Legal Framework Study of Extended Producer Responsibility

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List of abbreviations

CPI	Corruption Perception Index
EPR	Extended Producer Responsibility
GPL	Global Poverty Line
MRF	Material Recycling Facility
NPL	National Poverty Line
OECD	Organization for Economic Co-operation and Development
PR	Global Producer Responsibility
PRO	Producer Responsibility Organization (sometimes referred to as “system operator”)

1 Purpose and organization of the study

The world's oceans are drowning in plastic. Each year, an estimated 4.8 to 12.7 metric tons of plastic waste flows into the seas, with serious negative consequences for marine life.

To tackle this crisis, the WWF International Network has set a goal of "No Plastic in Nature by 2030." That means stopping the flow of plastics from entering the natural world by eliminating unnecessary plastic items; doubling reuse, recycling, and recovery efforts; and ensuring the remaining plastic is sourced responsibly. WWF has identified Extended Producer Responsibility (EPR) schemes as a critical policy tool with a successful track record that can hold manufacturers accountable for their plastic products and plastic packaging's end-of-life impact. Adhering to the "polluter-pays-principle," the EPR also encourages holistic eco-design practices in the business sector. Thus, the WWF Network EPR Project seeks to facilitate partnerships among various stakeholders and share best practices globally. It hopes to promote and enhance the adoption of EPR schemes and reduce the amount of plastic that escapes into nature.

This report, produced by cyclos GmbH, offers policy and business decision-makers the opportunity to acquire a solid knowledge base on EPR schemes, including details on key topics. It describes models of producer responsibility organizations, the typical roles and responsibilities of stakeholders, and provides the characteristics of high-performing systems as well as less effective ones. It also gives detailed country-level assessments of the current EPR status for managing packaging waste, with a focus on Southeast Asia and South America, along with recommendations for taking the next steps toward a successful EPR implementation.

2 Packaging — a global challenge

In recent years, the variety and diversity of purchased products worldwide have continuously increased. No longer limited to domestic markets, the trade of these products now extends around the globe. This scale of production requires significant amounts of resources, and poor waste management practices lead to large amounts of littering. The main and most damaging share of this litter consists of plastic items. Plastic litter has become a ubiquitous fact of life, with waste items turning up on remote shores [1], in polar waters [2] and even in the ocean depths [3] – places remote from any human settlement. Humans urgently need to make a transformational change on all levels to face this challenge: from design to production to consumption, this change must focus on the long-term use of resources and our infrastructure. In most cases, only the informal sector is handling the collection and recycling of waste. Valuable recyclables are collected in the streets, from containers, and from dumpsites and landfills.

Most problems are caused by packaging – especially plastic packaging. Food packaging represents a particular challenge, due to the individual packaging solutions used and their associated functionality, such as the need for storing and transporting food over long distances. Correspondingly, the materials used for packaging, and the ways different solutions combine them, are just as diverse.

While private industries produce and retail goods, and thus organize and finance these commodities, the waste management and disposal of the packaging of these goods typically falls to public agencies. Waste management requires funding and a sound organization. However, in many regions both requirements are inadequately met, since waste management and disposal are often insufficiently organized and severely underfunded, especially in low- and middle-income countries. Consequently, to deal effectively with the world's growing waste management challenge, it makes sense to examine the concept of Extended Producer Responsibility (EPR).

Fortunately, a willingness to act on this crucial issue is growing among stakeholders, who seek to change the current situation. Industry, as well as governments and public authorities, agree on the need for action. The sticking point is the lack of practicable ideas and concrete measures and actions.

3 Extended Producer Responsibility as part of sustainable waste management

Overall waste quantities have constantly risen in many low and middle-income countries worldwide – especially for recyclable waste fractions such as paper, plastics and metals. Thus, demand for a properly executed and sustainable waste management strategy to re-use the recyclable shares of cast-off products and packaging effectively while reducing the environmental and human health threats they pose has grown as well. In many countries, the informal sector plays an active and important role in waste management, which is often is limited by the state or municipality to moving non-recyclable waste and providing landfill sites. With the goal of recycling, only the informal sector typically separates and manages individual waste fractions. These are people who support themselves – outside formal employment – through the collection, sorting, and recycling of waste, as well as its trade. However, the range of actions covered by the informal sector typically happens only in areas with the following general conditions:

- Easy access to materials,
- easy handling of transport and if necessary, storage,
- market for collected materials,
- buyers in close proximity, and
- revenue expectations for materials.

In addition to high risk levels and uncertainty for the people involved, the possibilities of developing a sustainable waste management strategy remain severely limited. Sustainable waste management must also meet the following criteria as a minimum:

- Nationwide collection systems,
- the development of recycling infrastructure,
- recovery at a highly beneficial level,
- environmentally compatible disposal,
- service obligations of the market participants, and
- training, consulting and communication activities.

Achieving these goals requires a robust organization and reliable financing. A sustainable waste management system must regulate responsibilities without ambiguity, and clearly differentiate two areas in general:

- Waste linked directly to the companies that produce packaging and introduce products into the market. These players can assume responsibility for its disposal, which includes packaging, electronic devices, batteries, automobiles, and so forth.
- Waste for which no producer has direct disposal responsibility, which includes residual waste, bulk waste, and organic waste (compost).

The foundations of any sustainable waste management include a robust organization and reliable financing sources. Generally, the organization and financing of disposal falls into two categories: First, the disposal of the waste that is covered by the EPR system (explained in detail in the next chapter), and second, the disposal of waste within the scope of the municipalities or public agencies. The latter comprises all waste for which the disposal responsibility cannot be assigned to any producer, particularly residual waste, bulky waste, and organic waste (compost).

The following table provides an overview of the organizational design and sustainable financing for waste management. A distinction is made between recyclables, for which an EPR system can be set up, and municipal waste, for which it is not possible to assign a responsible producer and must therefore be included in public waste management structures.

Table 1: Overview of a sustainable organization and financing of waste management according to current best practice

	(A) Recyclables, e.g. packaging, electronical equipment	(B) Organic waste	(C) Harmful substances	(D) Residual waste (incl. bulky waste)
(1) Current best practice in regard to handling the different fractions	Collection and recycling/recovery of material fractions. Create a reliable market for secondary raw materials	Collection and composting of organic waste	Collection, safe transport, safe storage, and final disposal	Use of recyclable materials and energies, treatment (biological-mechanical or thermal) for environmentally sound disposal of the residues; no untreated landfill
(2) Steps for achieving the goals	Establish a structure for collection, constructing sorting and recycling plants, environmental education, and public information	Separate collection of organic waste; environmental education and public information	Establish a structure for collection	Collection of residual waste; construction of waste treatment plants; environmental education and public information
(3) Important elements of the waste management concept	Establish collection sites for separate collection of recyclables (e.g., recycling centers, bring banks or curbside collection); recyclables are transported to processing and treatment plants, the recycling economy markets the recyclables; communication and education	Separate collection of organic waste for composting; composting plants and home composting; commercialization of the compost; communication and education	Collection points, separate collection; prevention of harmful substances a part of the municipal waste as they cause problems in the waste treatment	Collection of residual waste at the household and company levels; treatment plants may be needed depending on the demand: these are, e.g., mechanical-biological plants, treatment plants for the cement industry and landfill for the treated residues
(4) Liable to pay costs	Those who put packaged goods on the market (and electrical appliances and batteries) in the respective country (producers in the country and importers) bear the costs of collection, treatment, and recycling	The costs of composting in composting plants can be partially covered by revenues; remaining must be paid via fees	If possible, financing should also be covered by the companies introducing the substances on the market through an EPR system (e.g., batteries); otherwise, the costs will be covered by (municipal) fees	Costs for collection, treatment, landfill, administration, and logistics are covered by (municipal) fees. Citizens and the companies that produce waste bear the costs
(5) Responsibility for covering the	Investments in plants and infrastructure in all areas (A, B, C, D) should be supported through grant funds and subsidies; however, it is important for a sustainable waste management to ensure that ongoing costs are covered on a long-term basis in all areas, thus securing long-term			

disposal costs	financing (see (4)). This requires a reliable organizational structure, e.g., in the form of a special purpose association and EPR systems

Individual countries are actively beginning to address the need for better waste management systems. Local decision-makers and disposal companies are engaging in discussions with international engineering firms and mechanical engineering and waste-disposal companies. The objectives: set-up structures and strengthen local expertise to ensure sustainable operations. Despite ongoing challenges, there are already reasons for optimism they will be successful:

- Decision-makers and officials have recognized there is a problem and are pursuing tailored solutions that reflect their national and local context;
- many countries have mandated environment ministries and specialized authorities to work on waste management and staffed them with qualified personnel;
- "waste management" is now being taught as a course in certain universities;
- most cities and municipalities have increased their collection of waste in recent years;
- a private sector for waste management services has started to develop in most countries.

Table 2: Challenges and opportunities for waste management in middle- and low-income countries

Challenges for waste management	Opportunities for waste management
Lack of stable political structures also affecting the waste management structures	Establishment of a sound legal basis and a sound controlling system
Regions lack suitable administrative structures, definitions of responsibilities, and resources	Acknowledgement of the challenges by decision makers and officials
Insufficient funding	Willingness to develop new systems and come up with strategies to finance and organize them
Challenging political dynamics	Willingness in the private sector to assume more financial and technical responsibility
Deficiency in practical experience and qualified personnel	Experience gathered from previous projects
Lack of strategic planning, administrative communication, and definition of political goals	Establishment of specialist authorities for waste management
Lack of awareness of professional opportunities in waste management	Waste management now an option at universities
Underdeveloped capacity to handle the recycling of plastics and other waste. Lack of processing and recovery facilities	Expansion of collection and transport in cities, readiness to employ suitable systems for separated collection

Because the focus of this report concerns EPR schemes and the waste treatment of recyclables in such a system, the next chapter will provide a detailed introduction to this approach.

4 Extended Producer Responsibility

Many European countries only allow packaged goods to be introduced onto the market if the producer or importer also pays for the later collection and disposal of their packaging waste. If such a producer's

responsibility is strictly implemented in other countries as well, producers and importers would only be allowed to place their packaged goods in countries with specific assurances the packaging will be collected after it has become waste, followed by the proper recycling or disposal of the packaging waste.

This principle is named “extended producer responsibility” (EPR).

4.1 General information about extended producer responsibility (EPR)

The principle of the “global producer responsibility” (PR) defines the handling and the usage of a good while the “extended producer responsibility” (EPR) takes a broader approach. In comparison,

- Global producer responsibility (PR) means that producers / importers are responsible for their products regarding aspects of safety, health, and environmental impacts.
- Extended producer responsibility (EPR) means they are also responsible for their products until the end-of-life stage, when their packaging and products have turned into waste, covering the tasks of collecting, sorting, and recycling.

Germany developed the concept of an extended producer responsibility in the late 1980s with a focus on packaging and, since then, it has been introduced in almost all European countries and some non-European nations as well. EPR is an environmental-political approach based on the “polluter-pays” principle: Those who bring packaging into a market in a country must assume full responsibility for that packaging until the end of its life cycle.

The basics of EPR are almost the same in every country:

- Every obligated company pays a fee when introducing a packaged good in a market.
- The fees go toward the collection and further processing of the packaging waste.
- Ensuring the collection, sorting, recycling, or energy recovery of packaging waste remains the responsibility of the obligated companies.

EPR involves producers in the management and financing of packaging waste and gives them the obligation to assume responsibility for their waste.

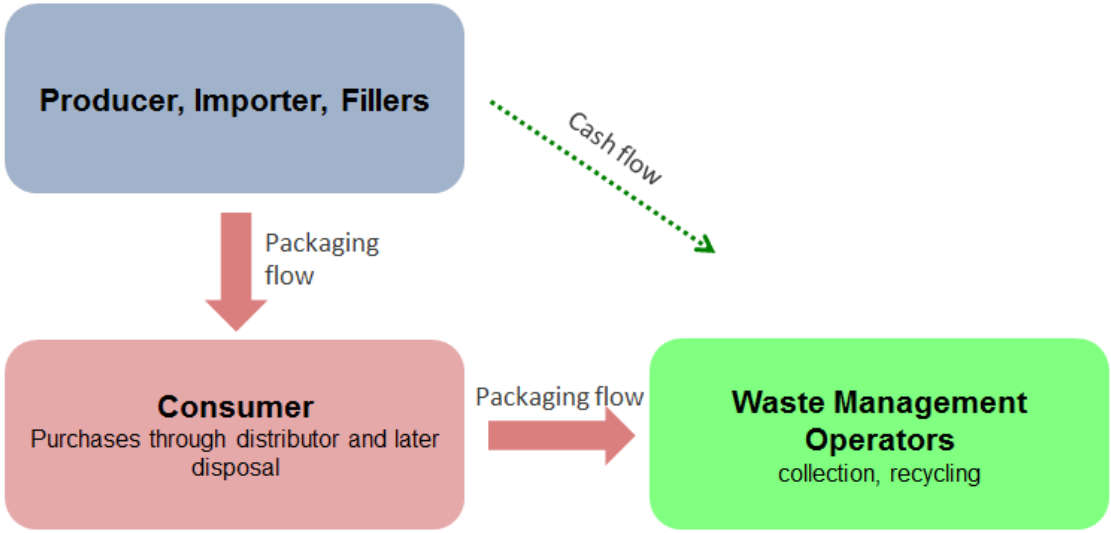


Figure 1: Basic idea of an EPR system

There are different possibilities for putting the EPR concept into practice.

Deposit-refund systems

In a deposit-refund system, consumers can return specific items like used beverage containers and receive a reward in return. This reward incentivizes consumers to bring these items to “take-back stations” instead of disposing them as waste. Thus, deposit-refund systems are systems based on consumer participation to reduce litter caused by these items.

A return of the items takes place at designated take-back stations, such as retailers or specific automats, where the consumer receives the reward. In most cases, this reward is a monetary one paid out for each item returned. The specific product is sold to the consumers with a deposit amount meaning that the price of an item (for instance USD 1.25) is the sum of the price of the single item (USD 1.00) and the deposit amount (USD 0.25). Once this item has been returned, the consumer receives the deposit amount or a voucher for the amount (USD 0.25). However, other rewards are also possible, such as vouchers for services.

This option is limited to specific, easily identifiable items like beverage bottles. It is not suitable to cover the broad range of existing types of packaging.

Direct interaction

The simplest possibility involves direct interactions between producers, importers, and fillers and the waste generation source. In action, these parties will collect the waste directly from that point and take it back. However, this model is only possible to a very limited extent. One prerequisite is that the producers know the source and that it generates significant amounts of waste.

One possibility is that many producers unite to form a business or industrial solution and contract one waste management operator to collect the waste from the various sources.

A system organization that transfers individual responsibility into a collective obligation

An individual producer, importer or order filler cannot organize the take-back of its packaging from every location where it turns into waste. Thus, a collective take-back system must be established. Such a system requires central monitoring and supervision. Moreover, the system must be financed by the producers, importers and fillers of the packaged goods, and responsible parties must also establish the collection of packaging waste at households and similar sources. Some countries like Belgium also have a similar system in place for industrial waste.

Transitioning from an individual to a collective responsibility typically requires the establishment of an EPR organization, which will take over the take-back responsibilities of the obligated companies. Thus, those producers and importers responsible for financing and organizing the EPR system must organize themselves and assume responsibility through a mandatory system by combining their efforts and jointly managing the packaging waste collectively. This organization is the so-called Producer Responsibility Organization (PRO; sometimes also referred to as the system operator). It is responsible for the organization of all tasks associated to the EPR system.

In an EPR system:

- The PRO is the most important stakeholder (organization).
- This organization is responsible for setting up, developing, and maintaining the system.
- This organization is responsible for the take-back obligations of the affected companies.

Joining forces reduces transaction costs for each company and facilitates the management of packaging waste for consumers. The PRO is accountable for fulfilling all its tasks and for spending the funds paid by the obligated companies accordingly. A public agency is responsible for supervising the PRO in this regard. The following graphic shows the basic principle of an EPR System.

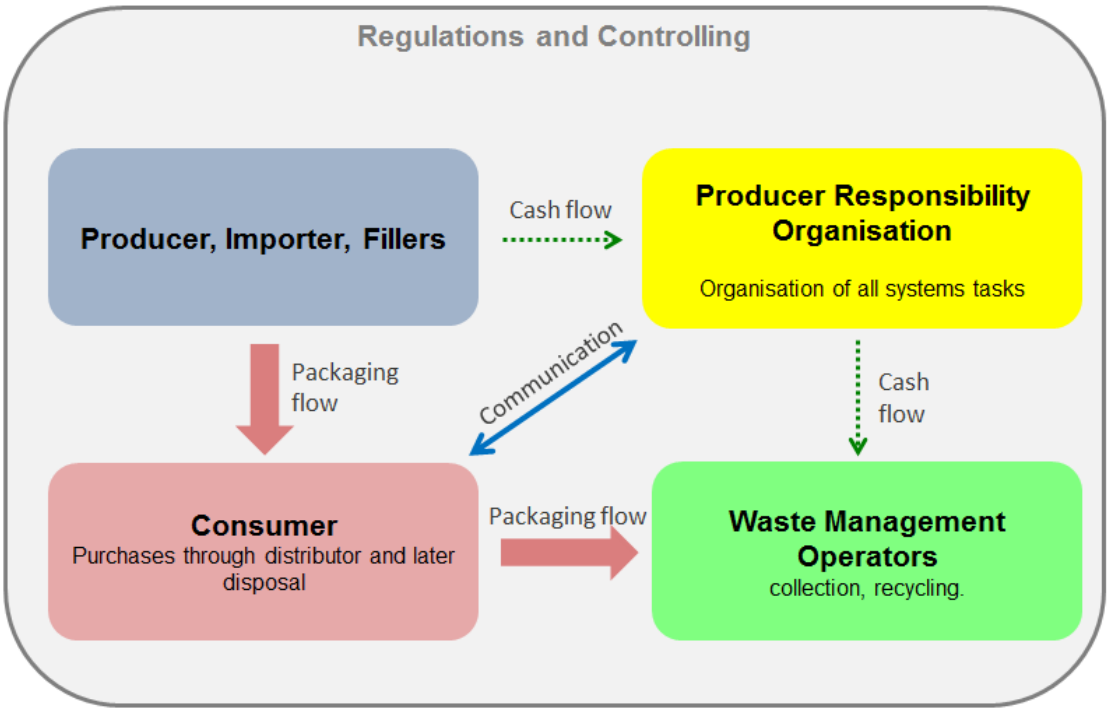


Figure 2: **Basic EPR scheme**

4.2 System participation of obligated packaging

Countries must clearly define the laws that obligate specific types of packaging to become part of the system. The different general categories could include:

- Packaging of households and similar sources
- Industrial packaging
- Commercial packaging
- Packaging with toxic content
- Refillable packaging
- Non-refillable deposit packaging

At the individual country level, differences can exist in terms of which packaging the EPR system covers. In some instances, the EPR system is limited to the packaging disposed by households and similar sources while in countries like Belgium and the Netherlands, the system also includes industrial and commercial packaging.

In most countries, there is a possibility for sources where large quantities of industrial or commercial packaging waste are generated to either participate in an EPR system or individually to organize the take-back directly from the source.

4.3 The Producer Responsibility Organization (PRO)

The PRO is responsible for operating the entire system.

Important tasks of the PRO are:

1. Registration of all obligated companies (in cooperation with the supervisory authorities). These are the companies introducing goods onto the market. These goods are consumed in the individual country, meaning their packaging is discarded in that country (financed by the importers, order fillers, and producers)

2. Collection and administration of all funds of all obligated companies

3. Tendering and contracting for collection and recycling of packaging waste

4. Documentation of collection, sorting and recycling of packaging waste

5. Informing all inhabitants and other waste producers about the separate collection of the packaging waste

6. Controlling all services awarded to service providers – in particular, collections fulfilment and recycling by waste management companies

7. Financing all tasks with the money from the obligated companies

8. Providing documentation and proof to the supervisory authorities – the PRO must prove it has completely fulfilled all its tasks. It must use the money collected from the obligated companies accordingly.

4.4 Different PRO models

EPR can be implemented in many ways. In Europe, there are currently 30 countries that have implemented EPRs via legislation, with industry having set up PROs (for instance, Austria, Belgium, Bosnia,

Bulgaria, Czech Republic, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Macedonia, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovak Republic, Slovenia, Spain, and Sweden). Beyond Europe, Israel, Turkey, Columbia, and Japan have established similar organizations.

The plan has achieved great success in all these countries. A successful EPR plan requires clear legislation coupled with genuine cooperation among all the actors involved in the waste management chain. Crucial players include governments, local authorities, producers, and waste management organizations.

The process should target the practical implementation of an EPR system and be economically, environmentally, and socially sustainable. The legal framework should outline clear objectives, responsibilities, enforcement mechanisms and a timeline for implementation. It should also include the mechanism for setting-up a PRO (e.g., non-profit versus for-profit systems, full cost coverage versus subsidies from the public budget).

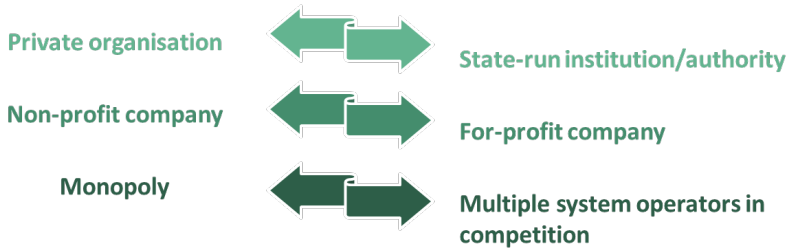


Figure 3: Possibilities for different PRO models

Nevertheless, the implemented PRO models vary across countries, mostly in terms of the three aspects illustrated in Figure 3, above. Generally, it is possible for a public agency to assume the organizational and financial administration of the system. Usually, however, the EPR system is organized by a non-profit organization or a for-profit corporation, which is only supervised and not managed by public institutions. In any case, effective and efficient organization, financing, administration, and control of the system are the crucial factors that determine the success of the EPR system.

Subsequently, examples from Germany, Belgium, France, and the Netherlands are illustrated and explained in detail. In all four countries, the respective EPR systems achieve good results. However, the countries set-up and regulated the EPR systems and their organization very differently.

4.4.1 PRO as for-profit corporation

Germany

The legal framework allows direct competition between several PROs instead of having a single monopolistic PRO. Such a model exists in Germany where the EPR systems have evolved from having a single PRO into a competition among several PROs. Since the PROs are private companies, they are not in the hands of the obligated industry but each responsible company must contract a PRO of their choice for the management of their packaging. Furthermore, in Germany, the EPR system exists in parallel to municipal waste management entities and municipalities are not part of the EPR system.

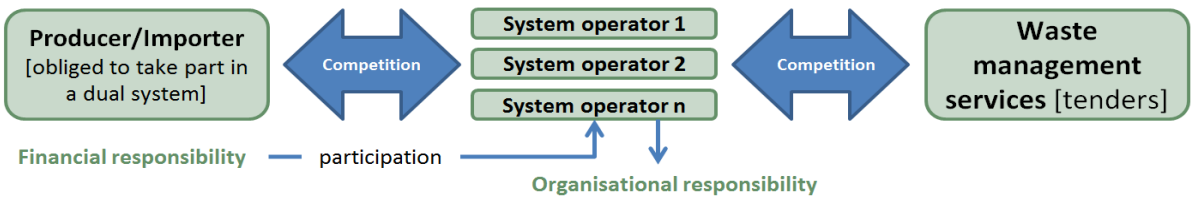


Figure 4: System and PRO model in Germany

This set-up achieves very good results in regard to collection, sorting and recycling. However, some companies exploit the complex and partially unclear structure to reduce or avoid their participation in the system. Thus, the country established the "Central Agency Packaging Regulation" after passing a new packaging law, which came into force in January 2019.

4.4.2 PROs as non-profit organizations

Belgium

The Belgian PRO, Fost Plus, was founded in the country as a voluntary initiative of the private sector. Although there are no competitive restrictions, the initiative has developed only one PRO so far. Set-up as a non-profit organization, it comprises approximately 5,000 members that pay their participation fees to Fost Plus. To incentivize good recyclability, these fees depend on (i) the amount of packaging introduced in the market as well as (ii) the degree of recyclability of the packaging material.

Under the current packaging law, all companies putting more than 300 kg per year of household packaging into the Belgian market (for consumption in Belgium) must effectively become members of Fost Plus. Each of these companies must pay for collection, sorting, and recycling of the packaging that they put into the market. Fost Plus is responsible for all the packaging sales according to specific definitions and a criteria catalog. Fast food packaging and packaging from online sales also fall under this law.

For collecting the waste of obligated companies, Fost Plus contracts the municipalities and transfers money from the distributors to them to cover the collection costs. These contracts also define a certain quality (e.g., collection coverage, collection frequency) the program must fulfill.

Aside from funding waste management, Fost Plus uses 10% of its annual budget for education and awareness campaigns focused on preventing littering.

This system has seen good results in terms of collection, sorting and recycling. However, most parts of Belgium do not collect mixed plastics and foils under this system. Planners expect to expand the system from 2022 onwards to cover all packaging materials with the EPR system.

France

In France, Citeo (known until 06/2017 as *Eco-Emballages*) has become the dominant EPR system and is exclusively responsible for sales packaging. *Eco-Emballages* represents a coalition of several industrial parties (i.e., manufacturers). A second EPR system, Adelphe, established by the wine and spirits industry, meets the take-back obligations for glass bottles. In the meantime, Citeo now fully owns Adelphe, but the latter continues to operate as an independent company.

Citeo is a non-profit joint-stock company with approximately 240 shareholders from the industry, as well as other sectors such as commerce distribution, paper and publishers, services, and material supply chains. In total, Citeo is the PRO for approximately 50,000 members.

Citeo collects fees based on packaging weight, a fixed-price per unit of packaging, and a malus system for non-recyclable packaging (e.g., the fees for non-recyclable plastics as packaging material are twice as expensive as those for recyclable plastics).

The producers finance approximately 80% of the system and the local municipalities finance the remaining 20%. Citeo transfers organizational responsibility to the involved municipalities, which are responsible for performing disposal services.

The system achieves good collection, sorting and recycling results. However, most areas of France do not include mixed plastics and plastic foils in the system. Plans call for a system expansion to cover all types of packaging waste by 2022.

The Netherlands:

Manufacturers and importers jointly established the *Afvalfonds Verpakkingen* (packaging waste fund) to fulfill their extended manufacturer responsibilities. A non-profit organization, it is overseen by a management board appointed by producers and importers.

Tasks include the institution and maintenance of a waste management system; collaboration with communities and other stakeholders to organize the collection and recycling of packaging; and the mitigation of packaging waste. It also monitors and reports on the collection and recycling of packaging materials; and defines financial contributions and the receipt of compulsory contributions from manufacturers and importers.

A noticeable feature is that the municipalities exclusively undertake the collection, sorting and transportation of waste to recyclers. In turn, *Afvalfonds* pays compensation for the collection and sorting of packaging waste.

Since December 2007, Nedvang, a non-profit organization, has been the mediator between manufacturers, importers, and retailers as well as recovery companies, municipalities, and national authorities. The responsibilities of Nedvang include monitoring the packaging market and the recovery of packaging waste. Nedvang works for the waste fund and makes contracts with municipalities regarding the reporting of packaging waste, which is collected, sorted, and recycled. It reviews this information and after the review, dispatches payments from the waste fund.

Overall, this system achieves good results in collection, sorting and recycling. However, the costs are high compared with other EPR models.

4.5 Roles and responsibilities of the different stakeholders

Although the exact models of the PRO are different in each country, the involved stakeholders and the roles and responsibilities assigned to them are the same in principle.

As shown in Figure 5, below, there are generally six groups involved in packaging supply.

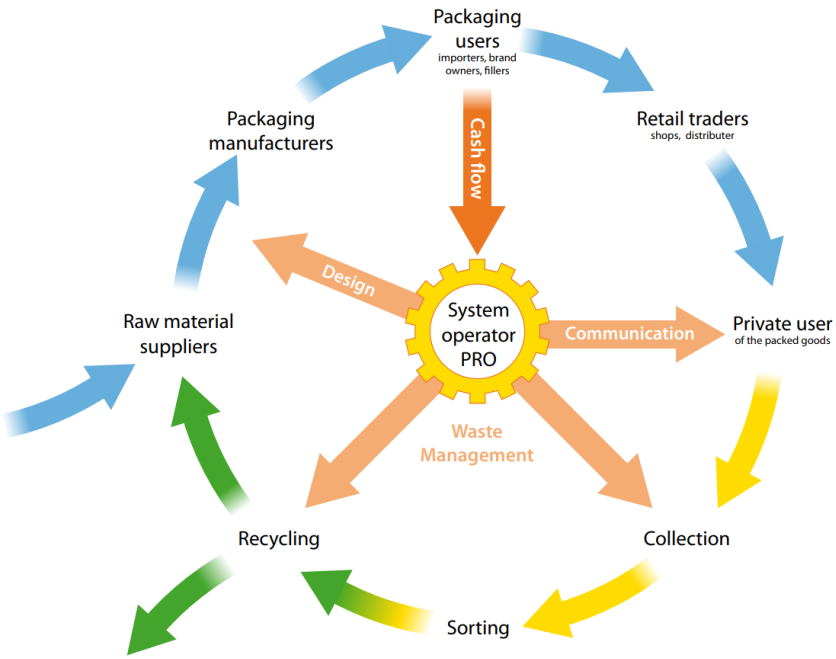


Figure 5: The supply chain of packaged goods

The interface in this chain that determines which party is responsible for financing the EPR system is the same in most countries, as presented in Figure 6. There are, however, some exceptions. For instance, in Japan, packaging manufacturers must also help finance the system. As the participation fee in the EPR system depends on the amount of packaged goods introduced into the market in the respective country, the interface highlighted in Figure 5 is most suitable to measure these amounts clearly.

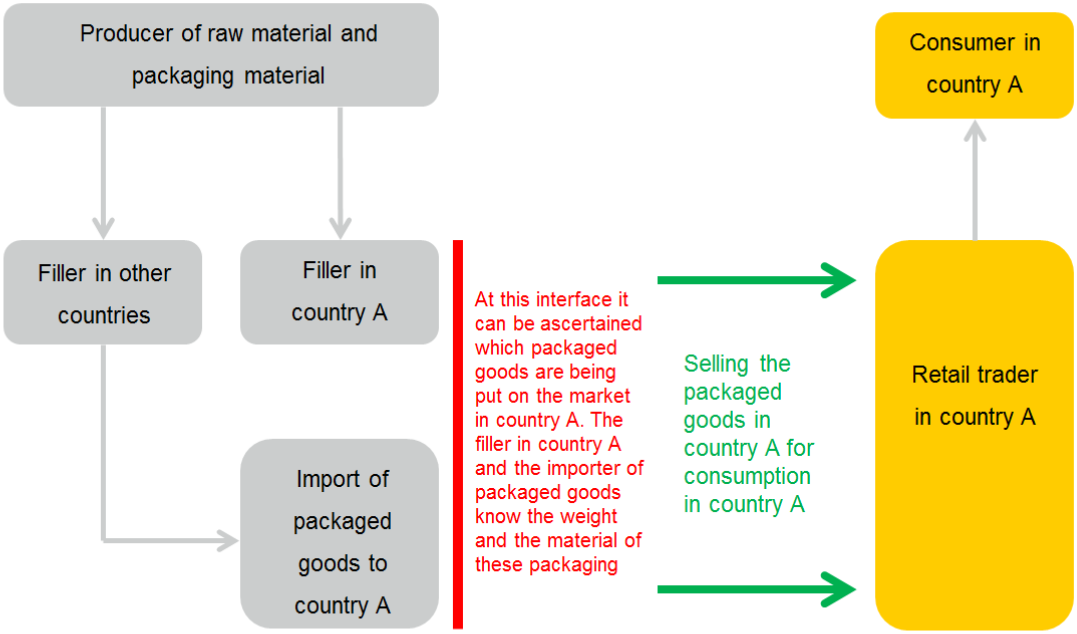


Figure 6: The supply chain of packaged goods

Moreover, all stakeholders must assume defined responsibilities in an EPR system (Table 3).

