTMs has risen in the last decade, particularly in developed countries [48].

4. THE ROLE OF TRADE AND TRADE POLICIES FOR LESS PACKAGING AND SINGLE-USE PLASTIC ITEMS

Governments and businesses must consider political risks and ways to anticipate, understand and mitigate them in international trade. Global companies require rigorous, reliable, and highly respected predictive analysis of key emerging markets and critical global themes. The World Trade Organisation (WTO) has benefited its members by providing a stable and predictable trading environment, allowing for a massive expansion of international trade while providing a framework for settling trade disputes through adjudication since its establishment in 1995.

The circular economy's solutions (i.e., package-less and reuse strategies) remain niche and linear based on "take-make-use-discard" approaches and continue dominating business-as-usual trade activities. Lack of circularity results from the perception that it is more cost-effective to produce goods from virgin resources and then use and discard them instead of increasing their durability at their highest utility rate. Recently, governments worldwide are already implementing a broad range of circular economy regulations and resource efficiency initiatives that can impact trade and trade-related policies and measures.

The WTO collects, assesses, and disseminates information about members' trade policies. It does so through three mechanisms: the notifications that members are required to make about their laws and policies, the reviews conducted by the Trade Policy Review Body and the monitoring activities. These notifications can be arrayed along a spectrum of Secretariat activism and analysis, such that the notifications are principally the responsibility of the members themselves and are strictly factual and narrowly focused; the trade policy reviews (TPRs) are comprehensive investigations conducted cooperatively by the members and the WTO Secretariat and involve some degree of a judgment of the members' policies. The monitoring activities are run cooperatively with other international organisations and aim to identify any "backsliding" by members [49].

These circular economy regulations and resource efficiency initiatives can reach beyond national borders. For example, an analysis of the WTO notifications between 2009 and 2017 identified some 370 measures from 65 WTO members referring to activities related to the circular economy [38]. Another study mapping regulatory development across 30 countries covered the last three years and found 344 measures [38].

Government support is the most common measure being notified to the WTO regarding the circular economy (i.e., assistive policies). They comprise grants and direct payments, preferential loans and loan guarantees, and income and price support. Figure 4 presents measures notified to the WTO between 2009 and 2017 related to the circular economy [38].

54%
Recycling

22%
Material substitution

16%
Reuse and repair

4%
Waste-to-energy

4%
Refurbishment and remanufacturing
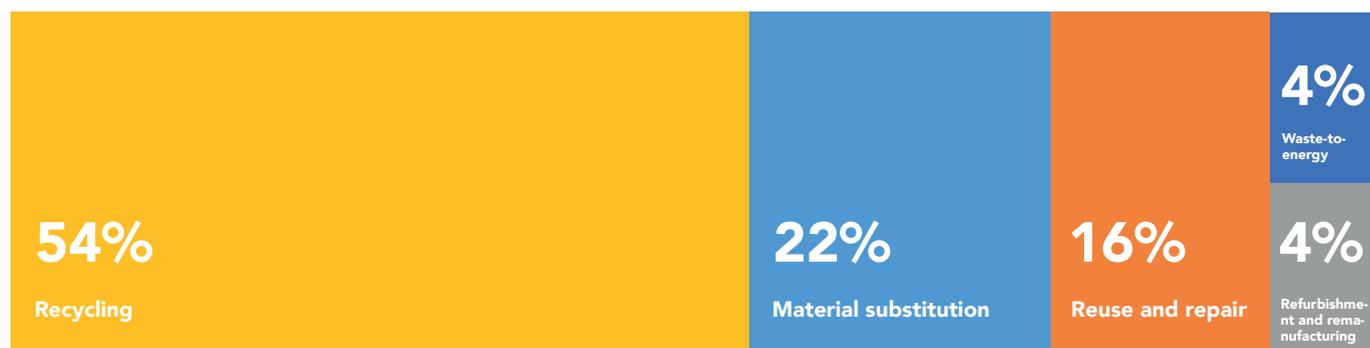
Figure 4: Measures related to the circular economy notified to the WTO (2009-2017)

Updating the analysis and targeting only packaging and reuse strategies, WTO notifications between 2009 and 2022 show a total of 212 notifications and 48 measures from 31 WTO members, not including the European Union (EU), with 27 countries, and the West African Economic and Monetary Union (UEMOA), with eight countries [50].