Table 3: The involved stakeholders and their responsibilities

Stakeholder	Responsibility
Manufacturers of packaging material or of packaging	Should enable reuse and ensure recyclability of packaging materials and should use secondary raw materials where possible. In some countries (like in Japan) they also must pay for the system
Consumer goods companies (fillers and importers)	**Obligated to pay fees for the EPR system for the packaging material of their packed goods.** Influence actors up and down the value chain
Distributors / retailers of packaged goods	Can be obligated to take packaging back and ensure its proper handling. Should also ensure that their suppliers are participating in the EPR system
Consumers	Must be informed about strategies for waste reduction and proper return disposal of packaging; should buy as much unpackaged goods and products as possible and reuse packaging as often as possible
Waste management operators	Receive funds from the EPR system for their services for handling packaging waste. Should try to recycle packaging to the highest standards possible to ensure high quality recycling; includes the informal sector
Government and other public authorities	Legislation and supervision of the EPR system
Municipalities	Linkage between consumers and waste management operators, main responsibilities for implementation of EPR on the local level through organizing the collection

4.6 Characteristics of good and poor EPR systems based on their practicality

The examples from Germany, Belgium, France and the Netherlands highlight that the performance of EPR systems does not depend on whether they are non-profit or for-profit organizations, monopolies, or if competition exists between various PROs. Instead, the crucial element is that all involved actors carry out their responsibilities fully, and that the overall collaboration within the system functions well.

Producer Responsibility Organization

Organization of all systems tasks

These criteria are important for a successful implementation

- PRO fulfils all its tasks
- Employs enough staff and is well equipped in terms of hardware and software
- Experienced with databases, balances, tenders, and contracts.
- Successfully implements the EPR system and thoroughly controls the services and tasks of the other involved actors

These characteristics lead to problems

- PRO does its work insufficiently
- No experiences regarding databases, balances, tenders, and contracts
- Is corrupt and accepts corruption payments
- Does not or only insufficiently develop the EPR system
- Does not control any services or tasks of the involved actors

Producer, Importer, Fillers

These criteria are important for a successful implementation

- All obligated companies are registered at the PRO
- The obligated companies know the exact quantities and material fractions and pay the corresponding amount of fees to the PRO
- There are no illegal imports

These characteristics lead to problems

- The obligated companies are not registered and do not pay.
- The companies do not know their quantities and the exact material fractions of their packaging.
- The companies import illegally
- Corrupting the PRO to pay lower fees

Waste Management Operators

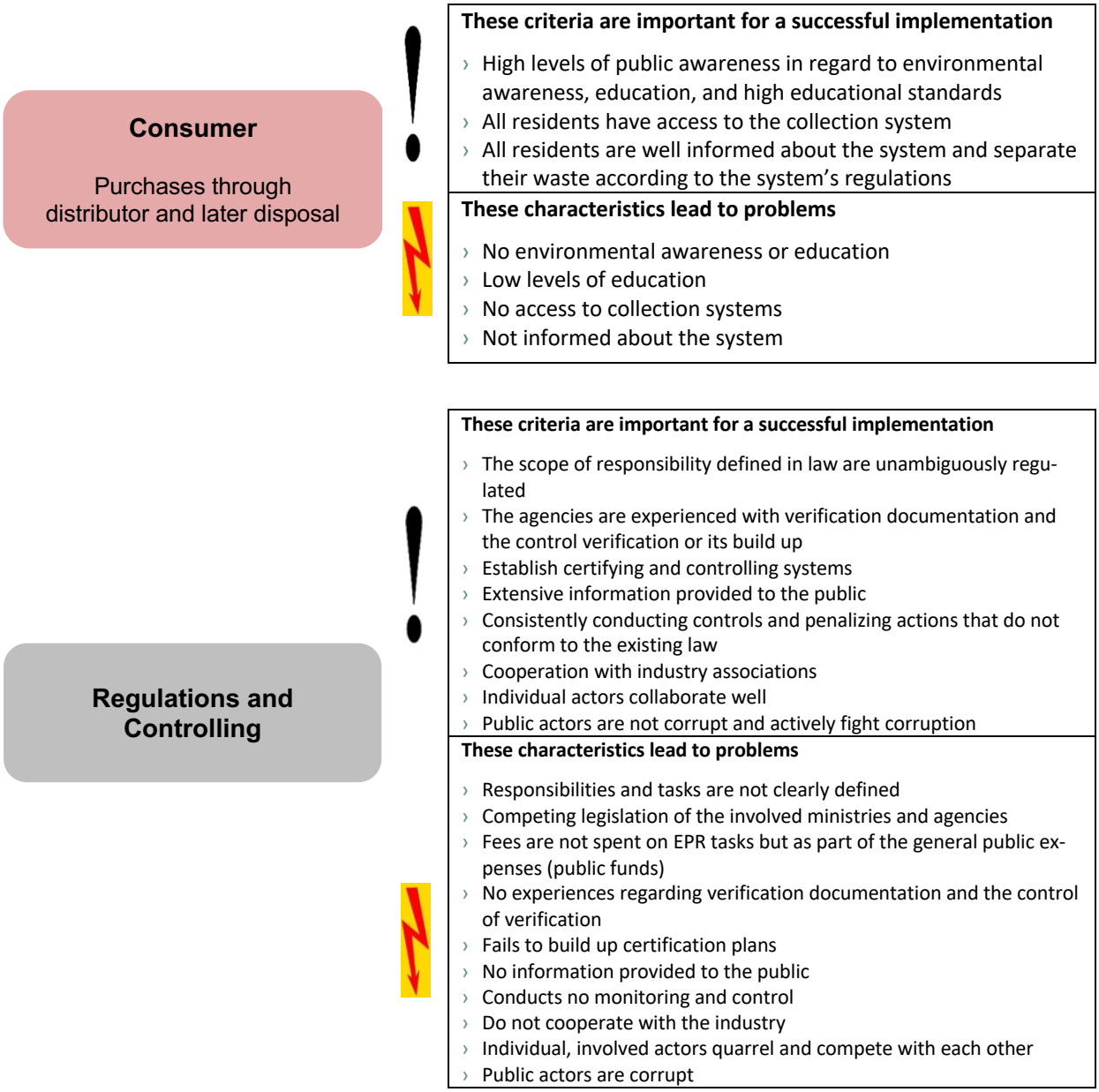
collection, recycling

These criteria are important for a successful implementation

- The collection points are clear, well accessible and reachable. A good infrastructure is established
- Waste management companies fulfil their contracts
- Waste management operators inform the public
- Work within the environmental standards
- Conduct transparent and correct mass flow balances

These characteristics lead to problems

- The collection points are unclear and hardly accessible
- Do not build up a good waste infrastructure
- Do not fulfil their contracts
- Corrupting the PRO
- Do not inform the public
- Do not work within environmental standards
- Do not conduct or conduct false mass flow balances



4.7 EPR fees compared to green taxes and environmental charges

Cases often exist where measures are referred to and published under the label EPR. However, these are mostly green taxes and environmental charges or "eco taxes." These environmental taxes or import duties are charged for raw materials and goods. In these cases, most of the funds usually flow into the general budget, so no producer responsibility exists as defined under the EPR system.

The following table compares the fees paid within an EPR system by the obligated companies with green taxes and environmental charges. The example refers to packaging; however, it can also be used for other items.

Table 4: Comparison EPR fees and green taxes

EPR fees for packaging	Green taxes / environmental charges
The fees are determined by the PRO according to defined criteria (see chapter 4.6) or – in case of for-profit corporations – negotiated with the obligated companies.	The tax is defined in law or other public regulations and acts
The PRO receives the PRO fee.	The responsible public agencies receive the tax
EPR describes extending the producer responsibility: Those who introduce packaged goods in a market are also responsible for the subsequent waste management and disposal of the arising packaging waste.	Eco taxes can be charged without being directly related to a specific responsibility of a producer. The duty is fulfilled through payments
The fees are precisely related to the packaging that is discarded in the respective country.	Eco taxes do not have to be related to the packaging consumption in the respective country. For instance, they can also be related to raw materials or imports.
There is a direct relationship between the EPR fee and the quantities of packaging waste in the respective country.	There is no relationship to the packaging waste quantities in the respective country.
The EPR fees are exclusively used for collection, sorting and recycling of the packaging waste. This includes corresponding communication and public awareness work.	ECO tax usually flows into the general public budget, so there is no producer responsibility in the sense of an EPR system.

4.8 Different EPR fees

EPR systems usually charge different fees for different packaging materials and sometimes also for the level of recyclability. The costs of an EPR system depend on several factors:

- Type of collection system
- Waste composition
- Organizational structures
- Contractual constellations
- Financial contributions of the municipalities
- Recycling quotas
- Recovery and disposal infrastructure
- The existence of deposit-refund systems
- Distribution of costs across different material fractions.

All these factors influence the total costs the EPR system should cover.

France and Italy were the first to modulate their fees based on the packaging's degree of recyclability. Thus, France doubles the fee for non-recyclable plastic packaging, while in Italy, non-recyclable packaging results in different surcharges that can amount to a quarter of the original fee.

Table 5: Costs in various EPR systems in 2018 for packaging waste (prices are per tonne in 2018)

Packaging type	Belgium	France	Netherlands	Spain

Paper packaging	25.30 €	163.00 €	22.00 €	68.00 €
Glass	27.30 €	14.20 €	56.00 €	21.20 € *
Beverage cartons	316.40 €	247.40 €	180.00 €	323.00 €
Plastic bottles	327.50 €	312.30 €	640.000 €	472.00 €
All (other) plastics	316.10 €	312.30 €	640.00 €	472.00 €
Non-recyclable plastics	316.10 €	624.60 €	640.00 e	472.00 €

* An additional unit factor is additionally

If the paid fees are broken down into the individual items, the amount is not significant and not noticeable for the single consumer. The following table gives an illustrative overview for the amount per item based on the participation fees in France.

Table 6: Illustrative price list contributions per packaging type in France

Material	Plastic bottles	Other plastics	Non-recyclable plastics	Other plastics	Liquid packaging board
Price per kg	31.23 ct	31.23 ct	62.46 ct	31.23 ct	24.74 ct
Description of the examined packaging	Akuta hand dish washing detergents, 0.5 l; PET bottle	Frosch Spirit Glass Cleaner, 0.5 l, LDPE stand-up pouch	ISANA Doctor soap, 0.5 l, multilayer PET/PE stand-up pouch (bag with spout, screw cap)	Plastic bag	Ursi Schoko Drink, 0.5 l, liquid packaging board (liquid packaging board (*SIG / combibloc*) straw, foil bag)
Weight of examined packaging	26.63 g	11.59 g	11.5 g	1.5 g	16.06 g
EPR fee for examined packaging per item	**0.83 ct**	**0.36 ct**	**0.72 ct**	**0.047 ct**	**0.039 ct**
Picture					

Figure 5 illustrates which tasks the fees cover. The main share goes for collection. Municipalities cover about 20% of the costs, which include collection, sorting and recycling.

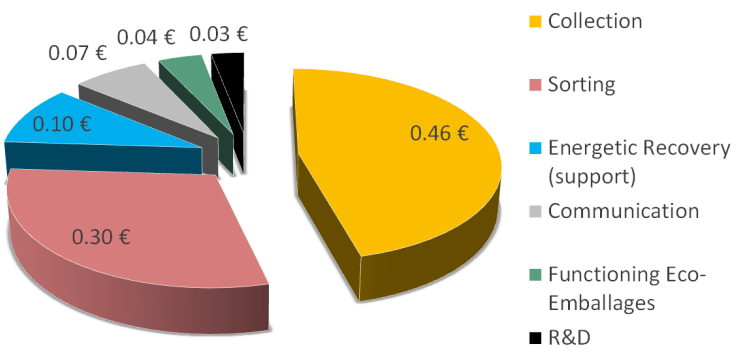


Figure 7: Cost distribution of 1 € in France

4.9 Collection, sorting and recycling

A packaging law must clearly define waste management targets in the following areas:

- Which material fractions should be collected?
- Should the waste management system and its infrastructure be built up comprehensibly or start with defined, geographical areas?
- Which recycling and recovery possibilities should be implemented (e.g., material recycling, feedstock recycling or energy recovery)?
- Should the waste management services be tendered or do the municipalities and local agencies bear the responsibility?
- Should specific recycling quotas be targeted or are there minimum standards for the system, which need to be fulfilled?

4.9.1 Collection

Glass is usually collected via a “bring” system, however, a few exceptions do exist. For instance, Berlin and some regions in southern Germany also collect glass waste through a curbside collection system. This chapter focuses on lightweight packaging, which comprises the packaging types shown on the right.

Figure 8: Overview of different lightweight packaging fractions

Generally, the collection of lightweight packaging varies across countries. Even in European countries with established EPR systems, the collection methods for different lightweight packaging materials vary, as shown in the table below.

Table 7: Collection structures for packaging for the individual material fractions in five different countries with EPR systems

	Germany	France	Spain	Italy	Nether-lands
Plastic foil (plastic bags) [1)]	X[6)]	3)	X[5)]	4)	X[6)]
PE and PP	X[6)]	X[2)5)6)]	X[5)]	X[2)5)6)]	X[6)]
PS	X[6)]	3)	X[5)]	4)	X[6)]
PET bottles	X[6)7)]	X[5)6)]	X[5)]	X[5)6)]	X[6)]
PET-non-beverage bottles	X[6)]	3)	X[5)]	4)	X[6)]
Mixed plastics (rigid)	X[6)]	X[2)5)6)]	X[5)]	X[2)5)]	X[6)]
Mixed plastics (flexible)	X[6)]	3)	X[5)]	4)	X[6)]
Beverage carton	X[6)]	X[5)6)8)]	X[5)]	X[5)6)8)]	X[6)]
Tin plate / ferrous metals	X[6)7)]	X[5)6)]	X[5)]	X[5)6)]	X[6)]
Aluminum / non-ferrous metals	X[6)7)]	X	X[5)]	X[5)6)]	X[6)]
Paper and cardboard	X[5)6)]	X[5)]	X[5)]	X[5)]	X[5)6)]

Source: cyclos, own compilation

1) The target fraction is narrowed down (size > DIN A4) to ensure a significant enrichment of LDPE.
2) At the moment: only bottle and / or container.
3) Expected from 2022.
4) It is expected that the collection systems of CONAI (Italy) will be expanded to these fractions as well to fulfil the quotas for 2025 set in the packaging directive.
5) Drop off system / “bring it yourself” system.
6) Curbside collection / pick-up system.
7) Deposit system for beverage packaging.
8) In France and Italy, beverage cartons are often (estimated 50% to 80%) collected together with paper and cardboard and not in the lightweight packaging collection system as in other countries.

The following describes the collection systems used in various countries in more detail.

Collection system – example Germany

In Germany, waste is usually separated into four fractions and collected at the household level through a curbside collection system. Glass packaging is usually collected through “bring banks” (also referred to as “bring it yourself” or drop-off systems). The costs arising from collection, sorting and recycling are covered by the PRO. The costs arising from the waste categorized as “paper, cardboard and carton” are divided between the municipalities and PROs, as this fraction includes both the paper packaging waste and other printed products for which there is no EPR plan.

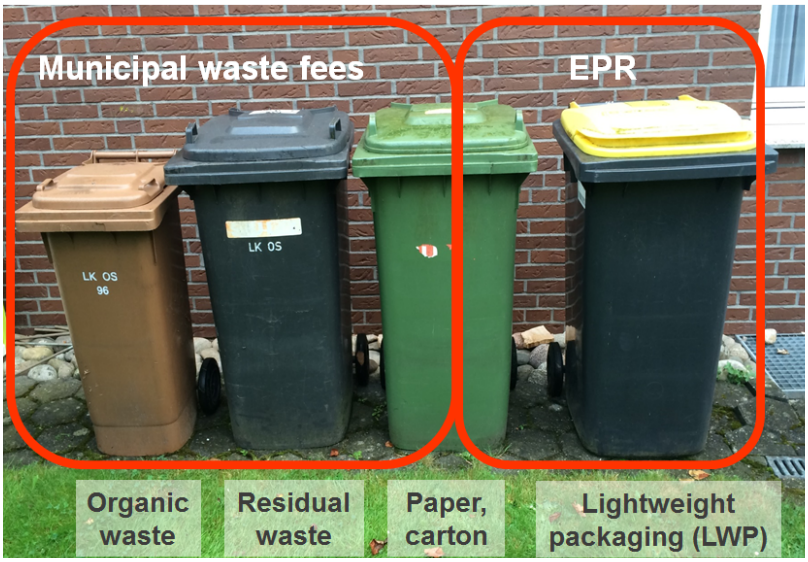


Figure 9: Curbside collection at the household level in Germany

Collection system – example Spain

Collection mainly centers on drop-off containers/banks. Rigid plastic, cans and cartons go in yellow containers, and paper and cardboard containers in blue ones. In total, there are over 573,000 yellow and blue containers available throughout Spain to collect packaging waste. From there the collected packaging goes to suitable sorting plants, which sort to prior to recycling.

Figure 10: Collection in the street through bring systems in Spain

Collection system – example Japan

The prevalent collection system in Japan is a bring system that sorts waste in different fractions. Nevertheless, some curbside collection systems also exist. Additional monetary incentives are available for municipalities regarding their high-quality, sorted recyclable waste. In several places, waste collection takes other forms, such as group collections organized by residents. The overall number of waste fractions, segregated at the source, varies across Japan.

Figure 11: Collection in the street through bring systems in Japan

Collection in Palermo, Italy – example of a poor practice

Problems arise when waste management operators fail to fulfill the services specified in their contracts and do not appropriately manage collection points.

Figure 12: Collection in the street through bring systems in Palermo, Italy

4.9.2 Sorting

All packaging is sorted into marketable fractions. In Germany, approximately 30 large sorting plants with a total annual capacity of approximately 30 million tonnes do this work.

After the sorting process, the process compresses the sorted packaging into bales and commercializes them.

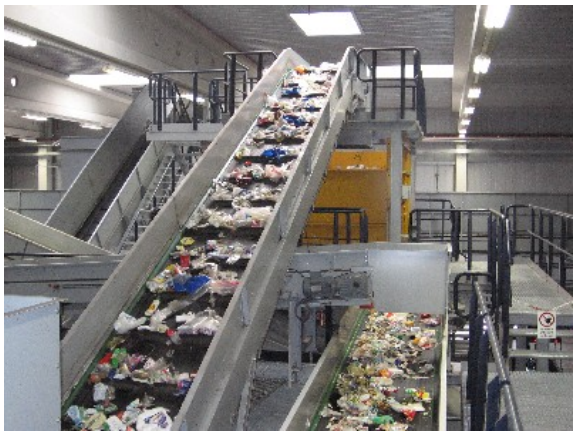


Figure 13: Sorting and baling of different fractions

4.9.3 Recycling

All collected packaging is then recycled or recovered, outcomes that typically require the development and enforcement of specific laws. For instance, the law needs to define if feedstock recycling or energy recovery are suitable possibilities. Furthermore, stakeholder need to define recycling and recovery targets, either as recycling quotas or absolute recycling quantities.

The table below shows the EU recycling targets. Please note that these targets cover not only household packaging but all packaging.

Table 8: EU recycling targets

Material contained in packaging	Quota in 2025	Quota in 2030
Plastic	50 %	55 %
Wood	25 %	30 %
Ferrous metals	70 %	80 %
Aluminum	50 %	60 %
Glass	70 %	75 %

Paper and cardboard	75 %	85 %

In the case of recycling quotas, stakeholders must precisely define corresponding reference quantities (e.g., the collection amounts, or the quantities of packaging introduced on the market).

Figure 14: Recycling PE / PP (left) into possible products after the recycling process (right)

In many countries with a shortage of wood, such as desert regions, recycling mixed plastics into thick-walled wood replacement products can provide a suitable substitute in this specific context.

Figure 15: Possible applications of recycled mixed plastics

4.10 Monitoring and controlling

The implementation of an EPR system requires a suitable monitoring and controlling system. Furthermore, the system must ensure all individual actors are fulfilling their tasks and responsibilities. This holds particularly true on two levels:

- Obligated companies (producers, importers, and order fillers) paying the PRO for their packaging
- The appropriate usage of the fees paid by the obligated companies

Therefore, the system requires control and certification plans, as well as a reporting system for data recording. Again, two levels of compliance are particularly important:

- Data regarding the packaging (or products) introduced in the market by the obligated companies.
- Data regarding the collection and processing of the waste arising from these products, which involves monitoring the waste material flows (collection, sorting, recycling).

4.11 Information and communication

To succeed, an EPR plan must ensure a regular dialogue among the actors involved in its implementation. This includes manufacturers and distributors, private and public waste management organizations, local authorities, civil society organizations and, where appropriate, non-profit actors, networks for reuse and repair, and facilities that prepare the waste for reuse.

4.12 Development of a packaging law

In several countries, consumer goods companies have founded voluntary initiatives to foster recycling activities. Examples include:

- **PARMS**: The Philippine Alliance for Recycling and Material Sustainability; members include Coca-Cola Philippines, Nestlé Philippines, Pepsi-Cola Products Philippines, Procter & Gamble Philippines, and Unilever Philippines
- **PRAISE**: The Packaging and Recycling Alliance for Indonesia Sustainable Environment; members include Nestlé Indonesia, Coca-Cola Indonesia, Tetra Pak Indonesia, Unilever Indonesia, Titra Investama, and Indofood Sukses Makmur
- **GRIPE**: The Ghana Recycling Initiative by Private Enterprises; members include Dow Chemical West Africa, Nestlé Ghana, Coca-Cola Ghana, Unilever Ghana, Voltic, Fan Milk Ghana, Guinness Ghana Breweries, and PZ Cussons Ghana
- **TIMPSE**: Thailand Institute of Packaging and Recycling Management for a Sustainable Environment; members include Nestlé Thailand, Unilever Thailand, Coca-Cola Thailand, Pepsi-Cola Thailand, and Tetra Pak Thailand.

These initiatives have experienced limited success as the companies involved, which work voluntarily on this issue, compete with others that do not participate:

- Only a few companies participate in voluntary measures
- The financial contribution of each company is low compared with the contribution companies must pay in an EPR plan
- The extent of individual activities is small and usually comprises only smaller projects
- Countries cannot establish nation-wide collection systems based on voluntary measures
- No official controlling systems exist

Voluntary initiatives should be used as a preliminary basis for the PRO (system operator) of an EPR system to help develop the respective legal basics of the system. They can help to gather individual

experiences through pilot projects. However, countries must ensure that voluntary initiatives do not impede important decisions regarding the establishment of nation-wide EPR systems and EPR laws.

Development of an EPR law

The establishment of an EPR system requires the unambiguous definition of all duties and responsibilities, as well as the creation of a monitoring system implemented by the government. Therefore, the goal is to build an EPR strategy to advocate proactively with the government. The decision-makers and all committed companies should strive for a sustainable solution they work out together with other stakeholders. Any company that markets packaged goods must become part of the process. The system must be transparent, leave no options for companies to escape responsibility, and offer no possibilities for corruption. An independent institution should control the system.

Important areas include:

- Development of a concept for sustainable and practicable waste management
- Establishment of the organizational structure
- Installation of an infrastructure for the collection of packaging
- Installation of recycling infrastructure
- Communication, waste advice, training, special education
- Development of activities against littering, for pollution control of waters and deserts
- Installation of a functional control system

Stakeholder should collaborate in working groups to achieve all these points. Crucial participants include:

- Ministry of environment
- Ministry of municipal affairs
- Department of statistics
- Chamber of industry
- Municipalities
- The main importers, fillers and producers
- Representatives from the waste management sector
- NGOs (e.g., WWF, …)

Ideally, all decisions should be unanimous. As this is not always achievable, participants must determine upfront who will have the power to decide in such situations (e.g., the ministry of environment). This will require the preparation of a work schedule that covers the following questions:

- Who is the PRO (system operator)?
- Who will finance the system?
- Which packaging will the system include?
- Which collection system should the initiative establish?
- What are the requirements for recycling?
- How should the initiative involve the informal sector?
- What kinds of controls does the system require and how are they organized?
- What are the information and data needs, and which steps are indispensable for implementation?

Initiatives must coordinate individual topics in depth in specific work groups, and summarize the following topics:

- PRO, financing and involved packaging
- The collection system, requirements for recycling, and interactions with the informal sector
- Documentation and control.

4.13 EPR initiative on a global scale

Currently, many countries have multiple approaches and systems, that they refer to as EPR systems. In contrast, in 2000, only a few European countries had introduced EPR systems for packaging. The number rose significantly in 2018 and began to spread around the globe (see Figure 13) [4]. A 2013 OECD study named over 400 different EPR systems. However, it remains questionable whether all these EPR systems are designed in such a way that the producers can assume responsibility.

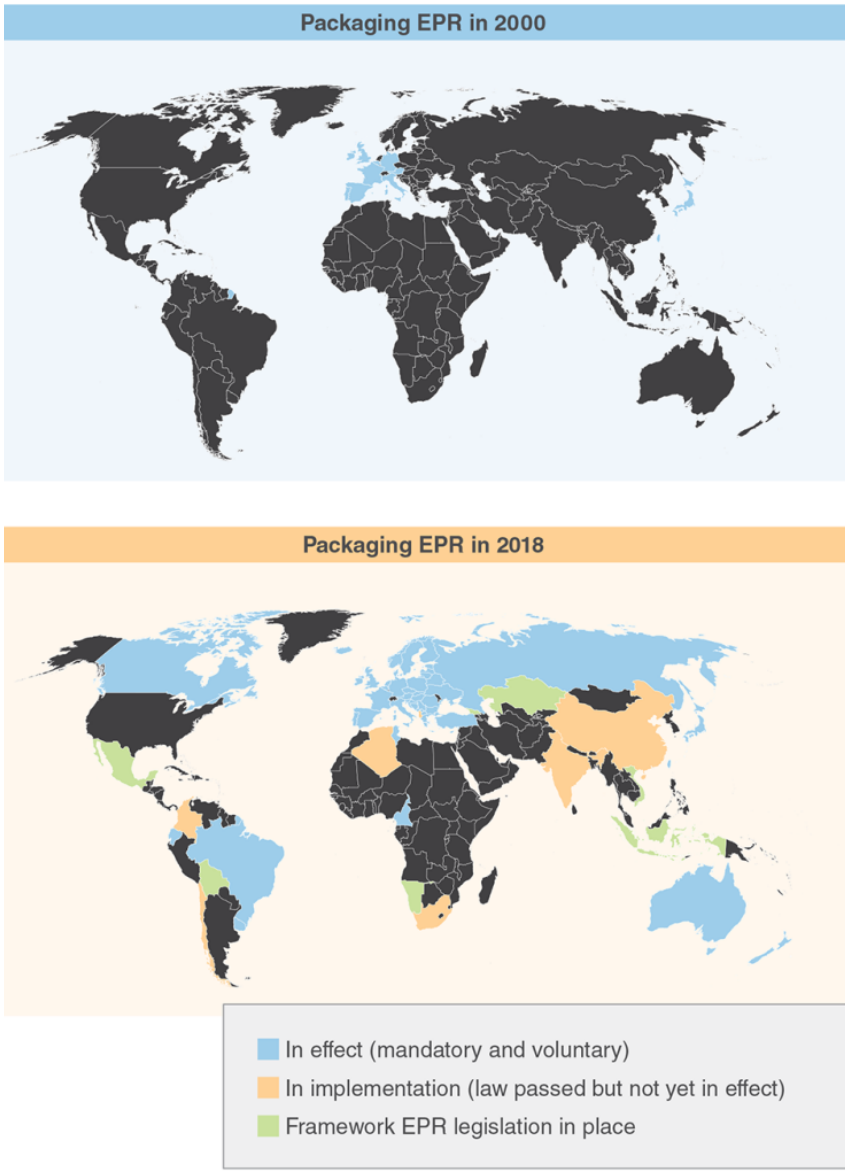


Figure 16: Countries with EPR system for packaging in 2000 and 2018 [4]

Many of these systems are either not EPR systems or only partial ones, including those in Russia, Brazil or Cameroon. However, this map clearly indicates the growing importance of the EPR topic on a global

scale. Furthermore, these developments suggest that now is the time for making important decisions, instead of focusing only on small (mostly voluntary) elements or minor political actions.

To support these decisions, this report has analyzed the 15 selected countries as to their current EPR status based on several criteria, as explained in the following chapter.

4.14 Pilot Projects for Packaging based on EPR

The nationwide implementation of an EPR system usually faces significant organizational, financial, and political challenges, as well as potential hazards. These arise especially from how well all stakeholders accept a nationwide system and therefor how successfully systems put it into practice. Thus, launching an EPR system as a pilot project in a defined model region opposed to the whole country has become a recurring activity.

a) Voluntary pilot projects
In smaller regions it is relatively easy to establish **voluntary initiatives or voluntary commitments** as pilot projects to collect and recycle packaging. Aside from the geographical boundaries, these pilot projects may focus on individual types of packaging, points of origin, specific brands and defined timeframes. Manufacturers, importers, and other stakeholders may work together to implement these voluntary projects.

b) Mandatory systems of Extended Producer Responsibility
If a **mandatory EPR system** is implemented, things are different. It requires a **legal basis** and **obligates specific manufacturers, importers and retailers** to take part in the EPR system financially (and organizationally, if feasible) or to take back packaging, if that is possible logistically (e.g., industrial packaging or retail packaging). Such a law will require **nationwide regulation**. This includes the unambiguous definition of the kinds of packaging obligated parties must finance. However, under specific circumstances, in specific constellations, limitations are possible. The following case examples offer additional insights.

Case 1: A nationwide EPR law is implemented. Within this framework, only a specific fraction of the population becomes part of the system at first. For example, 20% of all inhabitants join at five 5 years; 50% at eight years and 100% at 10 years. In this case, countries can launch the system in one or two cities in the first five years. However, all nationwide obligated companies (manufacturers, bottlers, and importers) will pay into this regionally limited system. The expenses correspond to the system needs in particular cities or regions.

Case 2: Only a specific part of a country implements an EPR law. In practice, systems have two options to determine who and how much each company must pay:

- **a)** Only companies that deliver packaged goods into this part of the country (e.g. into a specific city or island) that are then consumed in that particular area will participate in the system. In this case, countries need to define the specific areas clearly to determine which companies deliver how many goods there, and to determine the proportion of each company responsible for the packaging.
- **b)** The area is not clearly definable and the amounts of packaging that each company delivers together with their goods in this area cannot be determined precisely. In this case, by analyzing the nationwide revenue of all producers, regulators can calculate the proportion for each player.

Case 3: By law, only specific packaging must be taken back and only in a specific area. For example, a regulation in Jordan might state that only those companies that take part in the

return system and pay for collecting and recycling of their bottles are allowed to sell beverages in the historical city of Petra.

Case 4: Return obligation on special occasions. On a municipal level, regulations could state that the sale of specific goods is allowed only if the packaging is taken back. Examples could include beverage sales at sports events or at concerts, with the producer compelled to collect and recycle this packaging after the event.

5.0 Assessment criteria

This report conducted an assessment of the EPR status regarding packaging waste for each of the 15 selected countries, as well any critical issues preventing the successful implementation of these programs. This section provides a short overview of the existing organizations promoting an EPR approach in each of these countries.

In the final chapter, these results will support recommendations about the approach used in each country for EPR adoption or enhancement.

General situation

The waste management practices within a country are influenced and potentially limited by the general conditions in the respective country. Thus, waste management and consequently EPR emerge from the conditions in each country. This report uses the following criteria to assess the general situation.

a) Political situation

Well-functioning waste management and EPR systems require a stable political situation, given the importance of ensuring that everyone assumes their roles and responsibilities. Moreover, waste management interests receive less attention during highly unstable times as there are often more pressing issues.

The assessment of overall political stability reflects the research of the Political Risk Map 2019, which triangulated the risk based on each country's operational, political and economic risk [5]. This leads to five categories: stable (100-80), relatively stable (79-70), mediocre (69-60), relatively unstable (59-50) and unstable (<50).

b) Legal and regulatory framework

The legal and regulatory framework determines the roles and responsibilities of the various institutions, agencies, and actors and must be as unambiguous as possible to avoid misinterpretations. For instance, it regulates which ministries are involved in the various tasks connected to an EPR system, including waste management, and which governmental levels are responsible for the execution of certain tasks. Hence, the legal and regulatory frame and its suitability to regulate an EPR system is an important element for assessing the potential implementation of a system.

c) Income level and GDP

The income level of a household determines which and how many products members buy, and thus has important implications regarding the generated household waste. A global trend exists that connects rising income to (i) higher waste quantities, and (ii) a change in composition of the household waste marked through a rising share of packaging waste. This results in a relative increase of fractions like plastics and paper as these serve as packaging materials.

Assessing the income level requires the use of both the national and global poverty lines, according to the World Bank's definition. The national poverty line (NPL) represents the minimum requirements for food, clothing or shelter in a given country. This line obviously varies from nation to nation. In contrast, the global poverty line (GPL) assesses poverty across all countries according to the same standard. Currently, this poverty line is set at USD 1.90 a day [6].

d) Corruption

Corruption negatively affects the feasibility of any approach or project because it dilutes fair procedures, disrupts implementation activities, and can have an impact on the treatment of involved parties. Ultimately, it makes any approach or project dependent on power and money. Thus, corruption hinders the smooth functioning of sustainable waste management and EPR systems, making it possible to avoid penalties for non-compliance or to use incorrect data (e.g., for imports or the amount of collected waste).

This research assesses the level of corruption according to the Corruption Perception Index (CPI) of 2018 [7]. The CPI, published annually by Transparency International, ranks countries according to their perceived levels of public sector corruption. The scale ranges from 100 (no perceived corruption) to 0 (very high levels of perceived corruption).

e) Education and living standards

This criterion assesses the extent to which waste management and its environmental effects become part of daily life, such as in school curriculums or as communicated through newspapers and the media in general.

f) Geographical conditions

Geographical conditions have several implications for waste management practices and EPR systems. For instance, the topography of a country or region determines its accessibility, which in turn affects waste collection. Another example involves the implications of population distribution, which geographical conditions often indirectly determine since scarcely populated rural regions require different practices from densely populated urban areas. Other implications originating from the geographical conditions include the climate and natural hazards that a country or region faces, such as floods caused by monsoon rains that wash waste into rivers and oceans.

The World Risk Report and the World Risk Index [8] also consider the threats from natural hazards. This Index assigns the risk to five categories that range from very low, low, middle, high, and very high. These categories are based on a score derived from examining the exposure, vulnerability, susceptibility, lack of coping capacities, and lack of adaptive capacities of a country regarding natural threats.

Waste management situation

EPR provides sustainable waste management and increased recycling. Therefore, the (potential) implementation of any EPR system must consider existing waste management practices and structures to assess the current status of the system, and any potential challenges.

g) General waste management structure

Operating a well-functioning EPR system requires the systematic collection, sorting, and recycling / recovery of packaging waste in support of the recycling sector. It should thus increase the overall quantities of recyclates. Therefore, it is necessary to regard the current waste management potential of a country in terms of its general structure. For instance, practitioners must assess whether separate waste collection methods are present or if the waste is disposed of in landfills or dumpsites.

h) Financing waste management

Because EPR allows for a sustainable financing tool for waste management, those involved must examine the financing methods used for the current costs for waste management. This criterion examines how the current waste management practices are financed and how well the expenses cover all the arising costs.

i) Recycling packaging waste

The recycling of packaging waste plays a vital role in a well-functioning EPR system. That makes it necessary to assess which fractions of packaging waste already undergo recycling and the quality of the recyclates. Moreover, it is important to understand what kinds of commercialization possibilities exist for these recyclates.

j) Technical competences

This criterion focuses on the entire technical infrastructure used to collect, sort, and recycle the generated waste. It includes everything, such as the availability of bins, trucks, donkey carts, sorting plants, recycling plants, and incineration plants. It also focusses on the level of the technical infrastructure. For instance, do the incineration plants have high standards and lack environmentally harmful elements, or the opposite?

k) Public awareness

Public awareness is an important factor, since waste separation (necessary for a well-functioning EPR system) essentially depends on the participation of consumers, who in many cases may need to undergo behavior changes. Consequently, their awareness of the need to separate waste, the consequences of poor waste management practices, and the fact that plastic waste is not bio-degradable are all important prerequisites in support of this change. This criterion also assesses the general attitude towards waste.

l) Controlling and monitoring systems

Without a controlling and monitoring system, no EPR system can successfully work in the long run. All involved parties need to comply with the regulations, with no “free riders.” As a result, it is necessary to analyze whether such systems already exist in the respective country and how well they are working.

m) Importance of the informal sector

In many countries without well-functioning waste management systems, collection and recycling are predominantly in the hands of the informal sector. This not only poses high levels of uncertainty concerning these informal workers, it also limits the transformation of the current waste management system to a sustainable one, and produces inefficient results. It is highly inefficient and leads to more costs for public agencies since only the non-valuable materials remain in the waste stream.

It is also crucial to include the informal sector in a sustainable waste management program, because participant’s livelihoods often depend on informally collecting and recycling the waste.

n) Experiences and data availability

Eventually, the implementation of an EPR system will require an extensive database. For instance, to track the quantities of imported, packaged goods, since their importers must pay for them according to the quantities of such products distributed. Therefore, data availability and experiences are important prerequisites to an EPR system’s potential implementation.

Current status of EPR

Some countries have already started to introduce approaches for EPR systems or similar programs; some via law while others are voluntary. Given this mix, the criteria provided here focus on the current status of EPR systems in the respective countries and support existing approaches.

o) Existence of EPR laws for packaging

This criterion assesses whether a country has already planned or passed an EPR law for packaging.

p) Existence of EPR systems for other products and goods

EPR systems can work for a variety of products and goods, like electrical and electronical equipment or batteries. If EPR systems already exist for other products in a respective country, levels of familiarity already exist with these approaches that might facilitate the establishment of an EPR system for packaging.

q) Existence of voluntary initiatives from the industry

In several countries, companies and organizations are working voluntarily toward the implementation of an EPR system or the establishment of common practices under an EPR system such as waste segregation at the source. Multinational consumer goods companies often initiate these industry initiatives because they are familiar with EPR systems and their practices and value these systems.

Countries can use these initiatives as preliminary PROs for an EPR system.

r) Existence of initiatives for EPR systems from the government

Complementing the initiatives from private industry, governments often support activities that can help the implementation of an EPR system (and not only for packaging), although in many cases, these programs are not anchored in law. Such initiatives can provide the basis developing and legislating an EPR system for packaging.

s) Support for introducing an EPR system through external experts

In some countries, the government and industry work together with external experts to implement EPR systems. These arrangements can become joint efforts with external consultants and work toward the implementation of an EPR system for packaging.

Other remarks

This criterion lists all other remarks not part of the other criteria but considered important to the implementation of an EPR system for packaging in respective countries.

5 Situation in the selected countries

This chapter compares the waste management situations in selected countries – based on the above criteria – with the deliverables. Therefore, the conditions indicated by the criteria are directly linked to each deliverable, which is also reflected in the section's structure. After a short, general introduction, the section discusses the (i) assessment of the current EPR status, (ii) the initiatives and organizations promoting EPR, and (iii) the critical issues that surround implementing EPR. Finally, every chapter ends with a short evaluation of the success of introducing an EPR system in the respective country and a summary of the framework conditions in form of a table.

5.1 Thailand

Thailand is located at the center of the Southeast Asian Indochinese peninsula with a land area of 510.290 km,^{2} making it the world's 50th largest country by total area. It has a population of over 67 million unevenly distributed across the country. The highest population density occurs in and around Bangkok. Significant population clusters also exist throughout large parts of the country, including north and northeast of Bangkok and in the extreme southern region of the country. Trends in international and internal migration have led to rapid urbanization, particularly in the big cities like Bangkok and Pattaya. Due to its topography and geographical location, Thailand is threatened by natural hazards such as heavy monsoon rains, tsunamis, landslides and droughts [9]. According to the World Risk Index, its overall risk profile earns it a "middle" rating [8].

The Kingdom of Thailand features a constitutional monarchy system, with the royal king serving as the head of state. Thailand has undergone 19 constitutions, with the 20th and most recent featuring a referendum that the king has signed into law. However, an interim prime minister currently heads the government, after the toppling of the previously elected government in August 2014. Being the only southeast Asian country that has never been colonized, Thailand has experienced a series of political struggles that include bloodless revolutions (1932), foreign invasions (1945), political factions and rivalry (2008-2010), military coups and occasional large-scale street protests. The monarchy is hereditary. According to the provisions in the new 2017 transitory constitution, the House of Representatives approves the prime minister and the King appoints him or her with a tenure of office of not more than eight years. However, since the military takeover, Thailand's 2007 constitution was revoked and the National Council for Peace and Order (NCPO) took over administration, with the military replacing the general assembly. Nevertheless, the constitutional courts and the judiciary remain in force.

As of 2017, Thailand had 76 provinces led by senators, with smaller subdivisions called districts (*Amphor*), sub districts (*Tambon*) and villages (*Mubaan*). Overall, there are 878 districts in Thailand, excluding the 50 districts of Bangkok referred to as *"khet*." The local government administration oversees the city, town, and subdistrict municipalities, including the subdistrict administrative organization.

Thailand is a constitutional monarchy, maintaining a multi-party system, albeit with a less active role of the traditional political parties in parliament. A series of political instabilities have marked the country's political history, with the most recent being the military junta dominance of the parliamentary head as the prime minister. Nonetheless, elections held in March 2019, delivered a favorable result for the incumbent, pro-military government. Overall, the political stability is assessed as "mediocre" according to the Political Risk Index [5], an assessment supported by the prioritization of the Thai government policies that boost consumption and investment, including increased public spending on infrastructure.

The growth of Thai economy relies on tourism and increased exports to foreign markets. The tourism industry plays a pivotal role in Thailand, contributing 17% of the total GDP. However, the government still struggles with corruption as reflected in the CPI, in which Thailand scores 36 out of 100 points (putting it in 99th place in global comparison) [10].

Assessment of the current EPR status for managing packaging waste

Legal basis of EPR

Several policies, guidelines, and regulations relate to the principle of EPR. However, explicit EPR laws on packaging waste remain in the **drafting stage** and have yet pass into law. One example is the Strategic Plan on Packaging and Packaging Waste Management (draft), which attempts to minimize the large volume of packaging waste each year via an integrated waste management and lifecycle approach. This plan will provide measures for all relevant parties to handle waste generated from each stage of the packaging lifecycle, including the design process, production, consumption, treatment, and disposal. The strategies break into four target groups, including designer, producer, importer, and packer; product transporter and distributor; user and consumer; and waste collector, transporter, and processor.

General legal framework for waste management and responsibilities

Thailand has promulgated laws and regulations to govern and manage the waste in a country. MSW management in Thailand has been under the following laws and regulations. The **Enhancement and Conservation of National Environmental Quality Act** is the fundamental law governing environmental standards, including planning, and monitoring environmental quality and establishing a system for an environmental impact assessment. The Public Health Act provides a legal basis for local administration and managing of MSW, issuing and setting regulations to control and protect environmental sanitation, covering the collection, transportation and disposal of waste [11]. The National Health Act [12] specifies that state agencies have the responsibility to reveal and provide data and information to the public. The law obliges individuals to cooperate with state agencies in creating a healthy environment.

The **Ministry of Natural Resources and Environment** (MONRE) has overarching responsibility over all waste- and management-related units and departments responsible for the formulation of policies, guidelines, programs, regulations, and standards relating to waste. These include the Office of Natural Resources and Environment, Policy and Planning (ONEP), which prepares policies and prospective plans and administer the Environmental Fund); the Pollution Control Department (PCD) which provides recommendations on the technical preparation of MSW Management policy; the Department of Environmental Quality Promotion (DEQP), which promotes and disseminates information pertaining to MSW management and develops guidance/guidelines and processes; and the Department of Marine and Coastal Resources (DMCR). The PCD has played a key role in preparing the country for the development of EPR systems for various packaging, including e-waste. The provincial government coordinates waste management-related activities between local governments and the central governments with the former acting as implementing units.

Local governments handle waste management within governed areas. The four categories of local administrative organizations in Thailand are the municipality; sub-district administrative organizations (SAO); provincial administrative organizations (PAO); and the special administrative areas (Bangkok and Pattaya City). The local government's authority includes the implementation units responsible for handling waste management within governed areas. Waste reduction and diversion of waste from the disposal sites are achieved through increased numbers of waste separation options at the sources for government agency offices, local government offices, communities/villages, schools/nursery schools, temples, markets, and restaurants. Final disposal sites used in Thailand are sanitary landfills, including waste diversion for composting, energy recovery, and material recovery.

Regional governments coordinate related works between central and local governments.

Recycling

As of 2017, the total amount of recyclable waste constituted about 7.15 million tonnes. Thailand aims to achieve an annual recycling rate of 25% of the total amount of packaging waste generated by 2025

[13]. In 2015, packaging waste constituted approximately 3.75 million tonnes of all reused waste, or 75.91% [14]. In 2015, the country reused approximately 8.20 million tonnes of industrial recycled waste materials. Of this, 43.29%, or 3.55 million tonnes, resulted from the sale of industrial recyclables from community recycling centers. The recycling of plastic and paper packaging waste is less than 70% while that of metals is less than 50% [15].

There are also plans for constructing high-quality recycling plants, including one SUEZ is planning to construct close to Bangkok for LDPE and LLDPE.

Disposal

Waste disposal facilities in Thailand appear below.

No. of treatment & disposal sites	**2,914**
No. of treatment facilities	**103**
Incinerators	45
Compost sites	*35*
Mechanical biological treatment	*23*
No. of final disposal sites	**2,811**
Sanitary/engineered landfills	*109*
Controlled dumpsites	*465*
Open dumpsites	*2237*

(PCD, 2017)

Data on the cost elements of sanitary landfill management in Thailand is largely unavailable. However, we assume that the capital and operational expenditures on the development and management of landfills in Thailand will show only small deviations from that in Malaysia and Indonesia.

Waste banks

The implementation of the waste bank campaign for handling waste by buying it back, similar to a deposit banking system, should result in greater efficiency in waste segregation. The Wongpanit Company initiated a waste bank system in 1999 in Phitsanulok province, when personnel noticed poor students selling recycled waste and depositing the earnings in the bank. To help the students, waste banks were set up as pilot projects in schools. Leaflets listing prices were distributed, and over time, students progressively realized the unexpected value of waste, and became eager to sort the waste and deposit it directly in the waste bank.

Public awareness & education

Thailand's roadmap for municipal solid waste management emphasizes increased sustained efforts on environmental education, public awareness building, and participation in environmental programs. In addition, capacity building programs are being implemented through public and private institutions, NGOs and private sector associations such as the Thailand Institute of Packaging and Recycling Management for Sustainable Environment (TIMPSE). Other successful awareness-building programs include the effective "Magic Eyes" campaign to reduce littering in Bangkok by the Thai Environment and Community Development Association (TECDA). The Green Labelling System is an environmental certification awarded to specific products or services, excluding food, drink, and pharmaceuticals. The criterium to receive the label is that the products or services must have a minimum detrimental impact on the environment when compared with others serving the same function. Participation in the Thai green label plan is on a voluntary basis.

Controlling & monitoring

The waste management chain features various levels of monitoring and control. These include institutional and legal measures to control and guide the implementation of the various waste management policies, as reflected in the roadmap. The central government's PCD performs key functions and has the responsibility to control, prevent, and reduce pollution issues in order to build a good environment on a national level, with the following commitments [16]. The department has many divisions with specific roles to that support the department's key mandate. The Inspection and Enforcement Division of PCD handles inspection and enforcement of the law according to the Enhancement and Conservation of National Environmental Quality Act and other related laws. The division also manages public complaints about pollution, and inspects and investigates legal disputes concerning pollution. Furthermore, it calls for damages from the pollution sources. It also support the local authorities in coordinating their environmental law enforcement. Local government authorities, civil societies (e.g., the network for monitoring illegal dumping wastes) and private sector entities are engaged in collaborative implementation and monitoring of waste management.

Data availability

Thailand has made great strides in implementing waste management policies and roadmaps on waste management. The country has made strong efforts to collect data on solid waste compared to other countries. However, there are limitations regarding the availability of packaging waste data. The TIMPSE in 2005 developed capacity regarding the comprehensive management of used packaging and recycled materials in all sectors. It also spearheads collaboration between government, private, and public sectors to promote used packaging and continuous recycling material separation. More important, TIMPSE is becoming the center for databases on used packaging and recycling material management. So far, TIMPSE has yet to develop the database on packaging waste. Therefore, there is a lack of up-to-date and disaggregated data to support EPR policy formulation and implementation.

Initiatives and organizations promoting EPR

As mentioned earlier, Thailand is currently in the drafting stage of a legal basis for EPR. There is also a **draft electrical and electronic equipment waste (WEEE) Act** that seeks to implement EPR for electronic and electrical equipment waste in the draft stage. It considers cameras and VDO recorders, portable audio-visual equipment, printers and facsimiles, telephones, personal computers, air conditioners, refrigerators; fluorescent lamps, and dry-cell batteries. Moreover, the establishment of an EPR system for packaging waste is supported by the GIZ as part of their strategy for managing packaging waste.

Industries have shown commitment to support government initiatives and policy directions to achieve sustainable production and consumption targets. TIPMSE is a non-profit organization that was officially established by the industrial clubs under the Federation of Thai Industries, associations and member from packaging and consumer products manufacturers. TIMPSE currently is not able to fully deliver on its mandate.

Conclusion – evaluation of a successful EPR implementation in Thailand

The political situation overall is stable, despite high levels of corruption, and the educational level is high. Generally, the existing structures are regulated and the government has already proposed a ban on the import of plastic waste 10 years ago. The government, NGOs and companies are strongly committed to begin controlling the existing waste problem. EPR as a solution to this is already on the table: for instance, participants are currently drafting an EPR law for WEEE. Through TIMPSE, a general structure already exists to support the development and research in the field of packaging. Thus, the overall situation appears good based on the existing institutional, political, and societal conditions. Thailand has also many islands. However, as these are only insignificantly inhabited, the geographical situation should support the introduction of an EPR system.

The composition and size of packaging in Thailand strongly differs from that typical in Europe, as the packaging sizes are generally much smaller and a significant share involving sachet packaging for water or food. Moreover, the country's distribution structures comprise many more steps than the ones in Europe, a difference that stakeholders must consider when discussing EPR system participation and infrastructure. Another challenge arises from the anonymity in urban areas.

Lastly, the informal sector and waste banks need to be included in the EPR system.

The below table summarizes the conditions in Thailand, which influence or determine the successful introduction of an EPR system.

Table 9: Summary Framework conditions for EPR in Thailand

	Influencing criteria	Good	Medio-cre	Not good	Explanations
General situation	a) Political situation		X		The political situation overall is stable
	b) Legal and regulatory frame-work		X		Quite extensive legal framework; how-ever, not efficient in reducing plastic lit-ter
	c) Income level and GDP		X		The growth of the Thai economy has been largely supported by tourism and increased exports to foreign markets. Income is low, but higher than in neigh-boring countries.
	d) Corruption			X	The government is still struggling with corruption.
	e) Education and living stand-ards	X			The constitution provides for 9 school years. The standard of living varies
	f) Geographical situation		X		Large spatial extent and climatic differ-ences and big urban regions.
Waste management situation	g) General waste management structure		X		Thailand aims to achieve an annual recy-cling rate of 25% by 2025.
	h) Financing of waste manage-ment		X		Garbage fees are taken by the munici-palities. They do not cover the costs of high-quality waste management
	i) Recycling of packaging waste			X	Only by informal sector and waste banks
	j) Technical competences		X		There are some treatment facilities and some plans for constructing high-quality recycling plants.
	k) Public awareness		X		Public awareness arises and there are capacity building programs and cam-paigns against littering.
	l) Controlling and monitoring systems		X		The government, NGOs and companies are strongly committed to begin con-trolling the existing waste problem, but corruption is a problem.
	m) Importance of the informal sector	X			The informal sector plays an important role in recovery.
	n) Experiences and data availa-bility		X		Thailand has made efforts to collect data on solid waste compared to other countries.
Current status of EPR	o) EPR laws for packaging		X		No; but discussions ongoing.
	p) EPR laws for other fractions	X			There is a draft WEEE Act.
	q) Initiatives from the industry	X			Initiative TIMPSE
	r) Initiatives of the government		X		There are several policies, guidelines, and regulations related to the principle of EPR. EPR laws on packaging waste are in discussion.
	s) Support through external ex-perts		X		Strong support by GIZ.
Other remarks					

For contacts please see Annex 1.

5.2 Vietnam

The Socialist Republic of Vietnam is located in Southeast Asia, bordering on China to the north, Cam-bodia and Laos to the west, and the South China Sea to the east. Vietnam has a land area of 310,070

square km. Vietnam's climate is categorized as tropical in the south; monsoonal in the north. There are 58 provinces and 5 municipalities in Vietnam. Hanoi, the capital, is the political and cultural center while the economic center is located in the south. Most of the largest industrial parks are located in the southern part of the country.

Vietnam has a long coast line, ranging to 3,400 km, and extensive delta areas. Three quarters of the country consists of mountain terrain, hillsides, and highland. Vietnam is highly exposed to such natural hazards as droughts, earthquakes, floods, forest fires, landslides, sea water intrusion, typhoons, and volcanic eruptions. The aftermaths of these hazards increase the amount of municipal solid waste with which the country must deal. The coastlines are prone to massive pollution from tourists. The country's World Risk Index reflects this exposure, giving it a "very high" rating [8].

The Vietnamese Communist Party rules this socialist republic state. The communist style political rule in recent times has trended toward the increasing use of large domestic security forces to contain rising popular discontent. Many analysts describe this as the lack of people's acceptance of Party rule and criticism of its failure to deal with corruption and to rule properly. Political commentaries assert that there are chronic problems the Vietnam Communist Party has faced in its ability to implement policy. Generally, the Political Risk Index gives the country a "mediocre" rating [5]. Political conditions in Vietnam are not effective in terms of the coherent implementation of policies and rampant corruption and insubordination exists in the party and state [17]. According to the CPI, Vietnam's scores in 2016 and 2017 were 33/100 points and 35/100 points, respectively. In the latest 2018 CPI, Vietnam ranked 117th amongst 180 countries and territories, dropping by 10 places compared with 2017. It scored 33 points out of 100 in the 2018 CPI, down two points compared with 2017 [10].

Vietnam has grown from one of the world's poorest nations to a lower middle-income country, exhibiting a fundamentally strong economy supported by robust domestic demand and export-oriented manufacturing. Vietnam's economy is maturing and forming a growing middle class that is increasingly seeking a higher standard of living in cities. Economic growth and urbanization are leading to an increasing demand for urban housing in cities, driving urban property prices upwards, and increasing the volume of municipal solid waste. Agriculture's share of GDP has sharply dropped from about 25% in 2000 to 18% in 2014, while the industrial share increased from 36% to 38% in the same period. Government-owned companies now make up about 40% of GDP. Vietnam's economy is currently dominated by the income generated from areas generally referred to as the primary sector. That means the country competes primarily on basis of low-skilled labor, unprocessed natural resources, and supports relatively low wages. Vietnam's urban population consumes two to three times more natural resources than its rural dwellers due to higher income levels in these areas. Similarly, waste generation in urban areas is about two to three times higher than in rural areas [18].

Assessment of the current EPR status for managing packaging waste

General legal framework

Policies on waste management in Vietnam started with the 1993 Law on Environmental Protection, which has regulated environmental protection and waste management. Vietnam has introduced and emphasized the 3Rs concept (reduce, reuse, and recycle) and principles into the Law on Environmental Protection 2005. This law, for the first time, regulated **waste segregation at the source and during reuse and recycling** in detail. The country also introduced **the concept of EPR**. In 2009, it adopted the National Strategy on Integrated Solid Waste Management to 2025, with a vision to 2050. The strategy has defined clear directions for waste management, and set the objectives, tasks and solutions to achieve the targets. Some of the related policies and plans developed to guide the implementation of promulgated waste management laws include the National Strategy for Environment Protection Until 2020 and Vision Toward 2030 (Decision No. 1216/QD-TTg dated 05 Sep 2012) [19], the National Strategy for Integrated Management of Solid Waste Until 2025, and Vision Toward 2050 (Decision No. 2149/QD-TTg dated 17 Dec 2009) [20], National Strategy for Green Growth (Decision 1393/QD-TTg, dated September 25, 2012) and National Action Plan for Green Growth 2014-2020 (Decision 403/QD-TTg dated March 20, 2014) [21]. On the **construction of disposal facilities**, the master plan for the

construction of solid waste treatment sites concentrates on three key economic areas in the North, Center and South of Vietnam to 2020 (Prime Minister Decision 1440/QD-TTg dated 06 October 2008) [19].

There are **six concerned ministries** performing regulatory functions in solid waste management: (i) the Ministry of Natural Resources and Environment (MONRE), (ii) the Ministry of Industry and Trade (MOIT), (iii) the Ministry of Construction (MOC), (v) the Ministry of Health (MOH), and (vi) the Ministry of Agriculture and Rural Development (MARD). Except for the MONRE, the other ministries play assigned roles related to sanitation, waste management and disposal facilities as well as the application of economic instruments to ensure effective waste management.

On the **department** level, the institutional set up for solid waste management in Vietnam is a bit **complicated,** with the Department of Natural Resources and Environment (DONRE), Urban Environment One Member Limited Companies (URENCOs) as lower level actors. DONRE plays an important role in waste management with respect to monitoring environmental quality, and managing and implementing waste management policies and regulations issued by MONRE and Provincial People's Committees (PPC's).

At **the local or provincial level**, several agencies participate in waste management including PPC, DONRE, Department of Construction (DOC) and URENCO. In each city, URENCO manages solid waste, and has full responsibility to collect, transport, and dispose of waste generated in the residential areas, industrial parks, and hospitals, among others [22]. Currently, more private companies are participating in waste disposal and recycling activities in some cities. Solid waste from municipal areas is usually stored temporarily at convenient locations, before being transported to the final landfills.

Environmental education & awareness

Curriculums typically incorporate environmental education. Recent pilot 3R programs emphasize community education and the need to raise awareness about reducing and segregating waste at the source. Opportunities for knowledge transfer (e.g., city-to-city cooperation) and the exchange of good practices are funded under such programs. Vietnam is increasing environmental education themes in its educational institutes [23]. Environment education is not limited to schools only but also includes other educational institutions such as museums and parks. Environmental education focuses on expanding the common conception of the environment while empowering young people, their parents, educators and ultimately the community at large to take action on everyday environmental problems. The government, civil society groups and NGOs such as the Asia Foundation typically pursue such educational issues.

Sorting **household solid waste at the source** is not a fully adopted practice in Vietnam. Household solid waste collection in urban areas has reached an average of 84% to 85%, according to the National Environment Report 2011-2015 [24]. Many Vietnamese would segregate recoverable garbage such as plastics, papers, and metals to sell to garbage collectors.

Disposal

Landfilling, open burning and poorly managed dumpsites have been the major disposal methods, although investments in the sector have significantly improved material recovery and waste treatment options such as composting, incineration and waste-to-energy plants. Hitherto, waste management has not emphasized the 3Rs. Nevertheless, the solid waste management system has improved, with implementable regulations and policies.

Almost no provinces **have enough resources to invest in** centralized, large-scale waste treatment facilities. Unhygienic open landfills are popular. Hygienic landfills and waste treatment facilities are typically available in big cities. Regarding landfill projects, URENCO is the agency designated to "own" landfill projects, and it also manages and operates the landfills over their operational life. Budgets for waste treatment, mainly landfilling, are low and inadequate. The total collected charges from households cover less than 60% of the total waste management cost and in some municipalities only 20-30% the cost [24].

Vietnam receives significant international development assistance to establish technical competence. There are 50 incinerators facilities operating to treat domestic solid waste throughout the country [25].

Recycling

In Vietnam, recycling activities largely fall to **informal sectors** such as informal companies, handicraft villages, and scavengers at all stages. The informal sectors make a significant contribution in recycling activities and provide livelihoods for many immigrants and marginalized people.

Informal waste sector members are very active in this industry, particularly in the collection and transportation of recyclables. On average, each city in Vietnam has up to an estimated 700 scavengers. In Hanoi for example, statistics indicate that there are approximately 6,000 recyclers and scavengers [26]. Other actors include small household/commercial recyclers, larger recyclers, and manufacturers that produce recycled products. Recyclers are at the middle of the recycling value chain, and usually collect recyclable materials from scavengers. The potential in Vietnam for recycling is considered high, although the industry suffers from a **scarcity of data**. On the other hand, some cities achieve high recycling rates in Vietnam; Hanoi, for instance, recycles an estimated 20% of all the domestic solid waste it generates.

Recyclable materials might be collected at the source at households or picked up at drop-off points by scavengers. Additionally, many waste pickers and scavengers work at waste treatment plants to collect recyclable materials. They sell to larger buyers or recycling centers afterwards, which separate the waste and sell it to factories as manufactured input materials. According to 2011 MONRE data, an estimated 8-12% of collected municipal solid waste has been recycled informally in craft villages in provinces such as Hung Yen, Bac Ninh and Hai Duong [24]. This results in significant pollution by paper, metal, plastics, and electronic waste in the villages. Recycling activities in the informal sector take place mainly in craft villages with backward technologies, causing major pollution and affecting health.