Figure 5 presents measures notified to the WTO between 2009 and 2022 related to packaging and reuse strategies [40]. It shows in that measures related to labelling (48%) represent almost half of all relevant measures. Measures related to waste control, recycling and return schemes represent 19%, followed by measures related to standards with 17% and plastic substitution, mostly with bioplastics, with 15%. Only 2% of the measures mention reuse, but it should be considered within the waste control category because the relevant information focuses primarily on recycling. Similarly to the previous analysis [38], most notified measures focus on downstream segments of the value chain, with only standards and plastic substitutes covering design and other upstream segments.

48% Labeling

19% Waste Control / Recycling / Return Scheme

17% Standards

14% Plastic substitution
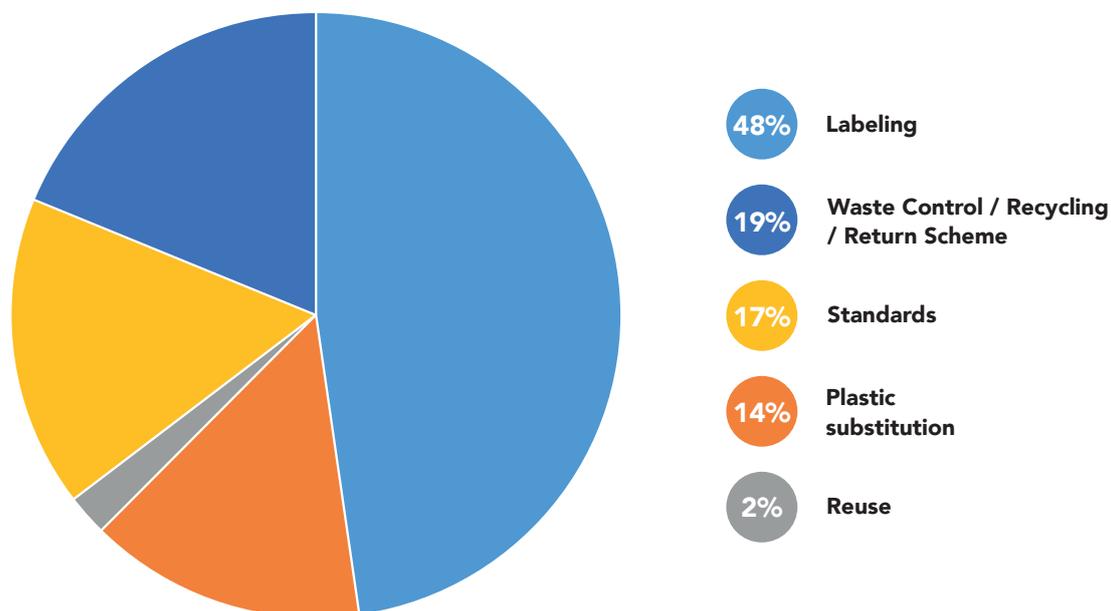
2% Reuse

Figure 5: Measures related to packaging and reuse strategies notified to the WTO (2009-2022)