In general, Vietnam has nearly 3,000 **craft villages** that manufacture handicrafts, but also specialize in recycling discarded plastic and other waste materials. The villages buy plastic from local depots or waste pickers and process it into plastic pellets or film to make new plastic products such as coat hangers and chairs. They also pelletize beer crates.

Critical issues to implementing an EPR system

Waste management does not generate a **consistent inventory** in Vietnam. **Responsibilities overlap or there is a lack of clear responsibilities** and/or coordination and cooperation among management agencies at different levels. What's more, no systematic database on waste management exists. Data on waste generation, materials flow, the cyclical use of waste, landfilling, or recyclables remain limited. Discrepancies in data from independent research and the official data by MOC/MONRE make it difficult to project, plan and develop waste management strategies and master plans.

As described above, solid waste management in Vietnam has been assigned to different ministries including MONRE, MOC, MARD, MOIT and MOH. However, at the local level, certain areas exist where this assignment is not clear and there are overlaps among sectors. For example, in some cities (such as Hanoi, Hai Phong, and Hue) municipal solid waste is the responsibility of the DOC, but in others (such as Ho Chi Minh City and Da Nang) it is the responsibility of DONRE.

Initiatives and organizations promoting EPR

EPR has not been fully implemented in Vietnam yet. However, legislation has passed that provides the legal basis for the initiation of an EPR system in the country. The Law on Environmental Protection 2005 enacted in July 2006 introduced the EPR concept in Vietnam. This law was not brought into full play until recently.

The EPR system has listed a couple of target products beyond packaging, such as electric and electronic equipment, compact and fluorescent lamps, and computers; computer displays; CPU printing

machines; fax and scanner machines, cameras, video cameras, mobile phones, iPads, and DVDs; VCD; CD and other players, photocopy machines and TVs; fridges and air conditioners; and washing machines.

To push an EPR system for packaging, several **multi-national companies** teamed up to found an organization that should eventually become the PRO of an EPR system for packaging. Founded in mid-June 2019, this organization has received support from the government.

Moreover, there is the **Vietnam Recycling Platform** (VRP), a consortium of leading producers of electrical and electronic equipment founded to reduce electronic waste, increase recycling, and manage the environmental, health and safety impact of products at the end of their life cycles. During the pilot phase, Vietnam Recycles will provide take-back services in the Hanoi and HCMC regions.

Conclusion – evaluation of a successful EPR implementation

Following China's import ban on plastic waste, there have been attempts to export more plastic waste quantities to Vietnam. However, these quantities could neither be technically nor organizationally handled, which is why parties can currently only import precisely labelled and high-quality waste. Thus, overall waste imports have fallen to around 25% in comparison to 2017 as the imports are now strongly regulated. Moreover, in the field of e-waste, Vietnam is also one of the biggest importers – aside from Ghana – of low quality e-waste.

There are already some discussions in Vietnam and a very general legal basis for introducing an EPR system. These include the recent foundation of an organization, which should eventually become the PRO of the EPR system, to manage and organize the system. This foundation took place in mid-June 2019 with positive governmental feedback.

However, successful implementation requires assurance that participants can overcome current mismanagement and a lack of technical know-how. Additionally, many local experts say the lack of the consequent implementation of environmental goals, especially regarding long-term goals, requires consistent monitoring and controlling. Moreover, they also often name the country's high levels of corruption as a hindrance.

It is necessary to develop strategies for the collection, sorting and recovery/recycling infrastructure – a challenge considering the vast space and the disparities in infrastructure across the country. Chile can serve as a positive example and a role model. That country recently published the draft of its EPR law for packaging, which will enter into force soon.

It is important for an EPR system for packaging to start managing the packaging waste in an environmentally sound way as the plastic litter, which flows into the oceans, cannot be handled by the municipalities. Thus, an important step toward developing a successful EPR system involves establishing a foundation for a PRO among multinational consumer good companies paired with governmental support.

The table below summarizes the results.

Table 10: Summary Framework conditions for EPR in Vietnam

	Influencing criteria	Good	Mediocre	Not good	Explanations
General situation	a) Political situation		X		The political conditions in Vietnam are stable but not effective for a coherent policy implementation
	b) Legal and regulatory framework		X		Some laws and masterplan
	c) Income level and GDP		X		Vietnam has grown from one of the world's poorest nations to a lower middle-income country.
	d) Corruption			X	Corruption and insubordination within the Party/State.
	e) Education and living standards		X		Growing middle class that is increasingly seeking a higher standard of living in cities
	f) Geographical situation			X	Long distance and a long coast line (3,400 km) and extensive delta area. There are earthquakes, floods, forest fires, landslides, sea water intrusion, typhoons, and volcanic eruptions.
Waste management situation	g) General waste management structure		X		Most involves landfilling, open burning and poorly managed dumpsites
	h) Financing of waste management		X		The collected charges from the households may cover less than 30% to 60% of the total waste management cost.
	i) Recycling of packaging waste				Informal sector and junk shops
	j) Technical competences		X		Not very high
	k) Public awareness		X		Awareness is increasing
	l) Controlling and monitoring systems			X	There are hardly any controls
	m) Importance of the informal sector				Plays important role in recovery
	n) Experiences and data availability			X	Data on waste generation material flow cyclical use of waste, landfilling, and recyclables are very limited.
Current status of EPR	o) EPR laws for packaging		X		In discussion
	p) EPR laws for other fractions			X	Not known, but a Vietnam Recycling Platform (leading producers of electrical and electronic equipment) does exist
	q) Initiatives from the industry	X			Several **multi-national companies** teamed up to found an organization that should eventually become the PRO of an EPR system for packaging.
	r) Initiatives of the government		X		The organization of multi-national companies has received support from the government.
	s) Support through external experts			X	Not known
Other remarks					

For contacts please see Annex 2.

5.3 The Philippines

The Philippines is an archipelagic country in Southeast Asia situated in the western Pacific Ocean. It includes about 7,641 islands categorized broadly under three main geographical divisions (from north to south); Luzon, Visayas, and Mindanao. However, only around 2,000 of the islands are inhabited. The Philippines is a presidential republic with a land area of 298 170 km² and a population of 104.9 million (as of 2017) [27]. Natural hazards affecting most of the Philippines include earthquakes, tropical storms, floods, and volcanic eruptions, with half the area exposed to high levels of risk. Storm surges do occur, but they affect only small areas. Densely populated cities like Metro Manila have high waste generation per capita while rural settings generate comparatively less. Thus, the World Risk Index gives the Philippines a "very high" score regarding its vulnerability due to this high exposure. Moreover, the country lacks adaptive and coping capacity [8].

The Philippines is a republic with a presidential form of government with power equally divided among its three branches: executive, legislative, and judicial. The president and the vice president are elected by direct popular vote for six-year terms without re-election [28]. The country has a mixed legal system of civil, common, Islamic, and customary law. The combination of the Philippines' powerful presidency and political institutions has come under attack since the presidency of Rodrigo Duterte. There have been notable concerns regarding human right abuses voiced among international human rights organizations that have criticized the country's leader's aggressive fight against crime, drugs and corruption [29]. An outbreak of Islamic jihadism in Marawi, a predominantly Muslim province in Mindanao, led to a high terrorism score for the country in 2017, with most incidents linked to insurgency movements (Abu Sayyaf and Moro) in the southern parts of the country (Mindanao, Sulu and Palawan). A decades-long Maoist-inspired New People's Army insurgency also operates throughout much of the country, posing threats to the government. Overall, political risk ranges from "mediocre" to "relatively unstable," fueled by attempts by the Duterte administration to introduce federalism, the deteriorating business environment, and tensions with China over marine disputes in the South China Sea [5].

Nevertheless, the Philippines, although a lower middle-income country, has been one of Asia's strong performers over the years. The country experienced notable economic growth, evidenced by its rising GDP [30]. Moreover, the economic growth has become more inclusive as the poverty rates have declined recently. In 2017, 21.6% lived below the NPL (compared with 26.6% in 2010) and 7.8% below the GPL [30].

In 2018, 2017, and 2016, the Philippines scored 36, 34 and 35, respectively in the perceived corruption scores published annually by the CPI [7]. Scores show a gradual improvement in perceived corruption level in the country. Declining trust regarding governance and consequential poor economic conditions likely result from systemic corruption among public officials and private organizations.

Assessment of the current EPR status for managing packaging waste

Legal framework

There is currently **no EPR system** in place in the Philippines. The Ecological Solid Waste Management Act of 2000 (Republic Act 9003, also called RA 9003) governs solid waste management. The Act was passed to provide policy direction for all local government units (LGUs – comprising provinces, cities/municipalities, and *barangays*, which are the smallest local administration units) in the country. It established an Ecological Solid Waste Management (ESWM) system by prescribing a systematic, comprehensive, and ecological solid waste management program [31]. The Act of 2000 remains the core legal framework upon which the major waste management policies and guidelines hinge, because it provides the legal basis for promoting systematic, comprehensive, ecological measures.

Waste management in the Philippines is mainly implemented according to the provisions of RA 9003, which allows the LGUs, cities and municipalities to perform micro-management of solid waste and prepare 10-year solid waste management plans, including collection, transportation, and disposal of solid wastes. Moreover, it obliges the creation of a solid waste management (SWM) board and committees at the barangay, city/municipal, and provincial levels.

The National Solid Waste Management Commission formulates policies to attain the objectives of the Act and to oversee and **monitor** the overall implementation of the solid waste management programs. The National Solid Waste Management Commission directly reports to the office of the president and is also responsible for the preparation of the National Solid Waste Management Framework for the country. Moreover in 2006, the Commission approved a resolution called "Creation of a Technical Working Committee for Phasing out non-environmentally acceptable products and packaging materials". Based on this resolution, a list of non-environmentally acceptable products can be prepared as defined in the Act that shall be prohibited [32].

At the provincial level, the provincial solid waste management boards oversee solid waste management while the city or municipal solid waste management boards coordinate the management of solid waste at the city/ municipal levels. Within the *barangays*, the collection of biodegradable and reusable waste including the establishment of material recovery facilities (MRF) and the performance of educational campaigns and awareness programs on solid waste management are handled by the *barangays* [33]. Nevertheless, proper planning and implementation by the LGUs on how to divert the organic waste from the waste stream and monitoring/validation of the actual reduction and diversion of organic wastes remain a challenge in the country.

Collection and waste separation

LGUs administer their own collection systems or assign private contractors to carry out this service. Collection vehicles are open dump trucks and compactor trucks that collect about 40% to 85% of the solid waste generated. Metro Manila collection is at 85% [34]. Biodegradable and recyclable waste is collected and managed on the barangay level. The government provides Material Recovery Facilities (MRF) to aid in the recapture of recyclable packaging waste. **Waste disposal** involves landfills, although the approach has proven to be inadequate. As of 2012, 7,683 MRFs have been established and now serve 8,704 *barangays* – an increase of 80% in the number of *barangays* covered over six years. Moreover, recently, MRFs have also been established in schools, malls, and other commercial establishments [35].

Many of the Philippine islands are frequented by tourists, undoubtedly bringing economic benefits but also a surge in solid waste generation that may fluctuate depending on the season. Coastal cities are particularly affected by the solid waste problems. Their inability to comply fully with the mandates of the national law on ecological solid waste management stems from insufficient budgets and expertise, resulting in fragmented implementation of solid waste management. Another problem is the **lack space for the treatment and disposal** of garbage, as most of the land belongs to private entities. The limited space for proper waste disposal places limitations on effective waste management. During natural disasters, comparatively higher volumes of waste are generated.

Separation of recyclables is mandatory and generally done at the source. Many households segregate and sell some of their used and disposable items like old newspapers, empty bottles, and scrap metal to pushcart-driving buyers, who are either the informal waste pickers or the organized eco-aides who, in turn, sell the items to junk shops or dealers. Eco-aides are the organized, door-to-door collectors of recyclable materials under the management of NGOs, LGUs, or barangay offices. Therefore, the collection amount by Eco-aides is much higher than that from informal street collectors.

In 2014, the recyclable waste fraction comprised 27.8% of the total waste generated [36]. Recyclables consist of paper and cardboard (8.7%), plastics (10.5%), metals (4.2%), glass (2.3%), textiles (1.6%) and leather and rubber (0.37%) [37]. The segregation ratio is comparatively lower in Metro Manila than in other regions except for paper. The percentage of households that sell or give to door-to-door collectors is high in metro Cebu and southern Mindanao. There are also networks of junk dealers along the recycling chain in the major cities. For example, in Metro Manila, these "*Linis Ganda*" buy recyclable materials from individual households.

Relevant for an EPR, the RA 9003 mandates the LGU describe methods for developing the markets for recycled materials, including, but not limited to, an evaluation of the feasibility of procurement

preferences for the purchase of recycled products. Each LGU may determine and grant a price preference to encourage the purchase of recycled products. The LGU recycling component shall evaluate industrial, commercial, residential, agricultural, governmental, and other curbside, mobile, drop-off, and buy-back recycling programs. It also covers manual and automated materials recovery facilities, zoning, building code changes and rate structures that encourage recycling of materials. The Act 9003 also allows LGUs to cluster together to set up a sanitary landfill for the entire province. However, compliance with the law among local governments varies widely due to various constraints, such as limited financial resources, limited markets for recyclable materials, and a lack of technical capacity. The number of LGUs with access to sanitary landfills remains below 15%. The solid waste diversion rate in Metro Manila is 48%, while outside Metro Manila the rate is 46% in 2015 [37].

Limited information exists to evaluate the country's level of performance in solid waste, although based on the data from a group of 128 selected and supported LGUs, a set of monitoring and evaluation criteria were established and compliance rates were found to range between 53% and 100%. Some LGUs have been successful in engaging the public to do source segregation while the majority still lags. The local SWM boards are tasked to prepare, submit, and implement a plan for the safe and sanitary management of solid wastes generated in areas under its geographic and political coverage.

Awareness and education

Many collection programs have been implemented to recapture packaging waste and residual waste. Multi-stakeholder meetings, dialogues and consultations exercised by LGUs aim at **increasing inclusiveness and public awareness** in tackling waste problems. For example, community-based organizations and civil society organizations might act to raise awareness and source segregation at places such as public markets and commercial establishments, as well as through the Eco-saver program for public schools. Moreover, the Republic Act No. 9512 requires the promotion of environmental awareness through **environmental education**. It integrates environmental education in the school curricula at all levels, public or private, barangay day care and pre-school, and non-formal, vocational, and indigenous learning. However, there are no appropriate national action plans on environmental education, skills training, and human development in support of a green vision.

All garbage collection and hauling companies are encouraged to employ other possible media approaches to ensure compliance with mandatory waste segregation (for example, the use of bells or color-coded trucks) in their garbage collection vehicles. Public awareness programs by civil society groups and NGOs seek to strengthen the adoption of 3Rs in every household and commercial institution.

Funding

On a national level, solid waste management is, as prescribed in the RA 9003, through the establishment of a **National Solid Waste Management Fund,** a special account in the National Treasury, and administered by the Commission. This is the catalytic fund for initiating bigger and wider SWM engagements in the future. The National Solid Waste Management Fund is resourced via donations, endowments, grants, and contributions from domestic and foreign sources. The administration of the fund shall include funding of products, facilities, technologies, and processes to enhance proper solid waste management, awards, incentives, research programs, information, education, communication, and monitoring activities. It will also be applied for technical assistance and capacity building activities. In most the cities in the Philippines, waste management utilizes about 20% of the LGUs' total budgets [38].

The informal sector

The importance of the informal sector in the waste management value chain in the Philippines should not be overestimated, however, it plays a critical role regarding the volume and quantity of recyclable waste being recovered. The RA 9003 also promotes collaboration with the private sector and associations working on solid waste management. However, regarding the informal sector, the enactment, on the one hand, prohibits waste picking in dumpsites and segregation areas unless the operator allows it, but on the other hand, it encourages cooperatives and associations to be integrated into the solid waste management system.

The Local Government Code (RA7160) requires local bodies to provide social welfare and basic facilities to different communities, including scavengers. There are also networks of junk dealers in Metro Manila – the *Linis Ganda* – that buy recyclable materials from individual households. About 500 waste dealers from 17 waste dealer groups are involved in *Linis Ganda*, with about 1,000 Eco-Aides. For the integration of the informal waste sector, resolutions have been passed in 2010. There are also pilot projects, which attempt to formalize waste pickers via PPP arrangements to allow informal recyclers and junk shops concessions to collect or receive materials or to operate recycling centers.

Critical issues to implementing an EPR system

Limited up-to-date data exists for policy and decision support on EPR. Existing data reports focus mainly on the solid waste in different waste streams and material types, but fails to differentiate packaging waste quantities and types. The unavailability of up-to-date disaggregated data on waste collection, disposal, infrastructure, recycling, and various waste streams makes it impossible to evaluate concrete critical issues when implementing an EPR system.

Initiatives and organizations promoting EPR

The Philippines have shown a commitment to adopting EPR as part of an inclusive waste management strategy that can contribute to increasing waste diversion from landfills, thus boosting the recapture of recyclable materials from waste streams.

On the **government** side, one senator, Senator Cynthia Villar, is pushing for the implementation of EPR. Villar said she is also considering the amendment of Republic Act 9003 or the Ecological Solid Waste Management Act, which failed to reduce plastic waste despite enactment in 2001. Senator Villar pushed for the implementation of a measure that will reduce plastic waste by making manufacturers responsible for the entire life cycle of plastic products [39]. As an initiative on EPR, the "Lighting Industry Waste Management Guidelines" were issued through the Joint DENR-DOE Administrative Order No. JAO 2013-09-0001 in 2013. According to these guidelines, all producers shall jointly work together in coming up with a lamp waste management plan and in setting up a lamp waste management system operator. Additionally, the Environmental Management Bureau developed guidelines on the Environmentally Sound Management (ESM) of waste related to electrical and electronic equipment. The guidelines, among other things, aim to institutionalize the principle of EPR in addressing the financial requirements involved in the environmentally sound management of WEEE [40].

Moreover, an administrative order currently being drafted is considering the establishment of a market-based instrument to control marine plastic litter and prevent land-based plastics from entering waterways [41]. This administrative order provides a good framework for the implementation of EPR in the Philippines. There are various other government initiatives that urge the National Solid Waste Management Commission and the Department of Environment and Natural Resources to implement EPR.

From the **industry**, there are also initiatives acting in favor of EPR. For instance, the Philippine Alliance for Recycling and Material Sustainability (PARMS) has members that include consumer goods companies such as Coca-Cola Philippines, Nestlé Philippines, Pepsi-Cola Products Philippines, Procter & Gamble Philippines, Unilever Philippines, Oishi, TAT, Kopiko, Monde Nissin, Mondelez international, and Universal Robina [42]. Currently PARMS is supporting five projects for separate waste collection in schools, coastal clean-ups, a children summit on solid waste management, environmental summits for companies and organizations and research and development for recycling in the Philippines. Aside from PARMS, the San Miguel Corporation, one of the largest food and beverage producers in the Philippines, announced it will not continue its plastic bottled water business in support of a more sustainable business model in 2017 [43].

Conclusion – evaluation of a successful EPR implementation in the Philippines

There are several initiatives from the consumer good companies and the industry in general in cooperation with the government. However, many think the overall potential for successfully introducing an EPR system is uncertain. This is rooted in the following reasons:

The stability required for sound management and effective control are currently not yet givens. Corruption and mismanagement are prevalent. It is unlikely that the necessary controls will be introduced soon at the necessary interfaces, and recycling is not given a high priority.

Moreover, there are about 2,000 inhabited islands that impede the introduction of a twofold way. First, they makes the implementation of an infrastructure for collection and recycling very difficult. Second, it is very difficult to register and control which packaged goods end up on which islands and thus which goods are introduced where. However, as previously explained, this is a crucial prerequisite for identifying the obligated companies and their respective quantities, which they need to pay for as part of the EPR system.

An authoritarian government theoretically has the power to determine requirements, and mandate their fulfillment, however without specific monitoring, registration, certification, and control, no successful implementation can be guaranteed.

The conclusion is complemented through the below table.

Table 11: Summary Framework conditions for EPR in the Philippines

	Influencing criteria	Good	Medio-cre	Not good	Explanations
Gen-eral	a) Political situation		**x**		Somewhat stable economy; however, political tensions and human rights violations

	b) Legal and regulatory framework		X		Quite extensive legal framework; however, not efficient in reducing plastic litter
	c) Income level and GDP		X		Despite political situation, it is increasing in past years
	d) Corruption			X	Corruption is a significant issue
	e) Education and living standards		X		Varies across country, increasing in the past years
	f) Geographical situation			X	Multiple islands, high exposure to natural hazards
Waste management situation	g) General waste management structure		X		Mandatory waste segregation at household level and relatively high collection rates in urban areas; waste treatment and disposal often insufficient
	h) Financing of waste management		X		National solid waste management fund, received funds from various sources
	i) Recycling of packaging waste			X	*Informal sector*
	j) Technical competences		X		Varies across country
	k) Public awareness		X		Embedded in school curriculum, pushed by LGU measures and collection companies; success unknown
	l) Controlling and monitoring systems		X		Public agency with monitoring responsibility; not known how well executed
	m) Importance of the informal sector	X			Plays important role in recovery; also, common practice of households to sell their recyclable waste to informal collectors; initiatives for integration
	n) Experiences and data availability			X	Data often not up-to-date and partial or insufficient
Current status of EPR	o) EPR laws for packaging			X	Not existent
	p) EPR laws for other fractions		X		Guidelines for WEEE including EPR
	q) Initiatives from the industry	X			Initiative from large multinational and regional companies
	r) Initiatives of the government		X		Several initiatives, which entail EPR, and support from politicians, however, nothing very specific
	s) Support through external experts			X	No information
Other remarks					

For contacts please see Annex 3.

5.4 Malaysia

Malaysia is separated by the South China Sea into peninsular Malaysia and East Malaysia on the island of Borneo. It shares borders with Thailand, Singapore, Indonesia, and Brunei. About 1,000 islands belong to the country in its coastal waters. Due to its location, Malaysia has many coastal lowlands, however, both on the peninsula as well as on Borneo island, the landscape rises to hills and mountains. The country has a multi-ethnic population of over 31.6 million, primarily Malays, Chinese, and Indians, and covers a land area of 328,550 square kilometers [44]. The population distribution is, however, highly uneven, as more than 80% of the entire population lives on the Malay peninsula. Additionally, more than 70% of the population lives in the urban areas – other one-fifth lives in the greater area of the country's capital Kuala Lumpur. Malaysia is vulnerable to natural hazards including floods, forest fires, tsunami, cyclonic storms, and landslides [45]. However, the Word Risk Index rates its overall risk as "middle," since its coping and adaptive capacities are relatively good [8].

The constitutional democratic monarchy practiced in Malaysia occurs within a framework of a federal constitution, which provides the legal legislation, courts, and administrative aspects of the law. The country has three federal territories and 13 states, of which nine have hereditary rulers. The country's constitution lays out the powers of the government, the monarch and citizen rights, as well as the separation of powers among the executive, judicial and legislative branches. Nevertheless, until the elections in May 2018, the country had been dominated by what many commentators described as an electoral authoritarian regime [46]. There appears to be a general optimism that the new government will support favorable policies to improve living conditions of the citizenry. The 13 states are governed by state governments, which have their own state assemblies and cabinets of chief ministers who are selected from their respective state assemblies by the majority party [47]. Each state may enact its own environmental laws and regulations.

Since its independence in 1957, Malaysia has become the third largest economy in Southeast Asia. The county successfully transitioned from an initially agriculture and commodity-based economy to a diversified one due to its high density of knowledge-based industries and the adoption of innovative technology for manufacturing and digital economy. Its focus on trade and investment has led to the creation of employment and income growth [48]. Moreover, on the Ease of Doing Business Score, Malaysia ranks 15th place out of 190 countries [49]. Since the year 2000, Malaysia's GNI per capita has consistently appreciated to gain place as one of the emerging economies of developing countries in the region [48]. Consequently, poverty has significantly decreased, with 0.4% living below the NPL [50]. Income inequalities are also declining but remain relatively high [48]. The political and economic situation is currently assessed as "relatively stable" to "mediocre" due to the "1MDB" scandal in which the previous administration channeled several hundred million dollars from a government-run strategic development company (1MDB) to their personal bank accounts. Moreover, the political situation is currently affected by political tensions among the current minister and his successor and is marked by further divisions between the majority Malays who dominate the politics and the Chinese and Indian minorities, who dominate the economy [5]. Corruption is an issue but not a significant one as indicated with a score of 47/100 points which puts it at 61 in the global comparison [7]. The low scores result from weak democratic institutions and a lack of laws and enforcement mechanisms. The country has passed anti-corruption legislations aimed at curbing the incidence of corruption at all levels [51].

Malaysia's Human Development Index is 0.802 (rank 57 in the global comparison), which indicates a relatively good level of key development factors [52].

Assessment of the current EPR status for managing packaging waste

Legal basis

Malaysia currently has **no implemented EPR system** for any material. The existing policies and strategies do not specifically target EPR plans. Currently, household packaging waste is – as part of the municipal waste stream − governed by the Solid Waste and Public Cleansing Management Act 2007, which falls into the jurisdiction of the Department of Solid Waste Management in the Ministry of Housing and Local Government. In contrast, the other category of "scheduled or hazardous waste" including e-waste, falls under the jurisdiction of the Department of Environment (DOE) in the Ministry of Natural Resources and Environment [53]. Moreover, the Solid Waste and Public Cleansing Management Act federalized the execution of waste management tasks, relieving local government authorities of the major responsibilities of solid waste management [54].

The majority of municipalities and state governments largely welcomed the **federalization of solid waste management**, although it has not been adopted by all municipalities [55]. Thus, the regulating authority (Public Cleansing Management Corporation) contracts with and monitors private operators handling waste management in the peninsular Malaysia. Waste collection on the islands has been contracted out to a private firm that generally does collection once to twice a day, depending on the waste generation rate of a given island. On islands like Perhentian, the normal practice has been the collection of waste in plastic bags from generators and resorts or villages without separation in pontoons that act as transfer stations. The pontoons transport the collected mixed waste to the mainland for landfilling [56]. However, other islands such as Redang, Tioman, Pangkor and Langkawi operate unsanitary landfills (mostly poorly designed and managed open dumps), and in some cases use small incinerators [57].

Waste management agreements exist between the federal, state and municipal governments regarding the transfer of responsibilities and funds, while another contract exists between the federal government and private entities or concessionaires. These companies entered into a 22-year concession agreement for solid waste management with the federal government and several state governments across the country [58].

The Public Cleansing Management Corporations are also responsible for **monitoring** waste management practices. However, they have a limited capacity to ensure enforcement and lack adequately skilled workforces and the resources to conduct effective monitoring systematically. Thus, there are gaps in existing data management practices such as a lack of proper data systems, obsolete data, complications in data handovers, and not enough supporting facilities. There is no consolidated data collection system in place for industrial and commercial waste or packaging waste. The current practice of waste data collection operates on a case-by-case basis through the commissioning of a sampling study. Moreover, the data collection system practiced in the country reports conflicting figures.

Furthermore, Malaysia introduced a **waste separation at the source** mandate on September 1, 2015 and has enforced it since June 1, 2016 [59]. Mandatory waste separation based on categories of paper, plastics and others, and the development of regulations and licensing of all categories of solid waste, should strengthen the enforcement of the "Regulation on Household and Institutions Solid Waste Collection."

Waste handling, collection, and disposal

All solid waste collection and urban cleansing services are under the purview of the three concessionaires overseeing three zones: the Federal Territory of Kuala Lumpur, Putrajaya and Pahang; Kedah and Perlis; and Johor, Malacca and Negeri Sembilan. [58]. Currently, households in the privatized areas are required to place their waste bags in waste bins in front of their houses (curbside collection) and private collectors pick up the waste several times a week. A property tax set by private service providers pays for the collection services, together with local authorities, and is currently paid as a share of an

"annual house assessment." Waste trucks collect waste from households and industrial and commercial premises for disposal, although service remains inadequate. In addition, there are concerns regarding the limited number of contractors, improper collection schedules and solid waste disposal dumpsites that are situated too far from collection areas.

Landfilling is the dominant waste disposal method, although more than 95% are unsanitary. The country also has five large scale incinerators with pollution control units and small-scale incinerators without pollution control units. In 2010, the nation landfilled about 85% of its generated waste, recycled 10% and disposed of 4.5% as compost or by incineration. For 2020, Malaysia targets the diversion of 40% of waste from landfills; however, current developments suggest that it will not achieve this goal. Targets for the recycling rate have been set at 30% by 2020 [60]. However, challenges posed by significant funding gaps and limited manpower have led to the approval of inadequate waste facilities developments. Additionally, there are waste banks, buy-back centers and a refuse-derived fuel integrated power plant.

The **waste banks** are licensed by the local authorities Pihak Berkuasa Tempatan (PBT) or the Royal Malaysian Police PDRM (scrap metals) [61]. An estimated 100 waste banks were established in communities and with waste retailers at the end of 2016 [62]. Recyclables are recaptured via buy-back and/or collection centers set up by local authorities, concessionaires, NGOs and private organizations. Others are installed by private collectors of recyclable materials. The collected recyclable materials are then sold to recycling factories or intermediate buyers. Such intermediate buyers also export a considerable amount of recyclable materials to other countries [63].

The **costs of collecting and disposing** waste have consistently increased over the years. Due to budgetary shortfalls, the costs rose from 83% in 2014 to 115% in 2015, with estimates putting the increase at 143% in 2017 [61]. The budgetary deficits reflect the heavily underfunded state of waste and public cleansing by the federal and central governments, and thus, the privatization cost. Moreover, this lack of funding often results in implementation delays. These budgetary shortfalls have affected the overall investments in the waste management sector, leading to inadequate waste collection equipment.

The market demand for **recycled packaging** waste remains unclear. As such, there appears to be little to no harmonized and disaggregated data on packaging waste recovery from waste streams. The recycling rate has increased significantly for more than a decade, rising from 5.0% in 2005 to 17.5% in 2016. Informal recycling amounts to approximately 15% of the recyclable waste recovered. According to empirical survey data for household recyclables in 2012, the country recycled only 22% of 33,000 tonnes of household waste [61]. There are about 60 plastic manufacturers, 10 paper mills, and more than 100 e-waste recyclers [58]. One recycler (for PE flexible) received certification according to the EUCertPlast program [64].

In the wake of the Chinese import ban, Malaysia has become the leading country for exported European **plastic waste**. In 2018, Malaysia received 404,106 tonnes of exported plastic waste. In October 2018, the country issued an import ban on plastic waste, which has been prolonged for an indefinite period after three months. However, high quality plastic waste imports from the EU, the USA and Japan are still allowed to be exported to Malaysia [65]. Additionally, in May 2019, Malaysia started to send back illegally imported plastic waste, which has been sent from several countries worldwide, including Canada, Australia and Japan, to be recycled or disposed of in Malaysia [66].

The country appears likely to fall short of its recycling rate targets for 2020 (30%) due to a variety of factors. It could boost compliance in recycling by accelerating the implementation of EPR, which obligates producers and manufacturers to take responsibility of packaging wastes for recycling or disposal at their own cost. In addition, observations suggest knowledge on waste hierarchy is generally low.

Education and public awareness

Since the start of mandatory waste separation, the nation has carried out a **series of initiatives including awareness campaigns** toward waste minimization and segregation in various institutions, such as

educational projects for the public to participate in holistic solid waste management. As of 2018, there have been (i) 2,873 awareness campaigns on holistic solid waste management organized in education institutions, (ii) 1,142 community programs on holistic solid waste management, and (iii) 923 awareness programs carried out in industries. At the same time, 356 publications used social media and other electronic media to promote (v) awareness campaigns in 703 advertisement units, including 7,618 broadcasting spots [67]. Other initiatives include the inclusion of sustainable living subjects for primary and secondary schools across the country, including a 3R-based environmental education in academic curriculums.

Despite these campaigns, many surveys have expressed the view that public perceptions of waste issues and the level of concern regarding them have not been very serious. Most respondents believed the cause was a lack of enforcement.

Critical issues to implementing an EPR system

There is currently no legal basis for an EPR system, which the country needs to ensure compliance that it cannot guarantee on a voluntary basis or only with clear definitions and regulations.

Initiatives and organizations promoting EPR

As previously stated, no EPR system exists in Malaysia, either for packaging or any other waste stream. There are several acts and plans that touch upon EPR elements, such as in the Environmental Quality Act 1974 (section 30A and 30B) and the National Strategic Plan on Solid Waste Management in Malaysia.

Moreover, both the 10th and 11th versions of the Malaysia Plan provide the guiding principles for effective and sustainable waste management for the period 2016-2020. These plans explicitly mention the provisions of EPR systems for all types of waste as part of the Malaysian government's strategy for sustainable waste management. The plans explored the initiatives to obtain producer and manufacturer commitments to implement a take-back system as well as a deposit refund system [59]. However, clear actions from public actors are still missing.

Additionally, there are voluntary initiatives from a few multinational electronics firms such as Motorola, Nokia, Dell, Apple, and Hewlett-Packard as part of their mobile phone global corporate responsibility policy.

Conclusion – evaluation of a successful EPR implementation in Malaysia

In the past, the country had many problems associated with political instability and high levels of corruption, which impeded developments and the implementation of ideas resulting from discussions about environmental approaches like EPR. However, the political situation has significantly changed in the past two to three years, as reflected in the reduced levels of corruption and the establishment of stabilized and controlled structures and other long-term developments.

After China's import ban on plastic packaging waste, several Chinese companies tried to shift their employees and technologies to Malaysia to continue their business there. These companies as well as some local players imported plastic waste from foreign countries, which were brought to China prior to the ban. This activity violated many environmental standards. Consequently, the government withdrew the licenses of approximately 150 companies, which now need to be licensed anew. Moreover, the process planning and tendering for technology has intensified.

The money for the establishment of a comprehensive recycling infrastructure exists in Malaysia. Clans that are close to the government have access both to decision-makers and the required funding, meaning that the implementation of needed infrastructural measures could occur quite quickly.

The limiting resources are know-how and management skill. An EPR system could play an important role. Overall, the present conditions provide a sound basis for establishing an EPR system for packaging. However, the country must pass a corresponding law, otherwise, the establishment of a system likely cannot go forward. Due to their importance, the informal sector and the waste banks need to take part in the formalized system.

The below tables show the assessment of the individual indicators for a successful EPR system.

Table 12: Summary Framework conditions for EPR in Malaysia

	Influencing criteria	Good	Mediocre	Not good	Explanations
General situation	a) Political situation	X			Overall relatively stable despite current tensions
	b) Legal and regulatory frame-work		X		Has been significantly improved in the past year through more stability and long-term planning
	c) Income level and GDP	X			One of the emerging economies in SE Asia, diversified,
	d) Corruption		X		Not very significant issue
	e) Education and living stand-ards	X			Increasing in past years, low poverty rates
	f) Geographical situation		X		Country spreads over Malay peninsula and several islands including parts of Borneo; natural hazards not too signifi-cant
Waste management situation	g) General waste management structure		X		Partly federalization, mandatory waste separation; waste banks
	h) Financing of waste manage-ment			X	Budgetary deficits
	i) Recycling of packaging waste		X		Only ~20 % of household waste recy-cled; several recycling plants, incl. one EUCertPlast one; receives illegally ex-ported plastic waste from around the globe; *informal sector and Waste Banks*
	j) Technical competences			X	Often insufficient due to budgetary defi-cits
	k) Public awareness			X	Overall low despite numerous cam-paigns and initiatives to raise awareness
	l) Controlling and monitoring systems			X	Limited capacity and inadequately skilled staff to ensure effective and ex-tensive monitoring
	m) Importance of the informal sector	X			
	n) Experiences and data avail-ability			X	Insufficient data; often on case-by-case basis; sometimes conflicting data
Current status of EPR	o) EPR laws for packaging			X	Not existent
	p) EPR laws for other fractions			X	Not existent
	q) Initiatives from the industry			X	Only few initiatives regarding WEEE, nothing for packaging
	r) Initiatives of the govern-ment		X		EPR is mentioned in several other plans but no specific measures to introduce yet
	s) Support through external experts			X	Not known
Other remarks					

For contacts please see Annex 4.

5.5 Indonesia

Indonesia is an archipelagic country in South East Asia with a population of over 264 million as of 2017 [68]. With a total land area of 1,811,570 km^2 the country lies between the Indian Ocean and the Pacific Ocean, having about 8,844 named islands out of which 922 are permanently inhabited. It comprises five main islands: Sumatra, Java, Borneo (known as *Kalimantan* in Indonesia), Sulawesi, and New Guinea. The country shares islands with other countries such as Malaysia, Brunei, East Timor and Papua New Guinea. Indonesia is located strategically along major sea lanes that connect East Asia, South Asia, and Oceania. A very diverse ethnic group with more than 300 local languages shapes the country [69].

Indonesia's high population density, rapid urbanization, and industrialization result in high rates of municipal solid waste generation. Being an archipelagic country and a tourist destination, the country has become vulnerable to massive coastal pollution. Most of the larger islands are mountainous, with peaks ranging between 2,000 and 3,800 meters above sea level. Solid waste management in small island tourist communities is often complicated because of their isolated locations and tourism dominated economies, resulting in even greater challenges for ensuring sustainable solid waste management. For example, small island tourist destination sites are vulnerable to effects of high solid waste generation [70]. Also, in the tropical island of Bali, with an annual influx of over two million tourists, managing increased solid waste pollution has become a challenge causing significant pressure to the natural ecology landscape [71]. Also, frequent seismic events (400 volcanoes, approximately 150 are active) trigger waste and flooding events that exacerbate waste production and affect management efforts. East Java topography is varied, but dominated by mountainous areas, which adversely affect waste collection efforts. The World Risk Index rates the risk from natural hazards overall as "high" due to the high exposure and the lack of adequate coping and adaptive capacity [8].

Indonesia has a constitutional democracy with presidential elections. In recent years, and despite its past authoritarian regime under General Suharto, the country has adopted a decentralized governance system that hands power to regional governments to spur regional decision-making developments. The post-authoritarian era saw radical political reforms and the proliferation of many political parties that subsequently formed coalitions at the national and local levels. The apparent political cleavages dominating the political party system are based on religious worldviews: "traditionalism versus modernism" and "secularism versus moderate political Islam versus Islamism."

Indonesia's unitary republic is divided into five layers of government; central, provinces (34 in total); *kabupaten* (districts) and *kota* (municipalities); *kecamatan* (subdistricts); and *kelurahan/desa* (villages) [72]. The choices of local authorities and district leaders as to the strategies and actions they pursue are predicated on incentives created by their personal networks, alliances and constituencies. They depend less on their political ambition and administrative or technical skills, including "political entrepreneurship" that generates the popular support needed to get them re-elected [73].

The current struggles of the newly established democracy are also reflected in the Political Risk Index as the current government struggles to reduce corruption and implement economic reforms. Nevertheless, Indonesia remains the largest economy in Southeast Asia, posting a GDP per capita of USD 3,847. It is a member of the G20 and one of the emerging market economies of the world. Overall, the risk is assessed as "mediocre" [5].

The country's struggle with corruption is also shown in the CPI, which lists Indonesia in 89th place globally with 38/100 points; meaning corruption is a significant issue [7]. Notably, Transparency International Indonesia lists various manifestations of corruption, including the bribery of DPR members who plan to scrutinize entrepreneurs on their activities, members of parliament (MPs) acting as brokers to help private companies get government contracts, and financial rewards from public officers in "fit and proper tests" before the parliament [74]. Moreover, top officials are often pressured by predatory businesses seemingly acting to compromise parties' abilities to function as a genuine platform for political debate and reform. Many social and institutional reforms have been pursued by the government with massive support from the Indonesian people who are focused on eradicating corruption in the

country. One such move is the migration of most government services online to limit the bribery and corruption.

Assessment of the current EPR status for managing packaging waste

Legal framework for EPR

The **legal framework for an EPR system is in place**. However, implementation has yet to happen. The legal framework for EPR implementation is based on the Law on Waste Management No. 18/2008, which is – together with Law No. 32/2009 – the most important law in Indonesia regarding waste management. The Law 18/2008 prescribes waste management as the responsibility and authority of the government, including local governments, with public and business participation, to achieve effective and efficient waste management in the country [75].

Articles 12 − 15 of Government Regulation No. 81/2012 define the EPR concept further. Producers, individuals, and communities must take responsibility for packaging waste recovery through reuse, recycling, and recovery. Article 13 obligates producers to recycle waste by planning a program to recycle waste dumped from industries and/or caused by their activities using degradable raw materials and/or recollecting waste from products or packaging for recycling. It also stipulates that producers can appoint another party to recycle waste. Article 14 of the same law explains the reuse of waste by producers and the recollection of waste from products or packaging for recycling. Article 15 provides the means and procedures for establishing the EPR by spelling out the processes and ministries that must be involved in the drafting of the roadmap.

EPR system implementation in Indonesia faces **challenges** due to technical feasibility issues, limited government funding, unsupportive cultural and social conditions, and a lack of commitment among stakeholders. Nonetheless, negotiations are underway to clear the path for implementation. Other significant challenges involve the lack of an action plan concerning plastic waste reduction, especially for packaging waste. There are also ongoing discussions on developing technical regulations regarding limitations to EPR implementation arising from limited funds from the government, poor social and cultural conditions, the lack of commitment among stakeholders, and other impeding factors [76].

The EPR approach concerning e-waste management is currently being drafted.

General legal waste management framework

Three ministries are involved regarding waste management. The Ministry of Environment and Forestry (MoEF) is responsible for policy formulation and the development of regulations on the management of waste, including pollution control. The Ministry of Public Works and Housing (MPWH) provides technical advice, promotes pilot projects, and constructs/supervises large-scale off-site solid waste facilities (landfills). There are also sectoral / inter-departmental collaborations across ministries and overlaps in their mandates and institutional responsibilities. Thus, there is the need for Indonesia to clearly define and differentiate the roles and responsibilities of concerned ministries and local offices to address the challenges faced from **overlapping responsibilities**. The Municipal Planning Agency and the Cleansing Services Unit are the main local government agencies responsible for the planning and implementation of solid waste management.

Local government authorities are responsible for the implementation of waste management policies. The role of local government authorities also generally extends to strengthening mobilization and financing of waste management, infrastructure management and the building of human resource capacity. It also involves raising awareness for attitude changes and changing, implementing, supervising and monitoring projects related to waste management. However, the finances available to local governments are insufficient to cover the high recurrent expenditures associated with collection and landfill maintenance [77]. The collection and transport of household waste to transfer facilities are the responsibility of neighborhood and community organizations. Local governments bear the

responsibility of transporting waste from the transfer facilities to landfills, including waste collection, whereas transporting waste from public and social facilities is the responsibility of local governments. However, estate waste collection and transport to transfer stations or directly to landfills are the responsibility of the estate management (residential, commercial, or industrial).

Due to the vague legal basis regarding financing obligations, local authorities often dispute national agencies as to whom specifically must pay for what [78].

Collection, recycling, and treatment

Waste collection differs significantly across urban areas, which on average collect 56% of the total waste compared to rural areas, which collect only 5%. The City Cleansing Department (*Seksi Kebersihan*) of each district typically handles MSW management. However, in some cities the agency has become a local company (*Perusahaan Daerah*).

According to the implementation strategy of the 3R program of Indonesia, **waste banks** have been set up to promote resource efficiency and the circular economy. In 2012, there were approximately 471 waste banks in Indonesia distributed over 22 cities [79]. By 2016, 5,244 waste banks were established in 34 provinces and 219 cities in Indonesia [77]. Sorting and separation of waste at the community level **focuses on three waste types** (recyclable material, organic waste, and residues). The sorted and separated recyclable materials go into waste banks for transportation to recycling industries. Organic fractions are transferred to compost plants while residual waste goes to final treatment facilities, waste-to-energy (WtE) options, or landfills (>500 landfills). Waste banks operate as legal corporate entities under local governments, and largely **involve the private and informal sectors**. Waste bank products include: compost, handicraft, and recycling material. The number of waste banks in Indonesia has increased significantly, from 1,172 in 2014 to 7,488 in 2018. Similarly, the waste bank patronage increased with a clientele of 99,634 in 2014 to 209,144 in 2018 [80].

In terms of implementation, Indonesia has adopted the waste bank system, managed by the community, to collect recyclable solid waste by educating people to segregate waste at the source. This approach maximizes the recovery of recyclable materials from waste streams, and increases the waste diversion rate. Though it is difficult to differentiate, fractions of recyclable materials plastics and paper make up most waste fractions routed through the waste banks.

Currently, about 86% of municipal waste is disposed of either in a landfill (approximately 66 %) or **openly dumped** (approximately 20%). The remaining 14% is diverted from disposal through recycling and reuse (4.6%), composting (7%) and WtE/biogas generation (2.4%). The current waste management situation is considered poor and needs further investment and a more innovative approach.

Recycling is low (approximately 12%) and requires the implementation of innovative packaging and recyclable waste recapture plans [81]. On average, about 20% of plastics, metals, glass, paper, tires, and other materials are **recovered and recycled** by private sector individuals, and small and medium-sized enterprises (SMEs) [82]. According to Statistics Indonesia, about 5.6 million tonnes of plastic raw material come from a wide variety of plastic waste sources, 40% consisting of packaging, 6.5% shopping bags, 15% from building sites, and 20% from households [82]. Interestingly, about 17.4% of plastic is recycled while 29.4% is either disposed of in managed waste facilities or escapes as mismanaged waste. As of 2016, plans have proposed to add up to five recycling centers with the capacity to process 10 tonnes per day in tourist destinations. Indonesia has about seven recycling plants that are specialized in PET, HDPE and LDPE, PVC, and paper packaging waste recycling [83]. Indonesia is also **encouraging innovative private sector initiatives** in developing bioplastics, uptake of the circular economy and EPR systems. The Indonesian government is addressing waste problems by setting ambitious goals of reducing waste by 30% by 2025. Landfills are receiving less emphasis, while recycling and WtE will increase.

Informal sector

Informal sector activities take place openly and are not considered illegal in Indonesia. These types of activities occur throughout cities, either in people's own homes or on the streets or unoccupied lands. These activities commonly happen in cities near food stores, electronic and electric appliance repair services, tailors, and other service sectors. In some cases, these informal sector activities have some connections with the formal sector. In Indonesia, the informal sector plays a **significant role** in the recovery of reusable materials from waste. The recycling sector includes housewives, waste workers (from the cleansing division), vendors of used articles, and waste pickers (scavengers).

Recyclable material processing occurs on the way to temporary disposal points and final disposal facilities. Many stakeholders are involved in the reduction process, for example, sorting the solid waste at the sources or scavenging. Intermediary traders exist in many parts of Indonesian cities, often buying used articles directly door-to-door. These waste recovery activities mostly involve players in the informal sectors, consisting of handcart crews, mobile scavengers, transfer depot scavengers, final disposal scavengers, waste traders, recycling business people, and composting units at several points over a city.

Financing

Following decentralization, local government authorities have financed most solid waste management, infrastructure spending and program development. Funds for solid waste management come from the waste collection fee, and waste retribution and local governmental budgets. However, revenues from waste collection fees remain **inadequate and cannot fulfil** the needed expenditures on waste management. This puts a heavy burden on the budgets of local governments. The limited financial allocation for the waste sector leads to low levels of service in municipal solid waste management, accounting for some of the existing problems in landfills. The major cost components of waste management involve waste collection, transport, and disposal.

The Indonesian government has committed to allocate USD 1 billion to improve waste management over the next five years. Other funding sources include securing loans of USD 100 million from the German Government to build central dumpsites in Java regions. West Java's Swedish Waste Management Technology Norway has contributed USD 1.4 million to the Indonesia Oceans, Marine Debris and Coastal Resources Multi-Donor Trust Fund. Denmark has provided more than USD 800,000 to the fund. Indonesia is also focusing on exploring partnerships with private sector entities such as construction and engineering companies in building waste disposal facilities [84].

Monitoring

Within the course of decentralization, the responsibility for monitoring and supervision also goes to the local authorities. Data pertaining to waste management, EPR and recycling remains limited. Disaggregated data on packaging waste generation and recycling is mostly lacking or out of date. However, the country is developing a database on waste management. Each city has an obligation to provide local policy and strategy on household waste.

Education and awareness

Indonesia is promoting a **paradigm change** in waste handling and management through education curriculum and campaigns. These include waste management approaches such as WtE, paying for plastic bags and plastic debris being used as asphalt mix for plastic-tar roads. The National Collaborative Program on Solid Waste has incorporated public awareness as part of all environment projects. The Indonesian Government has recognized the importance of environmental education in successful implementation of 3R strategies as well as other important plans such as EPR in achieving effective waste

management. As the part of the national waste management strategy, the country deploys information systems to promote extensive campaigns, including strong collaboration among stakeholders on waste management. The curriculum system integrates environmental issues by including them in almost all subjects from the early stages to higher levels. The 2013 Education Curriculum of Indonesia incorporated environmental education in academic institutions in elementary, middle school and high school as well as in vocational schools. For higher-level education, study programs exist for populations and the environment, and environmental management [85]. Indonesian civil society and international organizations (e.g., Waste Platform, WWF) collaborate with local governmental education Departments via teacher training program on waste management to promote environmental education on topics such as 3R, principles of the circular economy and waste banks.

Critical issues to implementing an EPR system

Limitations to EPR implementation arise from limited funds from the government; poor social and cultural conditions; a lack of commitment among stakeholders; and other impeding factors [76]. Many business actors see the implementation of an EPR system critically, arguing that such a system would put additional burdens on producers while causing consumers to face rising costs.

Initiatives and organizations promoting EPR

As noted, the legal framework for an EPR system is already in place. However, implementation has not yet started. Additionally, the government considers the expansions of the waste bank mechanisms as the stepping stone for the implementation of EPR. Technical feasibility discussions are ongoing prior to full implementation and scaling of EPR in Indonesia. The Ministerial Regulation on Plastic Bag Reduction is a laudable initiative by the government to prepare consumers and producers for the implementation of an EPR system. Considerations for drafting and implementing a 10-year roadmap for EPR Policy promotion and implementation are noteworthy.

Moreover, there are also several **industry initiatives**: For instance, the Packaging and Recycling Alliance for Indonesia Sustainable Environment (PRAISE; formerly called Coalition for Sustainable Packaging) consists of top brands working to create awareness on Extended Stakeholder Responsibility (ESR)/ EPR. It is using a multi-stakeholder, integrated approach to sustainable waste management in line with the concept of a circular economy [86]. PRAISE is also working to increase stakeholder participation and the knowledge base for managing packaging waste. In addition to setting up the waste bank, each of the coalition members has been setting up their own waste recovery programs. Other initiatives involve the implementation of a single-use plastic bag fee policy for major retailers and shops, or an EPR modelling project envisaged in Bali for reducing plastic and carton packaging waste. This latter project is building collaboration between national government, local governments, producers (Aqua Danone and TetraPak Indonesia), retailers, recycling industries, Bank Sampah, and affected communities [78].

Conclusion – evaluation of successful EPR implementation in Indonesia

Indonesia is one of the top polluters in terms of marine plastic litter in the world. As in many other middle-income countries, there is a lack of a management, financing, technical know-how, infrastructure, and control for the establishment of a well-functioning infrastructure for the collection, sorting and recovery/recycling of waste.

The overall political situation is stable and the national government is pushing the implementation of EPR, which already has a legal framework. However, many disputes exist between the local and the national governments about responsibilities, which can hinder the implementation of any waste

management measures. Moreover, voluntary industry initiatives also exist for the introduction of an EPR system. Thus, overall the basis for implementing an EPR system is good.

One of the main challenges is the fact that Indonesia is spread over many islands, making the collection infrastructure for packaging difficult, along with the control of the shipment/transport of packaged goods to various islands. The country needs such systems for the identification and registration of the goods consumed. However, as noted, this is a vital prerequisite for a well-functioning EPR system.

In Indonesia, the informal sector and waste banks play an important role, which is why they need to be integrated in a formalized system.

The following tables summarize the results of this analysis.

Table 13: Summary Framework conditions for EPR in Indonesia

	Influencing criteria	Good	Mediocre	Not good	Explanations
General situation	a) Political situation		X		Overall relatively stable; relatively new democracy which is still struggling to pass necessary reforms
	b) Legal and regulatory framework		X		Quite comprehensive legalization, however quite vague in many regards leading to disputes
	c) Income level and GDP		X		One of the strongest economies of middle-income countries
	d) Corruption			X	38/100 points according to CPI; corruption is a significant issue
	e) Education and living standards		X		Heterogonous living standards across country
	f) Geographical situation			X	Inland archipelago spread over 9,000 islands, many natural threats
Waste management situation	g) General waste management structure		X		Local authorities have most responsibilities; high importance of waste banks
	h) Financing of waste management			X	Underfinanced; responsibility of local authorities; disputes over specific financing responsibilities with national government
	i) Recycling of packaging waste			X	Most recycling through waste bank collection, overall not too high and included in informal sector
	j) Technical competences			X	Differences across country;
	k) Public awareness			X	Strong investments to raise awareness through campaigns and adaption of curriculum; nevertheless, overall low
	l) Controlling and monitoring systems			X	Responsibility of local authorities; often insufficiently executed
	m) Importance of the informal sector	X			Very high importance, common practice, lion share of recycling
	n) Experiences and data availability			X	Disaggregated and not up to date
Current status of EPR	o) EPR laws for packaging			X	Legally in place but not implemented yet; not sure if law is defined precisely enough
	p) EPR laws for other fractions			X	EPR for electronic and electrical equipment is currently drafted
	q) Initiatives from the industry		X		Many big and multinational companies are actively and collectively engaging to push the implementation of an EPR system (e.g. through PRAISE) and similar activities
	r) Initiatives of the government		X		The government is trying to implement additional programs and initiatives such as a reduction on plastic bags
	s) Support through external experts			X	Support through several large international organizations in regards to waste management
Other remarks					

For contacts please see Annex 5.

5.6 China

General political situation

The People's Republic of China (PRC) is the world's most populous country, with a population of around 1 409.517 million (2016) located in East Asia with a land area of about 9,388,210 km² [87]. The state exercises jurisdiction over 22 provinces, five autonomous regions, four directly controlled municipalities (Beijing, Tianjin, Shanghai, and Chongqing), and the special administrative regions of Hong Kong and Macau. The National People's Congress (NPC) is the highest organ of state power in the People's Republic of China (PRC). The highest organ of state administration is the State Council. State organs for legal supervision are the People's procuratorates, while the judicial organs of the state are the people's courts. According to Article 59 of the Constitution, the NPC is composed of deputies elected from the provinces, autonomous regions, municipalities directly under the Central Government, and special administrative regions, and of deputies elected from the armed forces. Also, all the minority ethnic groups are entitled to appropriate representation [88]. The president is elected by the NPC with the premier nominated by the president and decided by the NPC.

The functions of the president include (i) conducting state affairs and receiving foreign diplomatic representatives on behalf of the PRC, and (ii) appointing or removing state officials according to the decision of the NPC and the Standing Committee of the NPC, including the nomination of the candidate for the premier of the State Council [89]. The State Council draws up the plan for national economic and social development, exercises unified leadership over the work of local organs of state administration at various levels throughout the country, and adopts administrative measures, including the enactment of administrative rules and regulations. It also issues decisions and orders. The NPC amends and the Constitution determines the choices of nominated principal officials of the PRC. The Communist Party of China governs the PRC. China's political system differs from the western constitutional democracy in that the politics of the People's Republic of China takes place in a framework of a socialist republic run by a single party, the Communist Party of China, headed by a general secretary. The Communist Party retains a tight grip on political life and much of wider society. Prime Minister Xi has consolidated power, adopting an approach considered opposite to the traditional system of collective leadership. In early 2018, the party also moved to allow him to remain in office indefinitely by abolishing the conventional two-term presidential limit.

The formulation of new policies requires central government leaders to build strong consensus among party members, local and regional leaders, influential non-party members, and the population at large. However, control is often maintained over the larger group through control of information. The Chinese Communist Party considers China to be in the initial stages of socialism. The judicial system is perceived to be heavily influenced by government agencies and the Chinese Communist Party.

China has experienced a large and rapid increase in solid waste quantities due to accelerated economic development and urbanization. In 2004, China surpassed the United States as the **world's largest waste generator**, and by 2030 China's annual solid waste quantities will increase by another 150% [90]. Being the second largest economy globally, China has **relied on landfills and incinerators to treat solid waste**. The rapid development of e-commerce along with strong economic development and urbanization contributed significantly to packaging consumption. China needs to approach waste minimization and segregation at the source to stem the volume of waste generation. China has a fast-growing economy and a rising working population, and the younger population is driving the demand for growth in packaged food and drinks, thus providing a boost to the growth of the overall packaging industry.

Legal and regulatory framework

The City Appearance and Environmental Sanitary Management Ordinance (1992) provides the principle guidelines on city appearance and environmental sanitary management; local governments then work out practical measures. Municipal Residential Solid Waste (1993) regulations concern the

management of collection, transfer and treatment residential solid waste. The Law on Prevention and Control of Environmental Pollution caused by Solid Waste of PRC (1996) regulates the management of MSW. Technical Policies on the Disposal of Domestic Waste and the Prevention of Pollution (2000) provides guidance and standards regarding the technologies applied in the MSW treatment. The Law for Promotion of Cleaner Production of PRC (2003) emphasizes that during each step of production, the manufacturers should take measures to reduce pollution. Law for Environment Impact Assessment of PRC (2003) emphasizes the importance of preventing environmental pollution from the source. Any new construction must obtain EIA approval before breaking ground [91].

The following ministries have responsibilities for managing various types of wastes − their functions and mandate vary and at times overlap along the waste management spectrum. The ministries include (i) the National Development and Reform Commission of PR China, (ii) the Ministry of industry and information technology of PR China, (iii) the Ministry of Environmental Protection of PR China, (iv) the Ministry of Housing and Urban-rural Department of PR China, (v) the Ministry of Agriculture of PR China and (vi) the Ministry of Commerce of PR China. The PRC has developed a series of five-year plans that give directions and guidelines in managing waste, like the 11th Five-Year Plan 2003, the 12th Five-Year Plan 2009, the Solid Waste Pollution Preventing and Control Law 2015 for the purpose of protecting and improving people's environment and the ecological environment. Likewise, the 13th Five-Year Plan for Ecological and Environmental Protection 2016-2020 aims to raise the quality of the environment, to strengthen holistic management solutions and to speed up the amendment of environmental issues.

Income level and GDP

After stagnating for decades under the rigid totalitarian socialism of founder Mao Zedong, China re-formed its economy along partly capitalist lines to make it one of the world's fastest-growing, as well its leading exporter. China is now a major overseas investor, and is pursuing an increasingly assertive foreign and defense policy. With rapid urbanization and living standard improvements, MSW generation has constantly increased [92]. More than 75% of China's urban consumers are expected to earn between 60,000 RMB (about USD 8,400) and 229,000 RMB (about USD 32,000) per year by 2022 [93]. World estimates project China’s per-capita waste generation in 2030 will range between 1.20 and 1.80 kilograms per person per day (kg/p/day) [91]. An estimated 7.8 million metric tons of packaging waste resulted in 2017 from 40 billion packages delivered in China, comprising 4.1% of country’s total MSW. In 2017 alone, over 40 billion packages delivered (7.8 million metric tons) in China consisted of 46.5% corrugated boxes, 30.4% plastic bags and mixed packages ((10.1% corrugated boxes with plastic layering), 5.0% envelopes, 4.2% polystyrene foamed boxes (4.2%), and 2.8% woven bags (2.8%)) [94]. About 6.7 MMT out of the total 7.8 MMT (86%) of packaging waste generated in 2017 were scrap corrugated papers (boxes) and only 0.28 MMT (3.6%) were plastic materials.

China is set to account for nearly 48% of the growth in the consumption of packaging worldwide in 2022 [95]. The Chinese packaging market was estimated at 604,751.9 million units in 2016, and should grow at a CAGR of 5.4% to reach 787,530.0 million units in 2021 [96]. Paper and cardboard make up the largest packaging type, accounting for 213,501 million units in 2016, while rigid plastics should see the fastest CAGR of 7.7% during 2016-2021. In 2016, Asia was the largest market with 42.1% of world consumption, ahead of North America with 24.3% and Western Europe with 18.4% [97].

Corruption

The CPI scores ranking of China in 2016, 2017 and 2018 were 40, 41 and 39, respectively. There is wide spread perception of institutional corruption and institutional arrangements within government power. According to Transparency International, corruption has particular characteristics in China and the country's leaders consider corruption to be a threat to the political system, which is being addressed through the implementation of an aggressive anti-corruption campaign.

Education

Environmental education is part of the academic curriculum in the forms of environmental engineering, environmental science, environmental management, and environmental planning. Environmental NGOs in China have grown rapidly in number (over 1,000) and sophistication, with relatively little interference from the central government. Many environmental education organizations work to increase public knowledge of, and participation in, environmental protection.

Geographical conditions

The natural hazards that affect most of China are droughts and earthquakes, and half of its area is exposed to high levels of risk. Floods also occur, but only relatively small areas experience high risk levels. In addition, even though high-risk volcanic eruptions and storm surges do occur, they affect only small areas, with tropical storms having the least impact on the country.

General waste management structure

Household and community waste is taken to collection sites and subsequently separated, then sent to landfills, incinerators, composting plants and some illegal dumpsites. **Waste management arrangements are complicated** and **often overlap**, or have **areas where no agency is responsible**. The country needs to increase the collection percentage and coverage. Urban SWM is largely the responsibility of municipal governments and local governments. The **informal sector remains a significant part** of the waste value chain, and **landfilling and incineration are the most prevalent forms of waste treatment**.

Generally, China is still grappling with waste reduction and the need to find sustainable ways of waste disposal. According to the 13th five-year plan (2016–2020), the Chinese government intends to ramp up investment in the waste sector through the provision of a special fund of up to 18.35 billion Yuan. This investment represents 7.29% of the total construction investment for municipal solid waste, and is helping to establish new processing capacity of 34,400 metric tons per day. The investment will increase total waste treatment capacity to about 64,620 metric tons per day. According to the China Statistical Yearbook 2016, the municipal solid waste harmless treatment rate has reached 94.1% and the comprehensive utilization rate of industrial solid waste was over 70% in 2015 [98].