Around 32% of the notified measures relate to import tariffs, tax concessions, and internal taxes. Since no legally binding agreement sets out the targets for tariff reductions, the most frequently notified measure type is technical regulations, standards, and conformity assessment procedures, with 23% submitted under the Agreement on Technical Barriers to Trade. It is followed by trade bans and licensing requirements with 18% of all measures introduced under the Agreement on Import Licensing Procedures. Government support measures account for 9%, and these notifications were submitted under the Agreement on Subsidies and Countervailing Measures. Government procurement corresponds to 5% and lies under the Agreement on Government Procurement. Not specified measures correspond to 14% and are spread out under the Decision on Notification Procedures for Quantitative Restrictions and the Agreement of Sanitary and Phytosanitary Measures [50]. Regarding geographical distributions, Europe leads the number of relevant notifications, especially as an EU representative pushing plastic substitution and recycling (see Figure 6). It is followed by China and India, going primarily for waste control.
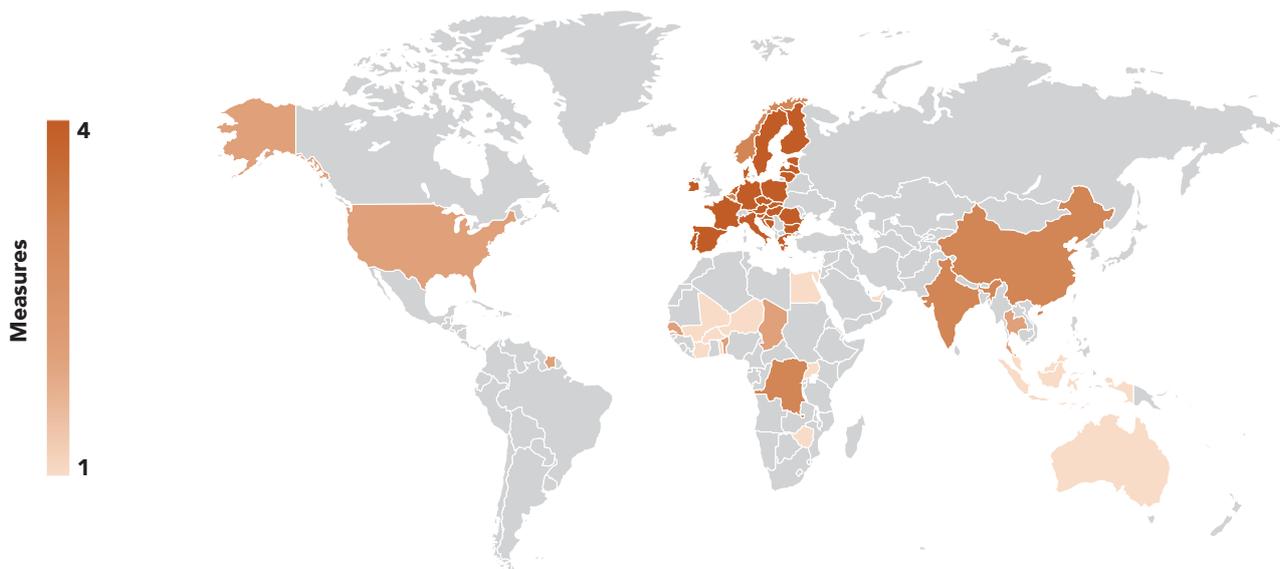
The EU has increased pressure to reduce packaging waste dramatically, and regulators are responding. As countries continue putting in place trade policies and measures relevant to minimise packaging waste and improving reuse strategies, it becomes increasingly important to ensure that trade policies and measures are not hindering and reducing their competitiveness. For example, trade restrictions affecting metal recycling tend to lower metal scrap prices in the restricting country, creating a disincentive for collecting it [51]. In addition, export restrictions can result in depressed trade flows and higher prices for secondary materials making material substitution less competitive [38]. The same can happen to reuse strategies designed to change B2B shipping and logistics to reusable packaging. Experience at the WTO provides valuable insights into how trade interacts with strategies attempting to reduce plastic waste. Improving cooperation and coordination among members allow WTO to ensure the adaptation of the global trade system to a changing regulatory landscape and contribute to plastic waste minimisation. The circular economy is not a novelty for WTO negotiating initiatives [38]; however, improving or changing B2B shipping and logistics to reusable packaging is. Hence, these disruptive initiatives require concrete steps that WTO members can take collectively to facilitate trade in critical areas of global supply chains.

5. THE WAY FORWARD

Policymakers worldwide are starting to acknowledge the urgent need for policy intervention to solve the plastic waste crisis. However, designing a policy framework that leads to impactful interventions without resistance is challenging, especially in international trade. Policy measures for plastic waste prevention and reuse should consider the plastics lifecycle, rethink the plastic packing supply chain, encouraging the eco-design of reusable plastic packaging within the reuse chain. This will require collaboration and sharing of learnings among stakeholders, particularly policymaker's engagement to create right enabling and effective conditions, strengthening domestic policies and fostering international cooperation. Plastic waste can be reduced in three ways; by reducing plastic use (e.g., plastic substitutes), changing B2B shipping and logistics to reusable packaging, and im-

proving package-less retailing options. These strategies have advantages and disadvantages regarding the likelihood of implementing impactful policies.

As interest in reducing plastic waste grows, it becomes increasingly important to ensure that trade policies minimise packaging waste and improve reuse strategies. Not doing so would be a missed opportunity, given the unique role of trade in scaling up solutions worldwide. Moreover, disregarding the need to align trade policies with waste pollution reduction risks reinforcing linear approaches over circularity. As a result, countries worldwide may forego the potential benefits of new opportunities to diversify trade and move towards a safe and efficient global circular economy, including higher productivity.

The well-known challenges of implementing a circular economy, such as technological limitations and a lack of waste infrastructure or the difference between consumer awareness and consumer behaviour, a uniform understanding of the reduction, reuse and recycling strategies are missing, which is also apparent in situations where common definitions are explicitly assumed. This absence of definitional precision, in combination with specific weaknesses in the formulation of targets, leads to a problem in which companies talk about a circular economy while implementing a recycling economy [52].