Eastern China, with a high GDP and significant population density, has the greatest industrial capacity (15,220 tonnes per day) and number of facilities [98]. The average capacity of waste treatment facilities is the highest in Eastern China (155 tonnes/day), followed by Northeast China (144 tonnes/day). Central China, covering the largest areas of land and with a low GDP, has the lowest treatment capacity (86 t/d) [98]. Recent findings indicate that households alone account for 80% of the MSW generated in Chinese cities. For 2016, 203.62 million tonnes of municipal solid waste was collected and transported, out of which 96.6% was treated either by incineration or other means [98]. However, even with aggressive waste diversion activities, China's future waste disposal needs are enormous. China's cities need to develop an additional 1,400 landfills over the next 20 years. China's annual solid waste quantities will increase substantially. The social, financial, and environmental effects of this growing waste stream are significant.

In **Shanghai**, the quantities that must be incinerated or disposed of, must be drastically reduced. Thus, a waste collection system has been introduced, which is based on a segregation into four fractions: kitchen waste for composting, valuables for recycling, specific waste (like hazardous waste), and residual waste (see figure 17). Inhabitants will be penalized if they do not segregate properly [99].

Figure 17: Children presenting the containers for waste segregation in Shanghai [99].

Financing of waste management

The administration and operation of solid waste management are carried out by various sanitation bureaus, with subsidization from the government. Solid waste programs in Chinese cities will require at least 230 Billion RMB annually by 2020. Where these funds come from will be a major challenge for all levels of government. Increasing the professionalization and efficiency of this service provision is critical. The investments in solid waste treatment equipment and infrastructure has increased significantly in the recent years. In terms of China's investments in waste treatment facilities, certain estimates have recently been reported. China Solid Waste Net estimated RMB 170 billion (20 billion €) during 2011-2015 – more than double the amount invested in the previous five years. Standard Chartered Bank estimated that investments in municipal waste treatment will quadruple to RMB 286 billion (€ 34 billion) for central, provincial, local, and private sector spending. These sources therefore imply a cost of RMB 34-57 billion (€4-7 billion) per annum. The 2005 World Bank report estimated required annual spending of RMB 115 billion (€14 billion) by 2010, apparently double the current estimated budget [100].

Recycling of packaging waste

Over the past 20 years, China has become the primary market for recyclables from across the globe. Nonetheless, about 41% of solid waste in China was incinerated in 2016. A ban on all mixed paper and mixed plastics by the Ministry of Environmental Protection (MEP) became effective January 1, 2018., which limited the flow of material last May by restricting the issuance of required import licenses to mills. Consequently, MRFs are expected to recycle curbside materials regardless of end markets and quality. Song et al. (2018) reported that the total amount of packaging waste from food delivery surged in China from 0.2 million tonnes (Mt) in 2015 to 1.5 Mt in 201. In megacities, food delivery packaging waste only accounts for approximate 1% of the annual municipal solid waste generated. Specifically, plastic containers made of polypropylene (PP) and polystyrene (PS) foam account for approximately 75% of the total food delivery packaging waste by weight, followed by wood chopsticks and plastic bags. In contrast, plastic spoons, and paper order slips only account for 5% by weight. China's waste stream is growing fastest in paper, plastics, and multi-laminates, such as plastic-coated paper [101]. The total recyclable amount of the ten dominant types of recyclable wastes reached 246 million tons

in 2016 (a 0.3% increase from the previous year), with an economic value of 515 billion RMB. For instance, waste paper is one of the most common recyclable resources in China, and its recycling rate increased from 27.5% in 2001 to 46.7% in 2015. Compared with waste paper, waste plastic has a lower recycling rate, ranging from 20% to 30%. Projections suggest a significant increase in the value of materials prices in China over the next 25 years. In 2030, even with a marked increase in packaging waste, paper products and plastics and a complete reduction of coal ash, organics will still make up more than 50% of the waste stream [91].

Costs for landfilling and other forms of waste disposal

The operation of landfills has been the major disposal method of municipal solid waste in China. Landfilling presents significant environmental cost and health affects if not properly engineered. However, methane gas harvesting from landfills have been practiced in some parts of China.

Technical competences
Total municipal solid wastes collected and transported in 2016 were 203.6 million tonnes. The amount of municipal solid waste disposed of in 2016 was 196.7 million tons. The treatment capacity of municipal solid waste in 2016 was 96.6% [98].

Table 14: Waste management data [98]

	Total	Landfills	Incinerators	Others
Unit	940	657	249	34
Combined Treatment capacity (tonnes/day)	621,351	350,103	255,850	15,398
Diverted waste to treatment facilities (million tonnes)	196.7	118.66	73.78	44.28

Public awareness

Many Chinese do not observe the basic civic code regarding environmental protection. In 2006, the China Environmental Culture Promotion Association noted that **environmental awareness among the Chinese is generally low**. There is a growing consensus for a strong environmental awareness program on waste minimization and source separation. The government recognizes this as an effective means to tackle the exponential waste generation in the megacities of the country.

Controlling and monitoring systems

Municipal solid waste management has been assigned to various ministries which often have **conflicting and overlapping responsibilities.** The MEP and other concerned national ministries are responsible for controlling and monitoring the waste industry, while provincial and local governments are directly responsible for implementation. The Department of Urban Construction of the Ministry of Construction is the government agency responsible for urban waste management. Local Environmental Protection Bureaus (EPBs) are responsible for enforcing environmental standards, including monitoring ambient environmental quality and qualities of discharge from these facilities. Market-based instruments are used in controlling various sectors of the industry. Examples include tipping fees, tariffs, tax credits and relief, bans, eco-labelling, and liability legislation.

Importance of the informal sector

The informal waste management sector plays a key role in waste collection in the country. Thus, despite the low collection rate of the formal sector, the informal sector remains relevant to the waste management sector of the country. Waste pickers play an indispensable role by helping to control municipal solid waste. They constitute the entry-level workforce of the waste recycling industry and receive little attention from the public. In China, approximately 4 million waste pickers make their living by collecting MSW recyclable materials.

Experiences and data availability

Currently, the China Statistical Year Book has data on various waste management operations. Nevertheless, the country still lacks **disaggregated data on the various waste streams**. The solid waste departments of municipal environmental sanitation bureaus and environmental protection bureaus should carry out primary data collection, and the responsible departments need to provide and disseminate clear and consistent methods of data collection. However, waste generation data is more useful since it includes recyclable secondary materials, and encourages more full-cost accounting of the overall MSW system and program financing. Most Chinese municipal solid waste generation data falls into three categories; municipal, industrial, and hazardous waste. Primary data collection should rest with the solid waste departments of municipal ESBs and EPBs. Clear and consistent methods of data collection will need to be provided and disseminated to the responsible departments. The categorization of wastes in China is not always consistent or comprehensive from city to city and adversely affects the utility of the database.

Current status of EPR

Existence of EPR laws for packaging

The current piloted EPR plan does not cover packaging materials. EPR laws focus on electrical and electronic equipment waste (WEEE), stating that the treatment fund will be charged for five categories of electrical and electronic waste. EPR has also been implemented for new and used automobiles. Five laws and regulations focus on EPR target waste. These are the (i) Solid Waste Pollution Control law, (ii) the Municipal Waste Treatment and Pollution Control Technologies and Policies (Ministry of Construction, 2000), (iii) the Municipal Waste Management Measures (Ministry of Construction, 2007), (iv) Opinions on Further Strengthening Treatment of Municipal Waste (State Council, 2011), and (v) the 12th Five-Year Plan on Construction of Municipal Waste Harmless Treatment Facilities (State Council, 2012). By 2020, an EPR policy framework should begin to take shape, while relevant laws and regulations will come into play by 2025

Existence of EPR systems for other products and goods

The State Council has approved the implementation plan for the EPR system and has issued instructions for implementation by provinces, autonomous regions and municipalities directly under the Central Government, ministries and commissions of the State Council, and their respective agencies. The EPR plan is focusing first on a handful of industries – electronics, automobiles, lead acid batteries and packaging products such as paper-based composite beverage cups – with a set of 20 major tasks to complete. Within the framework of the EPR system, implementation will promote the following: ecological design of products, the use of recycled raw materials, standardized recycling processes and strengthened information disclosure [102].

Hong Kong has implemented its first EPR system for “e-waste.” Important steps include the construction of a recycling plant built through cooperation with the government. The ALBA Group has a 10-year contract with Hong Kong for the disposal e-waste.

Existence of voluntary initiates from the industry

E-commerce firms have indicated their willingness to contribute to reducing packaging waste from online trade. They aim to replace cardboard boxes with reusable plastic ones that courier companies can share. They will also experiment with biodegradable delivery bags and tape-free boxes. However, some observers have said these efforts are still not enough.

The province Guangdong in southern China has undertaken efforts and approaches on the local level since 2017. They include the construction of a recycling park in the provincial capital Guangzhou, supported with funds from the KfW. However, these strategies face revision since the import ban as the original strategy also included waste imports.

Existence of initiates for EPR system from the government

The Chinese government has initiated an EPR program and consequently issued a timeline for implementation.

Support for introducing an EPR system through external experts

Extant literature shows the Chinese government has collaborated with the ADB and other development partners for grant support to improve the waste sector.

Table 15: The EPR Plan implementation timeline [103]

Key task	Responsible unit	Time schedule
Improve the recycling system for waste electrical and electronic products	The National Development and Reform Commission, the Ministry of Environmental Protection, and the Ministry of Finance are responsible for each of their respective responsibilities	Proposal before the end of 2017
Develop a list of products and packaging for compulsory recycling and management methods to determine national recycling targets for specific varieties	The National Development and Reform Commission took the lead, and the Ministry of Industry and Information Technology, the Ministry of Environmental Protection, the Ministry of Housing and Urban-Rural Development, the Ministry of Finance, the Ministry of Commerce, and the General Administration of Quality Supervision, Inspection and Quarantine participated.	Completed in 2018
Pilot the construction of a new recycling and utilization system for waste electrical and electronic products in Beijing	Beijing organized and implemented while the relevant departments of the State Council strengthened guidance	Launched in 2017
Launch a pilot program for recycling beverage paper-based composite packaging	Relevant industry alliance organizations to implement, the relevant departments of the State Council to strengthen guidance	Launched in 2017
Explore the centralized collection and cross-regional transport of lead-acid battery manufacturers	The Ministry of Environmental Protection took the lead, the National Development and Reform Commission, the Ministry of Industry and Information Technology	Launched in 2017
Pilot ecological design in some enterprises	Ministry of Industry and Information Technology, National Development and Reform Commission	Continuous promotion
Pilot the extension of the responsibility of producers of electrical and electronic products and auto products in some enterprises, take the lead in conducting credit evaluations	The Ministry of Industry and Information Technology, the Ministry of Science and Technology, the Ministry of Finance, and the Ministry of Commerce organized pilot projects, and the National Development and Reform Commission took the lead in organizing credit evaluation.	Continuous promotion
Take the lead in building a lead-acid battery recycling system in Shanghai	Organized and implemented in Shanghai, the relevant departments of the State Council strengthened guidance	Launched in 2017
Establish electric vehicle power battery product coding system and full life cycle traceability system	The Ministry of Industry and Information Technology and the General Administration of Quality Supervision, Inspection and Quarantine	Completed in 2017
Support the establishment of a full lifecycle traceability system for lead-acid batteries, and promote the implementation of uniform coding standards	Ministry of Industry and Information Technology, General Administration of Quality Supervision, Inspection and Quarantine, National Development and Reform Commission	Continue to advance
Establish a credit information collection system that extends the responsibility of producers; formulate management measures for the extension of producer responsibility, and formulate corresponding policy guidelines.	The National Development and Reform Commission took the lead with the Ministry of Industry and Information Technology, the Ministry of Environmental Protection, the Ministry of Commerce, and the People's Bank of China.	Completed in 2019
Amend the "Administrative Measures for the Recycling of Scrapped Vehicles" to	The Legislative Affairs Office of the State Council and the Ministry of Commerce take the lead in the participation of the State Administration for	Completed in 2017

Key task	Responsible unit	Time schedule
regulate the recycling system for scrapped automobile products	Industry and Commerce, the National Development and Reform Commission, and the Ministry of Industry and Information Technology.	
Formulate management measures for recycling of lead-acid batteries	The National Development and Reform Commission took the lead, with the participation of the Ministry of Industry and Information Technology and the Ministry of Environmental Protection.	Completed in 2017
Improve the standard measurement system and establish a certification evaluation system	National Development and Reform Commission, Ministry of Finance	Continue to advance
Study the support for the areas where the producer responsibility extension pilot is implemented and the production companies that perform the responsibility	National Development and Reform Commission, Ministry of Finance	Continue to advance
Increase scientific and technological support	The Ministry of Science and Technology took the lead, the National Development and Reform Commission, the Ministry of Industry and Information Technology, and the Ministry of Environmental Protection	Continue to advance
Accelerate the establishment of a system for the promotion and use of recycled products and raw materials	National Development and Reform Commission, Ministry of Industry and Information Technology, Ministry of Finance, Ministry of Environmental Protection, General Administration of Quality Supervision, Inspection and Quarantine	Completed in 2018
Implement green procurement target management	The Ministry of Finance took the lead and the relevant departments of the State Council participated	Completed in 2019
Strengthen publicity and guidance	The National Development and Reform Commission took the lead and all departments of the State Council participated	Continue to advance
Strengthen work planning and classification guidance	The National Development and Reform Commission took the lead and all departments of the State Council participate	Continue to advance

Conclusion

The main share of waste is disposed of or incinerated. There are, however, numerous recycling plants. China built up its recycling economy with waste imports from Europe. After the import ban, many problems arose for these recycling plants. They lack needed quantities of waste for treatment in their plants, which were previously imported from the US and Europe at cheap prices. As there is no comprehensive packaging waste collection, and sorting system yet in China, several recycling companies are closing or relocating to other countries.

There are many initiatives and governmental support for a separate collection system of packaging waste and plastics. An example of such a process is available in Shanghai, which separates waste into four fractions.

Overall, the conditions for the introduction of an EPR system are good as long as the government supports this strategy. Due to the regional conditions, it is also possible to trial pilot projects, which are on the level of a province or a big city. Due to its special status, it would also be possible to conduct a pilot project in Hong Kong.

The exhibit below summarizes the findings.

Table 16: Summary Framework conditions for EPR in China

	Influencing criteria	Good	Mediocre	Not good	Explanations
General situation	a) Political situation	X			Stable political situation
	b) Legal and regulatory framework		X		A lot of regulation. Included in the 5-year plans.
	c) Income level and GDP				China is a country with a growing economy and very high packaging consumption.
	d) Corruption		X		There is corruption, but there is also an aggressive anti-corruption campaign of the government.
	e) Education and living standards	X			Overall, the level of education is high

	f) Geographical situation		**X**		A lot of very big cities
Waste management situation	g) General waste management structure		**X**		The largest share of waste (over 90%) is dumped or incinerated, however, there are also numerous recycling plants.
	h) Financing of waste management		**X**		The government provides a range of resources
	i) Recycling of packaging waste		**X**		There are waste treatment facilities for packaging (mainly in the east).
	j) Technical competences	**X**			Packaging recycling has high standards in a lot of plants.
	k) Public awareness		**X**		Environmental education has been incorporated in academic curriculum and the public awareness is increasing.
	l) Controlling and monitoring systems		**X**		Problems are overlapping responsibilities.
	m) Importance of the informal sector				The informal sector plays an important role for the recycling.
	n) Experiences and data availability				A lack of data on the various waste streams.
Current status of EPR	o) EPR laws for packaging			**X**	No law, only discussions
	p) EPR laws for other fractions		**X**		EPR Laws focus on WEEE, stating that the treatment fund will be charged for five categories of electrical and electronic waste. EPR is implemented for automobiles and used cars.
	q) Initiatives from the industry		**X**		There are some small initiatives to reduce packaging waste
	r) Initiatives of the government	**X**			The Chinese government has initiated the EPR program and consequently issued timeline for implementation
	s) Support through external experts		**X**		Chinese government has collaborated with development partners to improve the waste sector.

For contacts please see Annex 6.

5.7 South Korea

Political situation

The Republic of Korea, an upper middle-income country located in the southern part of the Korean Peninsula, has land area of 97,489 km2 and a population of 50,982 million in 2017 [104]. The Republic of Korea's political framework is that of a multi-party, presidential representative democratic republic, with a president as the head of state. The government includes the National Assembly. Korea's presidential system allows the president to perform executive functions through a State Council made up of 15 to 30 members and presided over by the president, who is solely responsible for deciding all important government policies [105]. The prime minister is appointed by the president and approved by the National Assembly, and works with three deputy prime ministers assigned to carry out the affairs delegated by the prime minister.

The president appoints members of the State Council upon recommendation by the prime minister. They have the right to lead and supervise their administrative ministries, deliberate major state affairs, act on behalf of the president and appear at the National Assembly and express their opinions. Members of the State Council are collectively and individually responsible to the president only. However, the Judiciary is independent of the executive and the legislature and comprises a Supreme Court, appellate courts, and a Constitutional Court. The National Assembly makes laws, approves national budget, matters related to foreign policy, declarations of war, and the dispatch of armed forces abroad or the stationing of foreign forces within the country. It also inspects or investigates specific matters of state affairs and is responsible for impeachment. The National Assembly has 300 members: 246 members in single-seat constituencies and 54 members by proportional representation [106].

Currently, there are 16 provincial-level governments (i.e., political administrative divisions comprising nine provinces and seven metropolitan cities including the capital city, Seoul). There are also 235 lower-level local governments or municipal governments, including 72 city governments, 94 county governments, and 69 borough governments within the provincial-level metropolitan cities. Provincial governments serve as intermediaries between the central and municipal governments. Municipal governments have several districts that serve as field offices for handling the service needs of their constituents. Local governments depend heavily on the central government for decisions and funding for their roles and functions, organization and personnel, and budgets.

The local governments are the implementing agencies and exercises governance on waste issues. The local government unit oversees the collection and disposal of waste. Since 2003, the Republic of Korea has established an EPR plan under the provisions of the Act on Resource Recirculation of Electrical Waste and End of Life Vehicles. The plan covers packaging, electric products, tires, lubricant, fluorescent lamps, Styrofoam float. Cost recovery of the plan is fully covered by recycling fees. The EPR plan is set up and regulated by the government through the Korea Environment Corporation. This plan contributed to significant environmental performance in terms of packaging material recycling, resulting in colossal savings on landfilling.

Legal and regulatory framework

The following are the legal and regulatory framework on waste and related EPR. The Wastes Control Act contributes to the protection of the environment and the enhancement of the quality of life by minimizing the generation of wastes and properly managing the various waste streams. The Act also provides a legal basis for the conduct of general disposal of wastes, controlled waste disposal certification, waste management business, and guidance and supervision for operators of waste disposal business [107]. The Act on Promotion of Saving and Recycling of Resources provides legal frameworks for the promotion of the recycling of resources, the proper treatment of wastes and the efficient use of resources. These include the recycling of resources, recycling business mutual aid cooperatives, the establishment of a foundation for the facilitation of recycling of resources, and supplementary provisions. Resource Saving and Recycling Promotion (RSRP) (2003) emphasizes the promotion of the

recycling of resources, the proper treatment of wastes and the efficient use of resources. It also facilitates the recycling of resources, recycling business mutual aid cooperatives, and the establishment of a foundation for the recycling of resources and supplementary provisions [108]. Other related laws include the Act on WEEEs and End of Life Vehicles (ELVs) (2008).

Some related policies and plans that provide a basis for the implementation of EPR are the "Maximization of Recycling and Landfill Zero (2020)," the "Resource Recirculation Act enacted 19 May 2016" and enforcement of the "Framework Act on Resource Recirculation," which encourages businesses to voluntarily recirculate resources and reduce waste generation. A "Landfill / Incineration Levy" will be implemented and impose a fee on generators when recyclables go to landfills or incineration facilities. Also, policy directions focus on landfill minimization, resource recovery maximization, waste collection not interfering with urban aesthetics, layered infrastructure, waste industry promotion and waste governance development.

Income level and GDP

The Republic of South Korea has experienced income-led growth through the promotion of a people-centered economy. Since 1986, the Republic of Korea's GDP has experienced general growth from USD 115.5 billion to USD 1.53 trillion in 2017 and a five-year growth rate of 3.1% through 2017 [109]. The government has increased its intervention in the economy with measures to alleviate household debt pressures, increase corporate taxes and marginal income tax rates, and raise the minimum wage. The overall tax burden equals 26.3% of total domestic income. Some have noted that high household debt has limited private consumption. Higher oil prices pushed inflation toward the 2% inflation target and the current account surplus remains large. With an annual urban population growth of 0.4% in 2018, private consumption continues to expand [110]. Household wastes should steadily rise due to increases in population and economic growth.

Corruption

South Korea is the 45th least corrupt nation out of 175 countries, according to the 2018 CPI. The corruption rank in South Korea averaged 42.29 from 1995 until 2018, reaching 52 in 1999 and a record low of 27 in 1996 [7]. Recent rankings show a marginal improvement in corruption perception of the country. The Republic of Korea faced a tumultuous political situation in December 9, 2016. Private property rights are protected, and the judicial system is independent and efficient, but the judiciary is not completely free from political pressure despite the government's anticorruption efforts. Laws and regulations often feature vague terms and are subject to differing interpretations by rotating government officials. Nepotism, especially when securing contracts and tax favors, is still frequently encountered.

Education

Curriculums cover environmental education from kindergartens through to elementary, middle, and high schools. Influential organizations have incorporated social environmental education in their programs. Some of such groups include: the Environmental Campaign Association, the Environment and Pollution Research Group, the Green Family, the Korean Environment, Scouts, the Young Women's Christian Association, (YWCA), the Young Men's Christian Association (YMCA), and the Korean Institute of Environmental Education [111]. The Korean government highly publicized and implemented a Volume-Based Waste Fee (VBWF) system countrywide to reduce the quantity of waste and increase the rate of recycling.

Geographical conditions

Urbanization and rapid population growth have increased waste generation rates, resulting in associated challenges in effective waste management. Densely populated cities such as Seoul cause many kinds of urban problems such as traffic, housing, and waste treatment problems. Waste collection in rural and under-developed areas face challenges relating to narrow, winding, and blocked roads, door-to-door collection, smaller vehicle sizes, and higher labor and cost requirements. Well-developed areas utilize curbside or station collection, larger vehicle sizes, and lower labor and cost requirements, which ultimately support improved waste management. Commercial, residential, and commercial areas enjoy daily waste collection, particularly for bulk waste generators.

General waste management structure

Korea sought to minimize resource utilization to meet the country's high energy demand, thus promoting the adoption of efficient resource recovery from landfill and maximization of reuse and recycling. KMOE established and developed the laws related to waste management to implement the principle of 3R (reduce, reuse and recycle). Based on a firm legal foundation, these policies can be implemented well in the private sector. Waste management in South Korea is **decentralized, with policy formulation occurring at the central government level.** The provincial levels act as intermediaries, relying on the local authorities and district level administration to implement laws and regulations concerning waste management. The country is increasingly shifting towards a sustainable resource circulation society. The Ministry of Environment amended and enforced the Enforcement Decree and Enforcement Rules of the Waste Management Act to make material recycling more effective. In 1982, utilization of landfills as dumping sites for MSW were above 96% and recycling almost zero. However, sustained expedient policy implementation reduced landfilling to 15.1% by 2015 [112]. Recycling, incineration, and other uses of MSW and industrial waste has also increased significantly. Several Wastes Deposit Programs have been implemented since 1992 to strengthen the role of manufacturers regarding recycling.

The Korean government introduced several recycling policies, such as the Volume-based Waste Fee (VBWF) System, Extended Producers Responsibility, the Deposit Refund System, and the Waste Charge System. Up to now, the most successful recycling polices are the VBWF System and EPR [113]. The Wastes Deposit Program allowed manufacturers to deposit a cost in proportion to their production output and retrieve it in the amount in proportion to their records in reuse. Designed to encourage businesses to make the effort to recycle by offering financial incentives, the system faced criticism because companies simply paid the charge and did not make actual reuse efforts.

EPR was introduced after the Waste Deposit Program had been implemented in 2003. Waste-to-energy plans are also implemented in the country. Due to the diversity of products, the reduction of product life cycles and changes of lifestyles, packaging waste, which currently accounts for 32% of total household wastes based on weight and for 50% based on volume, has been constantly increasing. The local government collects waste generated by detached dwellings and small business buildings and transfers it to MRFs (public and private) for disposed. Packaging products from large apartments and buildings collected by private recyclers and sent to private MRFs and later to recyclers for recycled products and manufacturers.

Financing of waste management

Korea applies various waste management financing models. Basically, it uses collection fees, disposal fees and taxes to raise capital and nudge behavior toward effective waste management, specifically, deposit-refund systems (DRSs), VBWF Systems, Waste Charge Systems and EPR systems. Under the newer system, monthly fees per household decreased to KRW 2,224 to 2,288 [114]. Now that the fees are equalized, district offices will be more convincing in their logic when they wish to adjust the fees to secure financing for waste disposal. The waste charge system charges the manufacturer and importer of the product part of the cost involved in the disposal of a product that contains hazardous

materials or that is not easily recycled (applicable to containers of insecticides and toxic chemicals, antifreeze, chewing gum, disposable diapers, cigarettes, plastic products, and packaging materials). Waste charge revenues are used for the research and development of technology to reduce the amount of waste and recycle it, the installation of waste disposal facilities, and the operation of waste recycling projects. It also provides financial support for local governments to collect and recycle waste, and the purchase and storage of recyclable resources [115]. Total annual government expenditures for waste management amounted to about ₩340 billion (or $300 million) between 2014 to 2015. For paper, plastic and metal, the volume-based fee system emphasizes “pay as you produce/generate.”

Recycling of packaging waste

The Act on the Resource Circulation of Electrical and Electronic Equipment and Vehicles and the Act on Promotion of Saving and Recycling of Resources are the main laws emphasizing recycling. The EPR system and Eco-Assurance System (ECOAS) system are the main relevant policies related to recycling. The recycling of paper, plastic metal, construction waste and e-waste is very high (>90%). There are resource recovery facilities for separate waste streams such as paper, plastic, metal construction waste and e-waste. The number of recycling companies increased from 2,941 in 2001 to 5,372 in 2014. Public sector recycling facilities numbered 217 at a combined capacity of 4,723 tonnes /day. Private sector recycling facilities numbered 524 at a combined capacity of 60,291 tonnes/day. The Republic of Korea Ministry of Environment allocated a total of 103.6 billion KRW (around USD 94.18 million) in 2016 with an interest rate of 1.51% for a maximum period of 10 years for the waste recycling investment activities [106].

Costs for landfilling and other forms of waste disposal

Korea is about to introduce a landfill/incineration levy imposed when recyclables go to landfills or incineration facilities. According to a case study, the costs of installing a landfill by Seoul City for about 23 million residents (including Gyeonggi and Incheon) are USD 45 million. An initial installation cost of the first landfill was USD 32 million paid by Seoul in Sudokwon [116].

Technical competences

There are adequate technical competencies, workforces, skills, and resources to collect, transport, compact, sort, utilize and convert waste. For waste disposal, there are the Allbaro (E-manifest) system for hazardous, medical and construction wastes, inspection systems for landfills and incineration plants, and post-management systems for waste treatment facilities and the management for neglected waste.

Public awareness

Korea has conducted well-planned public promotion campaigns to raise awareness and the implementation of various waste management plans such as EPR and VBWF System [117] as mentioned earlier. The Korean Ministry of Environment (KMOE) is also engaged in public promotion campaigns using TV advertisements, newspapers, TV discussions and the distribution of promotional materials such as VCR tapes, brochures, and posters. Other media such as public hearings, workshops with the relevant civil servants, seminars, and symposiums are organized on a continuous basis to increase awareness on waste management policies and initiatives. This has resulted in very high source segregation by households (>90%). Local governments bear the responsibility of carrying out public awareness programs for local residents under the EPR plan. And the Young Men's Christian Association (YMCA), Young Women Christian Association (YWCA) Korean Federation for Environmental Movement, Citizen Society for Solving Waste Problems and other NGOs have played important parts to raise awareness about the VBWF System and its implementation.

Controlling and monitoring systems

The Korea Environment Corporation monitors and ensures producers and importers comply to provide required sales reporting and import data, including waste collection and recycling. The central government creates and implements regulations regarding EPR whiles local governments ensures responsible and improved collection and recycling for reuse. Apartments contract private recycling collectors to collect and sell to recycling industries. Monitoring is enhanced by labelling systems (with information on disposal and recyclability) of EPR products by importers and producers.

Importance of the informal sector

Private company or volunteers collect used products and donate them to the poor, sell them at low prices or export them to other countries. The recycling value chain has primary and secondary dealers, recycling micro and small enterprises, junk shops, intermediate processors, brokers, and wholesalers who conduct both formal and informal sector activities. Thus, because of revisions affecting permissions in the informal recycling sectors since July 2013, municipal governments in South Korea need to develop eco-friendly infrastructure aimed at the proper management and integration of the informal recycling sectors involving scavengers and waste pickers.

Experiences and data availability

Available data and information include data on waste generation amounts at final disposal, disposal to land, total landfilled waste, hazardous and e-waste waste generation. There is systematically collected, disaggregated data and up-to-date data on EPR products and general waste management such as the online waste disposal verification system by the Korean Ministry of Environment. The Republic of Korea has been implementing the “industrial waste reduction system,” where businesses that generate lots of waste (more than 1,000 metric tonnes for municipal waste and 300 metric tonnes for controlled waste, annually) voluntarily set goals for waste reduction and report the results to the government annually. Various collection and recycling paths are regarded as a barrier to collecting statistical data, especially in the informal sector path, where individual entrepreneurs do not report their statistics.

Current status of EPR

Existence of EPR laws for packaging and Electrical and Electronic Waste

EPR was introduced to promote the reduction, reuse, and recycling (3R) of waste by encouraging manufacturers to consider the environment through the whole process of product design, manufacturing, distribution, consumption, and disposal. The Ministry of Environment announces a mandatory recycling ratio for each EPR product category. The EPR program is both effective and efficient in terms of raising recycling rates, establishing a target recyclability rate (the total annual mandatory recycling amount by items) every year starting in 2003. The EPR system primarily covers the following packaging products: Packages (metal can, glass bottle, carton pack, PET bottles, and synthetic resin packaging materials) that are used to pack food and beverages, agricultural products, marine products, livestock products, cleansers, medicines and cosmetics. EPR is being expanded to 32 items including fluorescent lamps, packing films, mobile phones, audio equipment, air conditioners, PCs, and batteries [118].

EPR is basically applied to existing items such as cotton packing, glass bottles, and tires under a deposit system, and new items including air conditioners, TVs, and refrigerators began to be added starting in 2003. In 2004, film-type packaging materials and fluorescent lamps were added, and audio products and mobile communication devices were added in 2005. Preventive management, such as restrictions on the use of hazardous materials, have been strengthened.

Korea introduced its EPR system in 2003 and has expanded it, targeting specific electronic products (27 items), with refrigerators, TVs, washing machines, air conditioners, PCs, printers, copiers, and facsimile machines added in 2006, cosmetics in 2007 and in 2008, manganese batteries, alkaline manganese batteries, and Ni–MH batteries as well as electric and electronic products (figure 18). The recycling target ratio has been set on items, and producers that fail to comply must pay the recycling fee commensurate with the unmet portion of the target.

EPR scheme	Legal basis	Target item	
Take-back with recycling targets	Act on the Promotion of Saving and Recycling of Resources	Package (4)	Packages(metal can, glass bottle, carton pack, synthetic resin packaging material) that are used to pack food and beverages, agricultural products, marine products, livestock products, cleansers, medicines and cosmetics, etc.
		Product (11)	Batteries(Mercury, Silver oxide, Lithium, Nickel-cadmium, Manganese, Nickel-hydrogen), Tire, Lubricant, Fluorescent lamp, Styrofoam float
	Act on Resource Recirculation of Electrical and Electronic Waste and End of Life Vehicles	Product(27) Television, Refrigerator, Washing machine, Air conditioner, Computer, Audio, Mobile phone, Copier, Fax machine, Printer, Automatic dispenser, Electric water purifier, Electric oven, Microwave, Food waste disposer, Dish washing machine, Bidet, Air purifier, Electric stove, Electric cooker, Water softener, Humidifier, Iron, Fan, Blender, Vacuum machine, Video cassette Recorder.	

Figure 18: Overview of the legal areas of the EPR scheme [119]

The state devises policies to facilitate the recycling, development, and distribution of the specified technologies, restrictions of the use of hazardous substances, and the facilitation of recycling electric and electronic waste and end-of-life vehicles. Local governments must improve curbside collection and the recycling of electrical and electronic waste in accordance with the national policies. Producers and importers of EPR items collect and recycle the end-of-life products or packaging materials, or pay the allotted share of charges to the PROs. Also, producers or importers attempt to enable recycling by developing recycling technologies and resource-efficient designs, restricting the use of hazardous substances, and producing or importing easier-to-recycle products. Producers or importers may establish a PRO for recycling to carry out the obligatory recycling responsibility [119]. The below figure illustrates the roles and responsibilities.

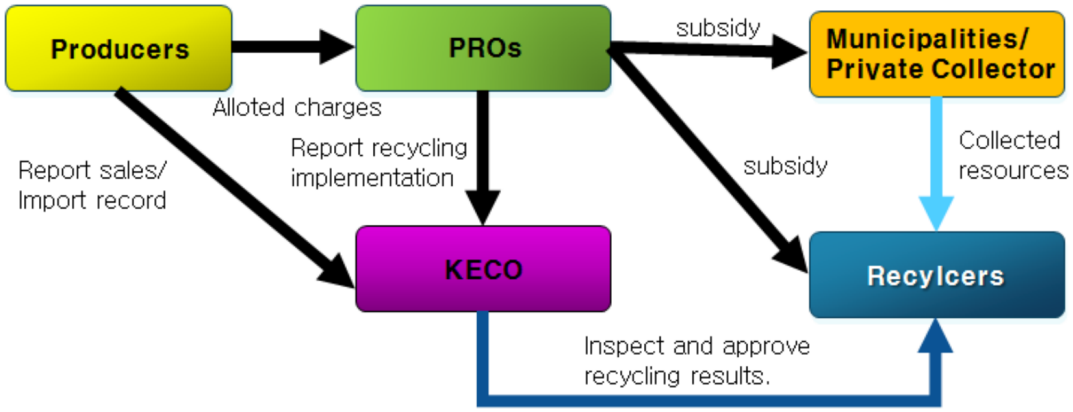


Figure 19: Roles and responsibility in the Korean EPR scheme [119]

Existence of voluntary initiatives from the industry

The Industrial sector showed support and cooperation towards the implementation of the EPR plan in Korea. Notwithstanding, the EPR initiative was initiated by the central government.

Existence of initiatives for EPR system from the government

The Korean Government initiated the existing EPR plan as a waste deposit program to promote sustainable consumption of electric and electronic products. Many electronic device manufacturing companies took advantage of this by pushing the additional cost to consumers. The EPR was introduced after the abolishment of the waste deposit program that targeted packaging products and other hazardous and electrical and electronic products.

Support for introducing an EPR system through external experts

The Ministry of Environment of Korea initiates overseas outreach and international cooperation as a principal field of foreign environmental cooperation in association with the country's domestic environmental industry promotion policy. Subsequently, various cooperation projects such as technology cooperation consulting and initiation are carried out as a technology transfer medium for environmental management experience as well as to improve technology on recycling household waste, demolition waste, plastic residual products waste, and to generate energy.

Conclusion

Korea has already introduced an EPR system for e-waste and packaging. As it is effective and efficient, this system is a good example for putting EPR into practice. Moreover, the general situation is good.

The entire situation is summarized in table 17 below.

Table 17: Summary Framework conditions for EPR in South Korea

	Influencing criteria	Good	Mediocre	Not good	Explanations
General situation	a) Political situation	X			Very stable
	b) Legal and regulatory framework	X			Very extensive and concrete
	c) Income level and GDP	X			Korea has become one of the most important economies in the world
	d) Corruption	X			Corruption perception is relatively low.
	e) Education and living standards	X			High education level and good living standard
	f) Geographical situation		X		Urbanization and rapid population growth increased waste generation rate resulting in associated challenges in effective waste management.
Waste management situation	g) General waste management structure	X			Government introduced several recycling policies
	h) Financing of waste management	X			EPR and fees
	i) Recycling of packaging waste	X			High recycling rates must be fulfilled
	j) Technical competences	X			High recycling standard
	k) Public awareness				A lot of initiatives to raise awareness
	l) Controlling and monitoring systems	X			Korea Environment Corporation monitors and ensures producers and importers comply to required sales reporting and import data
	m) Importance of the informal sector	X			The informal sector is included in the structure
	n) Experiences and data availability	X			Data is available
Current status of EPR	o) EPR laws for packaging	X			EPR system for packaging has already been realized
	p) EPR laws for other fractions	X			EPR system for E-Waste has already been realized
	q) Initiatives from the industry	X			The industrial sector showed support and cooperation toward the implementation of the EPR plan in Korea.
	r) Initiatives of the government	X			The EPR initiative was started by the central government.
	s) Support through external experts				Current activities are unknown
Other remarks					

For contacts please see Annex 7.

5.8 Japan

Japan is an island chain state located east of the Korean peninsula. Japan characteristically has a rugged and mountainous topography. Due to its close location to the tectonic borders, it has several active volcanoes, and earthquakes pose a significant threat [120], which is why Japan scores a “very high” value on the World Risk Index. However, while its exposure to the respective threats is very high, it is also acknowledged that Japan has very good coping and adaptive capacities to deal with these threats [8].

Overall, Japan is home to 126.8 million people [121]. Due to its topography, most of the residents live in the coastal area. One third of the entire population resides in the metropolitan region in and around Tokyo. The Japanese infrastructure is overall very dense, well developed, well maintained and comprises a well-developed network of roadways, waterways, railways and air carriers [120].

Japan consists of 47 prefectures governed by elected governors. Nevertheless, each governor is strongly influenced by the rather centralized operating government [122]. From a constitutional perspective, Japan is a parliamentary constitutional monarchy [120], but the king or queen have only representational roles. The head of government is the prime minister, who is also the commander-in-chief of the armed forces.

The overall political situation is relatively stable (75.8/100) according to the Political Risk Map. This reflects the high stability due to the dominance of the governing Liberal Democratic Party (for more than 60 years), low unemployment, a homogenous society and primarily, strong work ethics, and secondly school enrolment rates close 100%. Main challenges arise from mitigating the declining, ageing population (with an annual growth rate of − 0.2% in 2017) and a high public debt burden [5]. Corruption is not a significant issue in Japan: in terms of the CPI, Japan scores 73/100 points, which puts it 17th in the global comparison [7].

On the Human Development Index of the UN, Japan is listed at the 20th position with a score of 0.909, which is very high [52].

Assessment of the current EPR status for managing packaging waste

Legal framework

Japan introduced an **EPR system for packaging in 1995 via its Containers and Packaging Recycling Act** [123]. This act mandates fee payments from all manufacturers using containers and wrapping for shipping their products, retailers and wholesalers using containers and wrapping for selling merchandise, manufacturers of containers, importers who import and sell merchandise in containers or wrapping, and importers of containers [124]. The fees, which must be paid per kg of packaging material, are assessed on a yearly basis. However, the program excludes very small companies. This definition comprises manufactures with (i) net sales of 240 million Yen or less and (ii) 20 employees or less, as well as commercial and services with (i) net sales of 70 million Yen or less, and (ii) 5 employees or less [125].

The Act determines the **separate collection** of packaging types like plastic containers and wrapping, PET bottles, glass and paper containers and wrapping. Excluded from this are beverage cartons lined with aluminum [126].

The Japan Containers and Packaging Recycling Association (JCPRA) and its works falls into the jurisdiction of 5 ministries: (i) the Ministry of the Environment, (ii) the Ministry of the Economy, Trade and Industry, (iii) the Ministry of Finance, (iv) the Ministry of health, Labor and Welfare, and (v) the Ministry of Agriculture, Forestry and Fisheries. The national government is the supervisory authority of the system [123].

To put this Act into practice, the Japanese PRO is the JCPRA, founded in 1996. JCPRA is a so-called government-designated organization. It also coordinates among the government, municipalities,

consumers, obligated companies, recyclers, and manufacturers using recycled elements in their products. The participation of the municipalities is voluntary [123].

Collection

The **municipalities are responsible for the collection** of packaging waste. This includes responsibilities for removing incorrectly sorted materials and storing the collected waste at designated storage facilities based on the Act [125]. Each municipality must prepare a Municipal Sorted Collection Plan and submit it to the prefectural government. In turn, the prefectural governments are obliged to prepare Prefectural Sorted Collection Promotion Plans based on the municipal plans. The governments forward these to the national government, which advises on the plans or provides other necessary support [126]. Moreover, it is also the municipalities' responsibility to handle the waste produced by small businesses, which are exempt from the obligation of making payments to the JCPRA. Generally, municipalities can decide whether they want to carry out this task by themselves or contract a third-party [125].

In practice, the collection systems are very different in the individual municipalities across Japan. While several municipalities have no collection systems, individual municipalities exist with up to 34 different collected waste fractions. The primary collection system in Japan is a **drop-off system with "bring-banks**." However, curbside collection systems also exist. For curbside collection, residents purchase a licensed bag for each different fraction of waste [127]. Aside from this, special collection forms like group collection also exist, in which resident groups independently collect recyclable waste discharged from homes, such as PET bottles, metals cans, or cardboard, and take it to the recyclers. In some cities, such residents-based initiatives are the only form of waste collection, as no publicly organized waste collection exists. Other collection approaches include privately organized collection stations in front of supermarkets and similar points [125] [127].

Figure 20: Licensed waste bags for different fractions (right) and bins for collection of PET bottles next to a beverage vending machine [127]

To incentivize the municipalities to encourage high-quality waste sorting, Japan introduced a Cost Reduction Contribution system in 2006. This system seeks to reduce the overall costs of waste packaging recycling. If a municipality forwards high-quality, properly sorted waste packaging without impurities to recyclers, the recycling costs will be lower than initially estimated. In return, the JCPRA pays 50% of this difference in the recycling cost to municipalities. The individual amount that is paid to the respective municipality is based on the quality of their waste as well as the amount by which the recycling cost has been reduced due to the high quality of the waste packaging [126].

A noticeable feature of Japanese culture is the strong emphasis on cleanliness. There is a sense of responsibility for keeping spaces clean (e.g., students clean their schools after class) and also a feeling of responsibility for separating waste as well as possible according to the regulations. In some cases,

this can lead to “above and beyond” efforts: one village in the mountains separates waste into 34 different fractions [127].

Generally, there are no requirements for the achievement of collection or recovery rates.

The waste in the storage units is then collected, either directly through a contracted, suitable recycler (90% of municipalities do this) or by the PRO. The recyclers receive payment from the JCPRA after the confirmation that their recycling or products have been sold.

To achieve high transparency within the system, the JCPRA has a database containing detailed information about the producers obligated to participate, and material flows of waste packaging including the quantity of sorted waste packaging collected, the quantity recycled, and the quantity of each recycled product sold. The database is available to the public on the PRO’s website. The information about the quantities of packaging introduced into the market by the obligated companies is reported based on self-assessments. Obligated companies should record and store these records for a certain time period. As regulated in the contracts signed between obligated companies and the JCPRA, the JCPRA can conduct on-site inspections and check records to assess consistency in the quantities. However, it has not conducted such inspections so far [126].

Recycling and disposal

Based on a survey from 2014, Japan mechanically recycled only 7.3% of its domestic plastic waste (both plastic packaging and other items made of plastics), and incinerated 69% (with power or heat generation as well as without heat generation). Another 5% went into landfills [128]. **Incineration is thus the dominant form** of waste treatment in Japan. Particularly, small plastic packaging and mixed plastics are predominately not collected separately or sorted, but incinerated. Some recycling exceptions for mixed plastics do exist in small projects, and a small share is deposited in landfills.

By the end of 2017, Japan exported more than 50% of its collected plastic waste (mainly PET bottles) to China. After the Chinese government issued a ban on the import of plastic waste, the Japanese government decided to expand the national plastics recycling industry massively through subsidies, because the domestic treatment prices for plastic waste had increased tremendously [129]. Nevertheless, in 2018 the country exported 1.01 million tonnes of plastic waste to other Asian countries like Malaysia, Thailand, and Vietnam. However, these countries are currently in discussions concerning potential import bans, putting even more pressure on the Japanese government to act [130].

In response to this pressure, in November 2017, the government decided to fund new, innovative recycling plants strongly [127]. In February 2019, the it discussed the draft for a framework directive regarding the handling of plastic waste. The directive targeted a 25% reduction of all plastic waste. Other issues included (i) a fee on plastic carrier bags, (ii) a significantly increase of the share of plastics made from renewable sources like plants, and (iii) a supporting reduction of plastic waste in developing countries through exchange of experiences and knowledge. By 2035, all plastic waste generated in Japan should be either recycled or recovered through other processes like energy recovery. However, specific measures on how to achieve these targets and concrete dates for the start of implementation remain undecided [130].

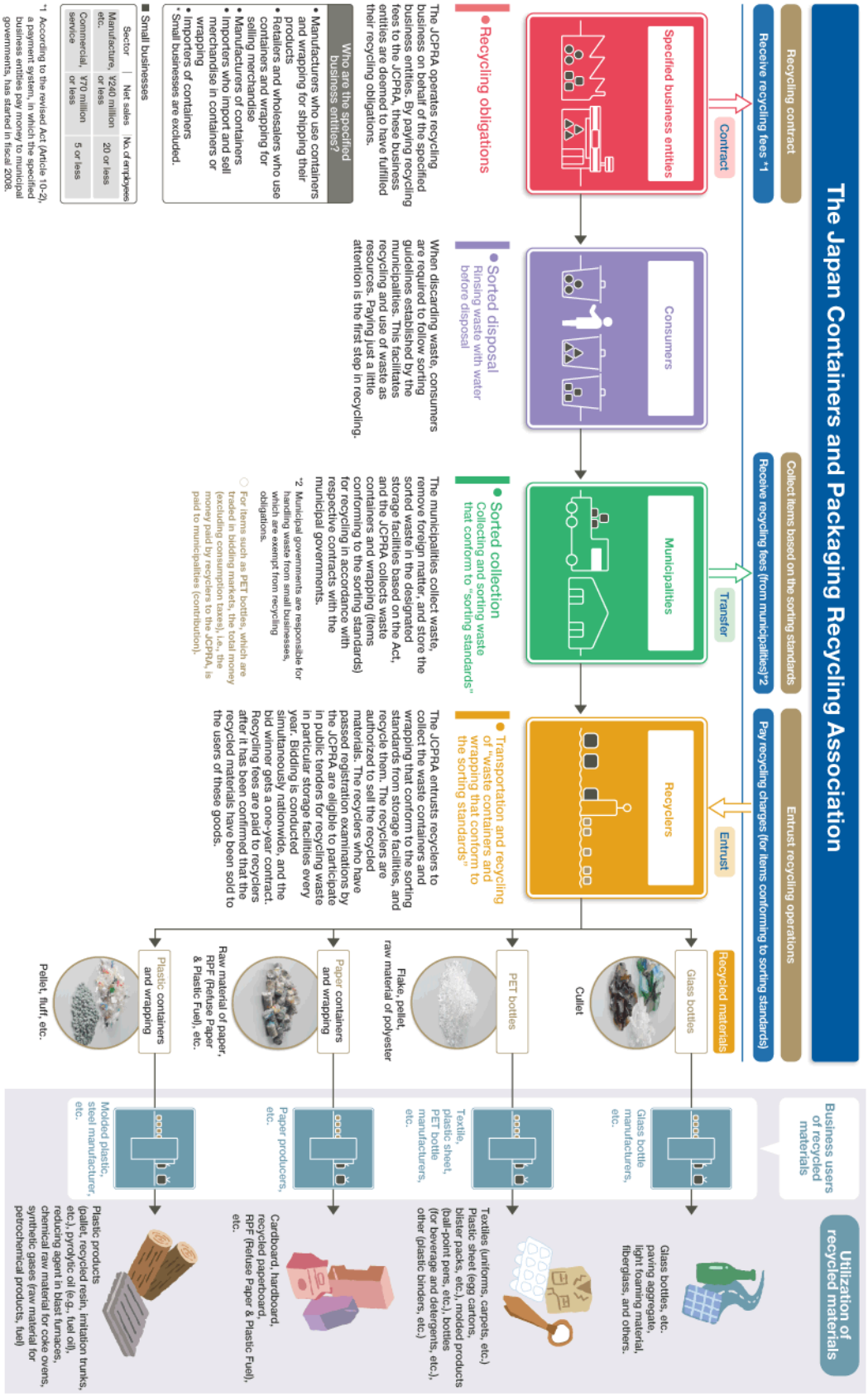


Figure 21: The Japanese EPR system (source: JCPRA)

Initiatives and organizations promoting EPR

Japan has introduced an EPR system for packaging, which is working well in regard to waste collection and public awareness. The current weakness is the inability of recycling to close the loop as previously explained. There are also EPR laws in place for electrical home appliances, automobiles [131] and batteries [132].

Critical issues to implementing an EPR system

As previously described, Japan has already implemented an EPR system for packaging. Nevertheless, some critical obstacles exist limiting the current mode of operation of the EPR system.

First, Japan has a good waste collection system and infrastructure. However, the collected packaging waste is predominantly not recycled (in the sense of mechanical or feedstock recycling) but incinerated and a minor share is disposed of in landfills. Thus, to close the loop, it is crucial to expand significantly and push forward the recycling economy. While this problem has also been recognized by the Japanese government, incineration plant owners are likely to meet strong resistance given the context that over 60% of the waste is incinerated.

Second, there are no collection targets. The lack of a shared target fosters only partial optimization of the system and indifference among the involved stakeholders regarding the system, as no collection target is incentivized [133].

Third, the application possibilities for recyclates remain very limited, which is why there is no strong domestic market for the recyclates. Thus, the market requires additional support for establishing application possibilities [133]. Additionally, there are currently no mandatory guidelines on recyclable product design considerations. There are, however, some guidelines and initiatives started by industry associations [126].

Conclusion in Japan

In summary, Japan needs to boost its recycling economy through combined efforts that involve more recycling possibilities and create capabilities for several waste fractions. It needs high-quality sorting prior to the recycling process, application possibilities for recyclates, and support of recyclable product design. Although this transition will probably not come along without obstacles, the general situation is extremely positive, which is significantly shaped by the overall very stable and advanced situation in the country.

The following provides a summary of these findings.

Table 18: Summary Framework conditions for EPR in Japan

	Influencing criteria	Good	Medio-cre	Not good	Explanations
General situation	a) Political situation	X			Mainly stable due political stability and an overall well-performing economy
	b) Legal and regulatory frame-work	X			Strong regulatory framework based on a rather centralized system
	c) Income level and GDP	X			High income and relatively affluent soci-ety
	d) Corruption	X			Corruption is not a significant issue
	e) Education and living standards	X			High education and generally high living standards
	f) Geographical situation		X		Highly exposed to earthquakes; how-ever high adaptive and coping capacities for that, most people live near the coast
Waste management situation	g) General waste management structure		X		Clear definition of responsibilities, very good waste collection and waste segre-gation, low levels of recycling
	h) Financing of waste manage-ment	X			Clearly regulated; expenses for packag-ing waste covered by obligated compa-nies, monetary incentives for municipal-ities to sort well
	i) Recycling of packaging waste			X	Weakness of system; incineration is dominating; only small share recycled
	j) Technical competences	X			High standards
	k) Public awareness	X			High as cleanliness is an important part in the culture, feeling of responsibility for waste
	l) Controlling and monitoring systems	X			Controlling of system by government
	m) Importance of the informal sector			X	*not known, probably very low*
	n) Experiences and data availa-bility	X			EPR established since several years, publicly accessible data; data about quantities of packaging based on self-as-sessment
Current status of EPR	o) EPR laws for packaging	X			Implemented since several years
	p) EPR laws for other fractions	X			In place for electrical home appliances
	q) Initiatives from the industry				*Initiatives for recyclable product design*
	r) Initiatives of the government				*not known*
	s) Support through external ex-perts				*not known*
Other remarks					–

For contacts please see Annex 8.

5.9 South Africa

South Africa is located at the southern tip of the African continent. It is characterized by its vast interior plains, which are rimmed by a mountainous frame and a narrow coastline. Natural hazards for South Africa include droughts exacerbated by a shortage of rivers and lakes and — to a very low extent — volcanic activity [134]. Thus, the according to the World Risk Index, South Africa has a "mediocre" level of risk [8].

There are approximately 57 million people living in South Africa [135] with pockets of agglomeration along the southern and southeastern coasts, and inland around Johannesburg [134]. Compared to the other countries on the continent, South Africa has one of the most extensive and modern infrastructure systems. In 2002, they had a road network of 358,596 km. However, only 17% of the roads are paved [136]. Moreover, there are 20,986 km of railways (numbers from 2014) [134].

Constitutionally, South Africa is a parliamentary republic with a bicameral parliament in which the president is the chief of the state, the head of government and commander-in-chief of the armed forces. The country has 9 provinces. Moreover, in South Africa, Pretoria is the administrative capital, with Cape Town being the legislative capital and Bloemfontein the judicial capital [134]. South Africa's peaceful political transition is known as one of the most remarkable political feats of the past century [137]. However, the currently ruling party, the African National Congress, has ruled since 1994 and remains highly divided between reformist and traditionalist camps. This results in much internal fighting and increasing levels of populism in the government's policy ahead of upcoming elections [5].

Since its transition to a democracy in the mid-1990s, the country has achieved significant improvements in poverty reduction and economic development, thus improving the overall well-being of citizens. These improvements include real income growth, the expansion of social safety nets, and access to basic services, including subsidized housing credit. However, progress has declined in recent years due to weak growth and structural changes resulting from the global financial crisis in 2008. An additional challenge involves from labor market developments that require skills that the country's poor currently lack [137]. Thus, more than 55% of the entire population lives below the national poverty line (NPL) and a total of 18.9% below the global poverty line (GPL) [135]. Furthermore, the unemployment rate is 27.1%, which is very high. Young people are particularly affected, with 54.7% unemployed. Additionally, South Africa has one of the highest inequalities globally, which has recently been increasing. The legacy of apartheid has an impact on employment, and the very nature of South Africa's growth does not generate a sufficient number of well-paid jobs and thus drives uneven consumption growth. In numbers: the richest 10% of the country own approximately 71% of the net wealth while the bottom 60% own just 7%. This inequality often persists over generations, resulting in low changes in inequality over time [137]. This is also reflected in the country's political risk, which is "relatively unstable," particularly because of the economic situation [5]. The perceived corruption rates 43 points out of 100, meaning it is an issue in South Africa, which ranks 72 in the global comparison [7].

Assessment of the current EPR status for managing packaging waste

South Africa is significantly **changing** its producer responsibility from a **voluntary, pre-compliance plan to a mandatory EPR plan** for the waste streams (i) printed paper and packaging, (ii) electrical and electronic appliances, and (iii) lighting [138].

Legal framework

South Africa's waste management is governed by the National Environmental Management Waste Act, which *inter alia* determines that the principle of the waste hierarchy is applied as a means to reduce the amount of waste going to landfills. This hierarchy includes waste avoidance, reduction, re-use, recycling, recovery, treatment, and safe disposal . However, in practice the waste hierarchy is only narrowly applied, which is why disposal remains the dominant form [139].

Even though South Africa has a comprehensive legislative framework, **compliance and enforcement remain relatively weak** in a range of areas. In recent years, South Africa has developed an extensive waste policy and regulatory framework supporting sound municipal waste management practices. However, due to the weak compliance and enforcement, there now remains a considerable scope for implementing and enforcing existing policies and regulations more effectively. Enhancing compliance with the existing legislation will require the development of capacities and operational adjustments at all levels. To support legislative measures, particular needs exist for technical capacities ensuring the successful operation of sanitary engineered landfill sites (and associated equipment) as well as capacities in auditing and monitoring [139].

The EPR plan only exists as a voluntary system. In 2016, 58% of packaging waste material was collected for recycling via the voluntary programs currently in place. As part of its **transition to a circular economy**, the South African government wants to **introduce mandatory EPR systems** for the (i) paper and packaging industry, (ii) electrical and electronic industry and (iii) lighting industry. Thus, the government has urged the respective industry associations to submit management plans on how to establish an EPR for their industry. The PRO for paper and packaging is called "Packaging South Africa".

Waste collection and disposal

The National Domestic Waste Collection Standards strongly promote **waste separation at the source** to increase recycling and recovery of the recyclables in the waste. However, waste separation is **not yet mandatory**. Waste collection occurs via **curbside collection systems** or **drop-off points / bring banks**. The responsibility for waste collection lies with the municipalities. Moreover, municipalities are also responsible for establishing so-called "alternative waste management" to divert waste from landfills to reduce environmental degradation and increase recycling. However, the costs for this approach are often regarded as more expensive than landfilling the waste, which is why this perception has been partially responsible for the slow uptake of alternative waste management measures, despite national laws and mandates [139].

Current government-run plans do not achieve their goals [138] as **most waste management services remain inadequate** and the practice of **open dumping still widely exists**. Overall, waste management remains a comparably low priority for most municipalities and the share of households separating their waste is still very low. For example, in 2015, 33.4% of urban households separated their waste at the source while only 19% did so in the rural areas and smaller cities.

Moreover, waste management services are particularly inadequate in many townships, since necessary maintenance and public infrastructure have often been neglected in the past. That is why a wide variety of public services are now inadequate in many townships. The problem is aggravated by the lack of strategies, financial resources, materials, and equipment, as are the skills required for waste management. Local communities therefore face a dilemma when attempting to keep their surroundings clean. Communities and their municipalities find it difficult to address this problem without support from other stakeholders [139].

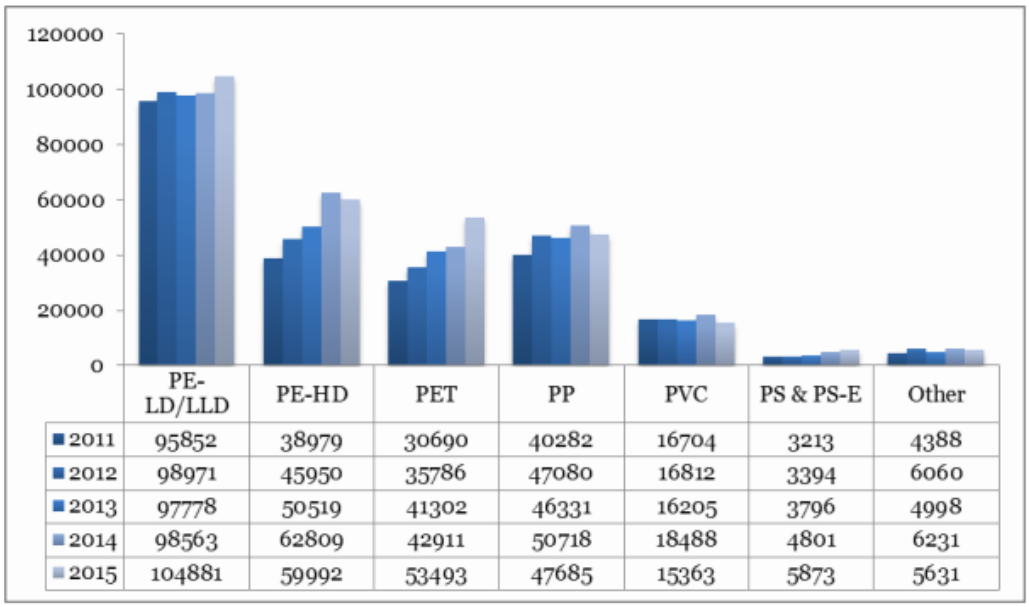
Informal sector

In South Africa, waste management is not a distinct economic sector and the **formal and informal waste management activities are often strongly intertwined**, which often makes it often to

distinguish them. Regardless, the importance of the informal sector is high because it plays a crucial role in current recovery/recycling processes. It is estimated that the informal sector recovers 80% to 90% of all packaging waste (by weight) [139].

Recycling

According to a survey of SA Recycling from 2015, an industry association representing the local plastic industry, there are approximately 230 recycling companies and around 4,500 formal workers in the sector. 30.1% of all plastic packaging is recovered and 18.6% of all plastics are recycled. The most recycled plastic fraction is LD-PE / LLD-PE, as noted in the figure below:



	PE-LD/LLD	PE-HD	PET	PP	PVC	PS & PS-E	Other
2011	95852	38979	30690	40282	16704	3213	4388
2012	98971	45950	35786	47080	16812	3394	6060
2013	97778	50519	41302	46331	16205	3796	4998
2014	98563	62809	42911	50718	18488	4801	6231
2015	104881	59992	53493	47685	15363	5873	5631

Figure 22: **Tonnages recycled in South Africa** [140]

According to Plastics SA, the lack of a consistent incoming stream of recyclables is the single biggest challenge plastics recyclers had to face during 2015. A large quantity of the materials made available for recycling was recovered by waste pickers off landfill sites, where they were contaminated and therefore of very poor quality. In the Northern Province, where the demand for recyclable materials exceeds supply, up to 40 % of materials had to be scrapped or rejected due to impurities. According to Plastics SA, this clearly highlights the need for an effective separation-at-source infrastructure to be implemented throughout the country [139] [140].

Critical issues to implementing an EPR system

The industry-led EPR plan is overall a good approach – its most critical issues regarding implementation is to what extent the government will agree to it, or if a more government-involved model will be implemented as a mandatory system.

Moreover, crucial issues involve addressing the weak monitoring and controlling aspects, and significantly improving the data availability, as all these issues are important for a well-functioning EPR system. Also, responsible parties need to ensure the collected money for the waste management services will be spent independent of income status – that is, that the poorer areas and townships are included to overcome one of the currently existing inequalities across South Africa.

Initiatives and organizations promoting EPR

The introduction of an EPR system is clearly targeted by the government in cooperation with industry. However, so far, there is no EPR system for any waste streams in place.

Conclusion – evaluation of a successful EPR implementation in South Africa

The introduction of an EPR system is likely, since the development process has already progressed quite far. However, it is questionable how strongly the government will follow the industry plans and establish an industry-led and managed model, as envisioned by the industry, or insist on a more government-led one.

The following provides a summary of these findings.