There is no denying that immediate and substantially more radical change in the present method of production and consumption of plastic, including a consistent avoidance of single-use packaging, is needed [52, 53]. Consequently, it must be ensured that stricter targets for reduction and reuse are formulated, given the technical limitation of recycling [53]. In addition, the commitments must be strictly evaluated based on unequivocal definitions [52], and governments should foster self-regulation by companies through self-commitments, guaranteeing these respective commitments contain ambitious targets. One important step to solve the lack of definitions is the negotiations ongoing at the United Nations Environment Assembly (UNEA), where many member states are stressing the importance of clarifying concepts.

The transition to package-less and reuse systems requires significant changes in consumer behaviour.

However, private-sector practices, the existing retailing infrastructure, and a wide range of governmental incentive structures and policies are still needed. Governments play an integral role in enabling, building and managing infrastructure, which is critical to establishing reuse systems that are economically and environmentally superior to single-use systems. These infrastructures are [8]:
- Physical infrastructure includes the various back-end functions needed for recapturing the value of packaging-less and reuse systems through its collection, cleaning, and redistribution into the forward supply chain.
- Soft infrastructure: it refers to the various means by which governments provide a regulatory platform for packaging-less and reuse systems in areas such as data pooling, container labelling, deposit-scheme management, communications, and education. It includes, for example, subsidies, procurement and other NTMs.

Besides the above measures, transition to package-less and reuse systems also brings significant changes to the supply chain, for instance:
- The bulk sales format demands a review of the storage methods at the distribution centres, where equipment is needed for loading and unloading at the distribution centres and at the stores,
- The process of stocking at supermarket counters, ensuring compliance with health regulations.
- In the case of refill stations, the equipment's must be considered, sometimes, heavy, and large machines.
- Rethinking the stages of the supply chain, this is crucial for reuse strategies become scalable. In this sense, circular economy can help companies to rethink their supply chains and business models.

The supply chain should also be able to answer demands that may impact customers:
- How many refill machines are needed to avoid

queues at the supermarkets with people waiting to fill the bottles?

- How many extra staff will supermarkets need to deal with any problems with refill machines, or to carry out bulk sales?
- Which retailers do have enough available shop space to have several refill machines?

Packaging-less and reuse strategies can be a trade differentiator. In short, a source of competitive advantage. Such prowess does not change the fact that the demand for packaging is derived from the need for the contained product. However, standardising reusable packaging can underplay its complexities.

Standardisation often is targeted at tertiary packaging. However, primary and secondary packaging also provide opportunities. The necessary recognition for policymakers is increasing. Standardisation, therefore, is not merely a process of eliminating existing variety. On the contrary, it should also be proactive and standard fare in designing and redesigning bulk containers, for example. The smaller the differences, the greater the opportunity to accommodate multiple reuse applications.

A. Key messages

- Focusing on diversion from landfill meant a focus primarily on recycling. In turn, the emphasis on recycling enabled a thriving and ever-expanding environment for disposable products.
- Developing countries are no strangers to reusing models, and uptake of such systems can be accelerated with policies incentivising their adoption while mandating a reduction of plastic production and use.
- The absence of definitional precision, in combination with specific weaknesses in the formulation of targets, leads to a problem in which companies talk about a circular economy while implementing a recycling economy.
- Companies prioritise recyclable packaging over package-less or reusable products, especially in the food sector.
- Companies must develop capabilities to understand regulatory measures, scope, application, and implications for their business and customers regarding plastic pollution. They must keep track of changes and remain compliant to thrive.
- Package-less and reuse systems must be designed with the local context in mind. They must guarantee affordability and accessibility for low-income communities.
- Package-less and reuse strategies need to be scalable. Thus, reuse models must consider consumer behaviour and address their needs.
- The reuse strategy promotes and encourages the sale of reusable containers, especially non-plastic containers, avoiding the problems associated with disposable plastics substitutes.
- Reuse strategies should have the potential to create jobs al local level. Therefore, the informal waste sector should be involved in the process of developing an efficient and well-managed packaging reuse systems, ensuring a fair and inclusive transition
- Reuse strategies should decrease public administration spending on waste management.
- Standardisation of reusing packaging in B2B (i.e., pallets, crates, dunnage, drums, intermediate bulk containers, and big bags) allows for automatisation and cost reduction.
- Products that are trade internationally should be designed to be reused and to use less raw materials in its life cycle. In this sense, eco-design and LCA are tools that can assess raw materials use and evaluate product environmental impacts.

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