Table 19: Summary Framework conditions for EPR in South Africa

	Influencing criteria	Good	Mediocre	Not good	Explanations
General situation	a) Political situation		X		Generally stable but inequalities still very strongly present
	b) Legal and regulatory framework		X		On paper, comprehensive legal and regulatory framework, however, weak enforcement
	c) Income levels and GDP		X		Very high inequalities
	d) Corruption		X		Corruption is an issue
	e) Education and living standards		X		Due to high inequalities, the living standards vary strongly depending on income
	f) Geographical situation	X			Population distributed in several pockets of agglomeration
Waste management situation	g) General waste management structure		X		Several good elements as waste segregation at the source in theory. However, in practice often not well implemented (or not at all)
	h) Financing of waste management			X	Municipalities often lack resources to provide adequate services
	i) Recycling of packaging waste		X		One third of all plastic packaging are recycled; often poorer quality as most materials are recovered from landfills
	j) Technical competences		X		Varying; some are very simple (waste pickers) while other are quite modern
	k) Public awareness		X		Gradually rising
	l) Controlling and monitoring systems			X	Enforcement and monitoring are overall weak
	m) Importance of the informal sector	X			Strong role; also, since informal and formal sector are often strongly intertwined
	n) Experiences and data availability		X		Generally, experience present due to voluntary plan, however, inconsistent data availability in regard to quality and quantity
Current status of EPR	o) EPR laws for packaging		X		Currently in the process of making them mandatory
	p) EPR laws for other fractions		X		Currently in the process of making them mandatory
	q) Initiatives from the industry	X			Industry has an agreed-upon industry-lead EPR models and developed a corresponding plan
	r) Initiatives of the government	X			Is pushing the transition from a mandatory to a voluntary one
	s) Support through external experts				*not known*
Other remarks					

For contacts please see Annex 9.

5.10 Peru

Peru is a country located in western South America. Neighboring countries are Ecuador, Colombia, Brazil, Bolivia, and Chile. To the west, Peru borders on the Pacific Ocean. The mountain ranges of the Andes are near parallel to the coast. Geographically, the country can be divided into three regions: the coast, the highlands, and the tropical rainforest, which is a wide, flat terrain covered by the Amazon rain forest extending east. The country lies within a seismic active zone; there are active volcanoes such as Sabancaya and Ulbinas in the South. Other than that, recurring earthquakes pose significant threats. Thus, Peru scores rank 81 on the World Risk Index [8].

Peru has approximately 32 million people. with capital region Lima being the most densely populated area with about 9.5 million people. The inland and coastal areas generally provide well-established infrastructure and transport connections. However, depending on the topography and threats such as landslides, which occur especially during the rainy season, the uplands may prove difficult to reach [141].

Peru is arranged in 24 regions, plus the Callao province. The regional governments consist of a president and a council, who are elected for four-year terms. Their responsibilities include regional development, the execution of public investment projects, and the promotion of economic activities and management of public property [142].

Peru is a semi-presidential democratic republic with a multi-party system. The overall political stability is mediocre; the political risk map portrayed Peru's country risk index as 59.5 out of 100 [5]. This is rooted in the escalating battle between the executive and legislative branches of government. In late 2018, President Martín Vizcarra used special powers to pass anticorruption and tax reforms, which were popular with the public. Corruption is a significant issue in Peru; the CPI identifies a score of 35/100, which is rank 105 in the global comparison [10].

Peru ranks place 87 on the Human Development Index (HDI) with a score of 0.740 [52].

Assessment of the current EPR status for managing packaging waste

Legal framework

The environmental law in Peru is uniquely structured within a constitutional framework that codifies it as the law of the people and not merely a regulatory mandate. This has enabled environmental law to hold an elevated place in Peru, where it is considered a fundamental part of the shared stewardship of a shared land. As a result, environmental law does not merely define general principles but also specifies processes for the application of the law, including establishing regulatory processes, defining the stakeholders, structures, programs and management instruments to be used, and implementing a broad set of definitions and designations that guide the oversight and management of environmental initiatives [143].

The regulatory structure governing waste management in Peru has **four levels of authority** over the determination and application of the environmental laws. At the highest levels are the (i) **national government agencies**, which determine the legal requirements for waste management within the various sectors that produce solid waste, such as mining, agro-industry, energy production, hospitals, sanitation, and others. Each of these sectors have a national authority overseeing compliance with the law by registered operators in the respective sectors. The **key environmental authority** in Peru, however, resides at the **provincial and municipal levels**, which are broadly empowered to develop policies, regulate practices, and institutionalize programs for solid waste management. These include the development and execution of projects to improve public waste collection, infrastructure for waste disposal, the recycling of municipal waste and the education and promotion of more sustainable behavior [143].

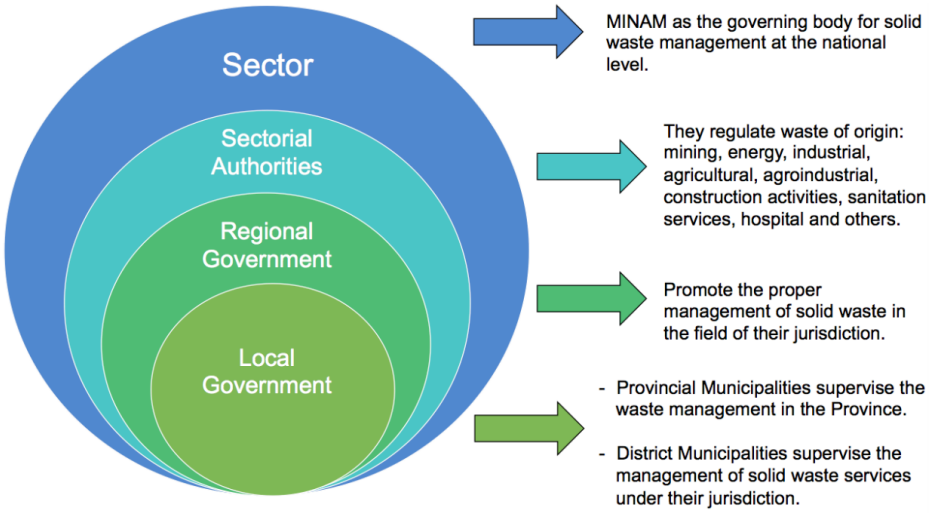


Figure 23: The four governance levels of waste management in Peru [143]

In Peru, the **EPR is loosely integrated** in the Law of Integral Management of Solid Waste and its regulation. Additionally, there is a national plan for Integrated Solid Waste Management 2016-2024. The goals of this plan specifically include making improvements in the disposal of solid waste.

Collection and disposal

Since municipalities are responsible for dealing with their own waste, municipal leaders, community-based organizations, and companies need to collaborate to maintain a waste management system that benefits all stakeholders. Municipalities must create action plans for waste management and are encouraged to **create partnerships with the private sector and civil society**. **Waste pickers should become integrated into the system and serve as a formal part** of the waste management infrastructure. Thus, informal waste collectors who had previously worked on open dumps have been able to form small enterprises made up of associations of waste pickers. Now they provide household and waste collection in dedicated sectors and cities.

In numbers, Peruvian municipalities generate 20,541 tonnes of municipal waste daily. Organic waste makes up 53.2% of municipal waste, bags make up 4.0%, sanitary waste 6.5%, while the remaining percentages include different types of waste such as paper, cardboard, metal or PET. There are 30 dumps across 43 cities and 11 sanitary dumps that receive 38% of the generated waste from urban zones. However, waste management capacities remain insufficient. Informal workers handle most recovery, and only 537 municipalities report that they segregate and recycle solid waste, representing 28.7% of the municipalities nationwide [144]. Thus, **landfilling remains a significant part** of waste management practices.

Peru recycles only 14% of its annual waste, although could potentially recycle or compost 74% of it. Although the recycling sector is nascent and largely informal, the growth of the sector and the opportunity it represents is nevertheless considerable from an economic, societal and environmental perspective [145].

Informal sector

In 2010, Peru became one of the first countries in the world to enact a law (Law No. 29419) that regulates the activity of waste pickers, promoting their **economic and social inclusion in the integrated solid waste management system**. Nevertheless, of approximately 109,000 recyclers, only 13,000 (12%) are formal workers, organized in recycler associations or micro-enterprises.

The situation of solid waste management in Peru, as in other developing countries, is closely related to poverty, diseases, and environmental pollution. In 2014, 86% of waste pickers lived on less than USD 1.25 per day, 30% were women and 36% were concentrated in Lima.

Further initiatives

Since 2011, a segregation at the source program and selective collection of solid urban waste in urban homes has been implemented nationwide to reduce the amount and danger of improperly disposed solid waste, promoting a formal recycling chain and generating an increase of the environmental awareness of the citizenship.

The program involves 249 municipalities distributed across the 25 regions of Peru. It has generated a significant reduction in environmental pollution, improved the quality of life and environmental education of the population, and generated new formal employment opportunities.

So far, 210 municipalities have implemented segregation programs at the source and selective collection, facilitating reuse and ensuring differentiated and technically adequate final disposal with the insertion of duly formalized recyclers. The programs recover 10,974 metric tons of solid waste each month [146].

Initiatives and organizations promoting EPR

As noted earlier, the waste management law of Peru mentions EPR, but merely in a general way. However, **in relation to waste electrical and electronic equipment (WEEE), progress has been made in terms of EPR**. Within the framework of the WEEE Regulation (DS 001-2012-MINAM), producers of electrical and electronic equipment are required to design, implement, and administer a WEEE management system, which can be individual or collective. To comply with the above, a Legal Collection and Compliance System (SRCL) was formed, "RLG Peru," which through its Collective Plan RLGA is responsible for collecting WEEE from all types of final consumers: private companies, public institutions and homes [147].

There is a new project, formulated in the Ministerial Resolution No. 090-2019-MINAM, which seeks to strengthen the EPR principles through the manufacturers, importers, and assemblers of electrical and electronic equipment, which will be responsible for their assets until the post-consumption phase. The Special WEEE Management Regime will replace the current WEEE regulation in force since 2012 [148].

Critical issues to implementing an EPR system

As mentioned above, a broad definition of EPR has been introduced in relation to electric and electronical waste. So far, however, no law defines the concrete regulation regarding the EPR in terms of other types of waste. Aside from that, the waste management infrastructure needs further development; insufficient waste collection and waste management still exist, although the sector is growing. Also, a proper recycling infrastructure is needed to increase recycling.

Conclusion on Peru

With growing concerns over waste management and the focus on environmental aspects and sustainability, Peru is moving in the right direction in terms of addressing its waste management issues. Collaborating with informal waste pickers and expanding the waste management infrastructure by integrating it with public plans provides higher rates of waste collection.

However, adequate waste disposal and recycling facilities are required to manage the waste. Municipalities should collaborate with local enterprises and waste picker associations to create a functioning

waste management system in which waste is either recycled, disposed of, or composted under sustainable conditions.

Also, introducing an EPR system that extends to packaging waste from other kinds of products, not only electrical or electronical, could lead to more sustainability in the manufacture, usage, and disposal processes of packaging.

The following provides a summary of these findings.

Table 20: Summary Framework conditions for EPR in Peru

	Influencing criteria	Good	Mediocre	Not good	Explanations
General situation	a) Political situation		X		The overall political stability is mediocre.
	b) Legal and regulatory frame-work		X		There is a certain basis of law
	c) Income level and GDP			X	Peru is an emerging economy with many very poor people.
	d) Corruption			X	Corruption is an issue in Peru; the CPI identifies a score of 35/100.
	e) Education and living stand-ards			X	Poverty is widespread in Peru.
	f) Geographical situation		X		The inlands and coastal areas generally provide a well-established infrastruc-ture and transport connection. The up-lands may prove difficult to reach.
Waste management situation	g) General waste management structure				Most of the waste goes to landfills or dumps
	h) Financing of waste manage-ment		X		Not sufficient for improved waste man-agement.
	i) Recycling of packaging waste			X	On a low level
	j) Technical competences			X	Not very high.
	k) Public awareness		X		There are some environmental projects
	l) Controlling and monitoring systems				No information
	m) Importance of the informal sector	X			Peru enacted a law that regulates the activity of waste pickers, promoting their economic and social inclusion in the integrated solid waste management system (Law No. 29419).
	n) Experiences and data availa-bility				No information
Current status of EPR	o) EPR laws for packaging		X		There is no law for packaging but initia-tives are in discussion.
	p) EPR laws for other fractions	X			In Peru is a law for WEEE and the "Legal Collection and Compliance System (SRCL) was formed"
	q) Initiatives from the industry				Not known.
	r) Initiatives of the government		X		EPR in discussion and supporting envi-ronmental projects.
	s) Support through external ex-perts				No information.
Other remarks					

For contacts please see Annex 10.

5.11 Chile

The South American country Chile borders on the South Pacific Ocean in the west [149]. Its coastline exceeds 6,000 km and the entire country covers an area of approximately 756.7 km² [150]. Along its coastal borders, low coastal mountains dominate the terrain, followed by a central, fertile valley and framed in the east by the Andes [149]. The risk of natural hazards is assessed as "very high" according to the World Risk Index [8], which is rooted in Chile's very high exposure to earthquakes, active volcanism and tsunamis due to its geographical location [149]. However, it should be noted that the nation's adaptive and coping capacity is assessed as "high" [8]. Infrastructure-wise, Chile is well-developed. Modern cross-country buses connect almost all parts of the country, guaranteeing high accessibility. Train connections from Santiago only exist to the south as far as Chillán.

Chile has a total population of over 18 million inhabitants [150]. Their distribution across the country, however, is highly uneven. Around 90% of all inhabitants live in the urban areas, most noticeably in the metropolitan area of Grand Santiago. In contrast, the deep south and the north are very lightly populated [149]. In the winter months (June to August), many cities face air pollution problems from increased levels of air pollutants, often leading to driving bans.

Chile is a presidential republic, which is sub-divided into 16 provinces. Generally, Chile is both politically and economically one of the most stable countries in Latin America [5] [151]. Due to its solid, macroeconomic framework, Chile has been able to reduce poverty significantly in the past decades (according to the NPL) from 36 % in 2000 to 8.6 % in 2017 [150]. However, due to a rather sluggish growth based on the boom of commodities at the end of the 2000s, existing inequalities and the perceived shortcomings of the social safety-net are at the center of current political discourse. As the policy-making environment is strongly divided in many regards, the current government faces problems in enacting policy changes [5]. Government efforts to rationalize the tax system, facilitate employment mobility, reduce bureaucracy, improve the pension system and strengthen the financial system will also be crucial for maintaining growth and reducing Chile's vulnerability to external risks [151]. Thus, the overall political and economic situation is "relatively stable," and the country's Ease of Doing Business Ranking lists Chile in 56th place (out of 190) [49].

The level of perceived corruption puts it in 27th place with a score of 67/100 points [10]. On the HDI, Chile ranks 44th out of 189 countries with a score of 0.843 [52].

Chile has ratified several important international treaties including:

- Membership in the OECD (as first South American country) in 2010
- Free trade agreements with the European Union, the USA, Japan, and China and the country with the most bilateral trade agreements globally
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal
- United Nations Framework Convention on Climate Change
- Stockholm Convention on Persistent Organic Pollutants

Assessment of the current EPR status for managing packaging waste

Legal basis

In 2013, a long-awaited waste management law entered the congress and was officially published in 2016 as the Waste Management, Extended Producer Responsibility and Recycling Incentives Bill (Ley N°20.920, 2016). It includes an **EPR plan** for six priority product categories:

1. Tires
2. **Packaging**
3. Lubricant oils
4. Electrical and electronic equipment waste (WEEE)
5. Automotive batteries
6. Portable batteries

This law creates an instrument for producer responsibility that obligates the producers of these product categories to found PROs or deliver proof of take-back. A corresponding producer register (RETC) is already established. This law will gradually start to come into effect as the specific regulations and targets (collection and recovery rates) are defined and published [*dated June 2019*].

Moreover, the law also considers the **inclusion of the informal recycling sector**, mainly waste pickers, as accredited waste operators, once they obtain the corresponding certification (Ley N°20.920, 2016). Collection and recycling must be tendered separately and informal recyclers and municipalities are treated with preference.

Regulations for tires have already been adopted and will enter into force 01 January 2021; regulations for packaging are almost finished as collection and recycling targets have been defined, along with responsibilities (expected to be published in 2019). Regulations for lubricant oils are under development.

On June 10, 2019, Chile published the **draft EPR law for packaging**. Important aspects are:

- Five material groups with separate targets: beverage cartons, metal, paper and carton, plastic, and glass
- Different targets for industrial packaging and packaging for private consumers (increasing quotas over the years)
- Industrial consumers can participate in a system or are responsible as individuals
- Exemptions for small producers (less than 300 kg of waste per year)
- For household packaging, only one system operator for each district or municipality
- Mandatory door-to-door collection, expanded from covering 10% to 85% of the inhabitants
- The systems must report annually, with the reports controlled by experts
- The PRO is responsible for the integration of the waste pickers

Moreover, important articles are:

Article 52

Waste pickers.

The waste pickers who are registered in the national register (RETC or PRTR) will be able to participate in the waste management for the fulfilment of the goals established in the decree. For these purposes, they must be certified within the framework of the National System of Certification of Labour Competences established in Law No. 20 267.

The Producer Responsibility Organization must make the bidding rules under which they will contract the collection and recovery services available to the waste pickers free of charge.

In addition, the Inclusion Plan of the PRO (article 13) must indicate the mechanisms and tools for training, financing and formalization, aimed at enabling the full integration of waste pickers.

Article 44

Collection.

Article 44: Obligation of separate delivery at source and selective collection of waste. The GRANSIC (big PRO) must carry out the home collection of waste, allowing the separate delivery of the same, which covers a territory that considers, at least, 10% of the country's homes, at the end of the first calendar year the decree came into force.

This percentage should be increased by 10 additional percentage points annually, to cover 85% of the total number of homes in the country.

The standard for home collection should be uniform throughout the national territory, and may vary only in terms of population density. This standard and its exceptions must be sufficiently detailed in the management plan.

The bag or the container from which the management system will collect the packaging residues and household packaging delivered by consumers must be yellow.

Current collection and recycling

The **waste collection** rate across Chile is almost 100%. Each year, approximately 8 million tonnes of municipal waste is generated, and the amounts are increasing (30% from 2000 to 2010), most noticeable in the metropolitan area of Santiago. In most cases, the waste is collected through a drop-off or bring system. Only a few stations practice **waste segregation**, mostly as initiatives from the industry and/or waste management operators. Curbside collection exists in fewer than 10 municipalities, of which only two have comprehensive and extensive collection systems.

Figure 24: Drop-off stations in Chile with waste segregation

There are about 7,250 drop-off stations, of which 87 have a compactor and are staffed. For sorting, there is currently only one plant with manual sorting for mixed recyclable waste.

Currently, **no waste incineration** exists. The system landfills over 95% of the generated waste. Out of all landfills, 23% are regarded as unsanitary.

As most waste goes to landfills, recycling is almost exclusively limited to the informal sector. Only an estimated 4% to 10% of municipal waste is recovered. Regarding plastic waste, 8.5% is recycled, and only 17% comes from households [152].

Financing

Almost 70 % of the population does not pay for the treatment of municipal waste, which poses a **financing problem for municipalities**. There is a National Waste Program in place that should support the sustainable waste management systems. Most funds received are spent on landfills.

Moreover, a recycling fund was established in 2018 for funding 33 projects focused on raising awareness and the integration of the informal sector. Currently, this fund is not used for waste infrastructure purposes, and only a few publicly funded projects for drop-off station exist.

Plastic bag ban

In October 2017, Chile became the first South American country to introduce a ban on plastic bags. The corresponding law for the ban should prohibit the use of plastic bags in more than 100 coastal cities, to protect the marine ecosystem. The ban was ratified by the government in May 2018 for the entire territory. After a period of six months, large supermarkets were not allowed to sell or hand out single-use plastic bags – small supermarkets and kiosks were given two years to find alternatives before the ban takes effect.

This ban also concerns biologically degradable plastic bags as they are not the norm in Chile.

Critical issues to implementing an EPR system

As noted earlier, Chile has already passed laws for an EPR system, but crucial issues could arise in regards to its implementation. The two most crucial points are (i) the establishment of a well-developed recycling and recovery infrastructure including commercialization possibilities for the recyclates to reduce and eventually end the common practice of landfilling, and (ii) the integration of the informal sector.

Initiatives and organizations promoting EPR

Chile is a member of the OECD since 2010. In the latest report in 2016, Chile ranked in last place together with Turkey regarding its recycling quotas. Consequently, the country has been trying to improve these numbers. The newly elected government from 2018 continues to work on developments like the inclusion of the informal sector or the recycling fond (which will be available in the next three years).

Moreover, Chile was also the first South American country to join the Ellen MacArthur Foundation's "Global Network of Pacts for Plastics" initiative. The corresponding act was signed in April 2019. The targets, which should be achieved by 2015, will be announced in June 2019. The targets will comprise (i) designing plastic containers in such a way that they can be recycled, recovered or composted, (ii) phasing out unnecessary single-use plastic containers through innovation and re-design, (iii) increasing the reuse, collection and recycling of post-consumer packaging containers, and (iv) increasing the recyclate content in the plastic containers [152].

Finally, the government is currently discussing a law that would ban single-use products like cups, mugs, bowl, straws, plates and similar items for food and the corresponding lids, bottles and other supplies [153].

Conclusion for Chile

In summary, Chile needs to emphasize the establishment of a sound recycling infrastructure (including waste segregation at the source) and economy to work on its bottleneck in the waste management of plastic packaging. Moreover, the integration of the informal sector will be a crucial aspect of the transition from an EPR law to a well-functioning EPR system. The livelihoods of these informal workers

often depend on their informal waste management activities, and disruptions could cause significant hindrances.

If the establishment of an EPR system is combined with other recent supporting developments and initiatives, it is likely that the both will mutually reinforce each other's success. The following table summarizes this section's findings.

Table 21: Summary Framework conditions for EPR in Chile

	Influencing criteria	Good	Mediocre	Not good	Explanations
General situation	a) Political situation	X			Overall stable
	b) Legal and regulatory framework	X			Several laws enacted, sound legal framework
	c) Income level and GDP	X			Relatively high income, overall stable economic situation
	d) Corruption	X			Corruption is not a significant issue
	e) Education and living standards	X			High level of education, massive poverty reduction in past decades
	f) Geographical situation		X		High exposure to natural hazards, high urbanization but good accessibility of cities
Waste management situation	g) General waste management structure		X		High collection rates, almost only landfilling for disposal; waste segregation only practiced at a few stations
	h) Financing of waste management		X		Several funds to support cities, however, finance problems for municipalities
	i) Recycling of packaging waste			X	Only a few, small initiatives exist
	j) Technical competences			X	Quite low
	k) Public awareness		X		Is currently increasing
	l) Controlling and monitoring systems			X	No extensive controlling and monitoring systems in place yet
	m) Importance of the informal sector		X		Informal sector plays an important role, integration is government target
	n) Experiences and data availability		X		There is a database for importers and more databases are currently established; however, no systematic data collection yet
Current status of EPR	o) EPR laws for packaging	X			Passed in 2016; a proposal was published on 10th June 2019.
	p) EPR laws for other fractions	X			Regulations for tires are already finished and for lubricant oils under development. The processes for the other products (WEEE, batteries) should start this and next year and be completed by the end of 2022
	q) Initiatives from the industry		X		Several initiatives for elements of an EPR system like waste segregation; sometimes in cooperation with waste management operators
	r) Initiatives of the government	X			Actively working on establishing the EPR system for packaging and discussing other related initiatives like a ban on single-use plastic containers

	s) Support through external experts	**X**			Environmental Ministry consulted external experts for its EPR system for packaging
Other remarks					

For contacts please see Annex 11.

5.12 Argentina

Argentina borders the South Atlantic Ocean in the East and the Andes in the West. In the Northern half, fertile plains in the pampas region change into a hilly and later mountainous region when approaching the Andes. These latter regions can experience volcanisms and earthquakes. Natural hazards in the northern and particularly the pampas region are the so-called pampero winds which carry cold, Antarctic air leading to drops in temperatures often accompanied by violent winds and heavy rainfall that can cause flooding events [154]. Nevertheless, the overall risk is assessed as "low" according to the World Risk Index, as the exposure itself is "very low" paired with good coping and adaptive capacities [8].

Argentina is a vast country with a size of approximately 2.8 million km² and is home to 44.27 million inhabitants [155]. However, the population is unevenly distributed. While rural regions like Patagonia in the South are very scarcely populated, one third of the entire population lives in and around Buenos Aires. Over 90% of the entire population lives in the urban areas [154]. The overall infrastructure is good in comparison with other South American countries. However, large disparities do exist. While the infrastructure within Buenos Aires is very well developed, maintained and dense, main roads outside the large cities need significant improvement. Additionally, only 29% of all roads are paved [156].

Constitutionally, Argentina is a presidential republic in which the president is the chief of the state, the head of government and command-in-chief of the armed forces. The country is divided into 23 provinces as well as the independent city of Buenos Aires, which are mostly independent as they have an own jurisdiction, executive and government [154]. Thus, each province has the power to enact its own environmental regulations.

Economic growth has been volatile. The recent political agenda of the current government focuses on liberalization. Items include the structural reformation of the Argentine economy through deregulation, a unification of the exchange rate, the modernization of the import regime, the reduction of inflation and fewer price controls. Combined with fiscal turbulences in 2018, reforms have heralded a depreciated currency. The Argentine peso has experienced a depreciation of over 50 % [157]. Moreover, this has caused increased food prices and growing disparities between the rich and poor [8]. In 2017, 25.7% of all residents lived below the NPL and 0.4 % below the GPL [155]. Children are especially vulnerable: The incidence of poverty reaches 41% among children aged 0 to 14 years [157]. Also, the unemployment rate has risen to approximately 10%, where, again, younger people are strongly affected, with an unemployment rate of over 20% [8].

Thus, overall political stability has decreased and is rated as "relatively unstable" [5]. Additionally, the CPI assesses Argentina corruption level of 40/100 points, meaning that corruption is an issue. Globally, Argentina ranks 85th based on perceived corruption level [7]. On the Human Development Index of the UN, Argentina scores 0.825 (rank 47) which is quite high, indicating a relatively good level of key development factors [52].

Argentina has signed and ratified the following, waste-relevant international agreements:

- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal
- United Nations Framework Convention on Climate Change
- Kyoto Protocol
- Stockholm Convention on Persistent Organic Pollutants

Assessment of the current EPR status for managing packaging waste

Currently, Argentina has not implemented an EPR system for packaging waste. The waste management for (packaging) waste is currently organized and executed as follows.

Collection

Waste collection is a municipal responsibility. However, the collection rate varies significantly in terms of collection degree and collection form across the country. Across Argentine the overall collection rate exceeds 90%; however, the rural regions in the country's North underperform in terms of waste collection. In contrast, collection in the urban agglomeration centers is quite advanced and uses high technical standards in order to ensure a sufficient services level, since the waste generation levels are rather high in these areas. In terms of numbers, 15,000 tonnes of municipal waste are generated in Buenos Aires on a daily basis [158], which equals 1.252 kg of waste per capita per day. In comparison, smaller cities (10,000 to 50,000 inhabitants) generate only 0.7 kg of waste per capita per day. Moreover, these numbers will likely rise considering the recent developments in population growth and the growth of gross income [159].

The most advanced collection system is in Buenos Aires. Some parts of the metropolitan area have introduce waste separation and collect recyclable waste such as paper and plastics in yellow containers. There are several private companies active in waste collection and other subsequent waste management services. One of the largest actors is the company CEAMSE (*Coordinación Ecologica Área Metropolitana Sociedad del Estado*), founded by the city council and regional government of Buenos Aires in 1976. Other cities have also introduced waste segregation initiatives [160].

Figure 25: Solar-powered waste containers with integrated compactor in the centrum of Buenos Aires; source: Kaltenbach Energy Consulting; 2017

Moreover, the city council of Buenos Aires banned plastic bags and other single-use items like straws. It passed the "*Basua Cero*" law (zero waste) and initiated the gradual integration of **informal waste workers**, so-called Cartoneros, into a formalized employment relationship. In 2017, a total of 12 cooperatives with 5,500 employees collected the recyclable waste. Additionally, there are another 3,500 informal workers in Buenos Aires who also collect recyclables. In the "*Centros Verdes*" (green centers), informal workers can segregate their collected waste and no longer need to do this in public next to the roads. In total, there are eight such Centros Verde in Buenos Aires that are organized by cooperatives [160].

Recycling and disposal

Approximately 65% of municipal waste goes into sanitary landfills, 10% in so-called controlled landfills and approximately 25% in open dumpsites, which causes tremendous environmental degradation. Neither waste incineration nor energy recovery exists in Argentina. Moreover, most landfills will reach their maximum capacity within the next several years, which fostered the public awareness about waste as an issue. Thus, waste prevention, the separation of recyclables and the closing and decontamination of the open dumpsites have become important targets in the national strategy for the creation of a holistic municipal waste management system by 2005. A total of 6% of the municipal waste is recovered through material recycling.

Recycling of other waste streams, such as electrical waste, occurs only marginally. The lion's share of this waste fraction is disposed of and no legal basis for a separate collection exists [161].

Approximately 150 companies work in the field of plastics recycling, processing an estimated 225,000 tonnes altogether. However, most of this plastic waste does not come from households. Direct separation of industrial and commercial waste at the producer level is not enforced. Additionally, approximately 40 companies work in the field of paper recycling, and are predominantly located in the metropolitan area of Buenos Aires. Lastly, there are nine glass recycling facilities; five of them in Buenos Aires [160].

Since neither recycling nor composting take place on a large scale, expectations are that the waste quantities will constantly increase. There are also plans for several waste incineration plants. According to the program for fostering energy recovery, plans call for the construction of multiple waste incineration plants through 2030. However, details regarding this initiative are missing. Moreover, there is resistance from NGOs and the recycling economy, which fear the loss of jobs [158].

Some promising initiatives do exist, however. In Rivadavia (province San Juan), the construction works for building an environmental technology park started in 2017. This park seeks to establish a cluster that will support the extensive waste collection and recovery of recyclables in the province. Recycling processes are planned for vegetable oils, batteries, electronic waste, construction waste as well as waste-to-energy processes [160].

Initiatives and organizations promoting EPR

Although no EPR system is in place, the topic and the need to act are high on the government's agenda as the parliament is currently discussing the introduction of an EPR law. Since concrete details have yet to be published, no further information is currently available. However, many expect future pronouncements to be more general in nature and act as basis for further legislation for specific waste streams and items.

Additionally, other initiatives for reducing and managing packaging wastes are gaining momentum. For instance, Argentina enacted a pesticide packaging take-back law in 2016. This law has been passed to achieve a higher level of environmental protection. It obligates all individuals and companies who have obtained a "Pesticide Certificate of Use and Sale" to register with the Ministry of Agriculture and assume responsibility for the waste, to minimize the environmental impact of the pesticide containers.

There are also discussions for (i) establishing a general packaging take-back as well as (ii) recycling systems. The first proposed law would establish a comprehensive packaging waste management regulation that envisions many EPR mechanisms such as the creation of management systems and labelling requirements. Additionally, it will pass a second, complementing law for environmental protection requirements regarding the management of packaging waste, which includes EPR, as this law would obligate producers, packagers, importers, and manufacturers of packaging materials to establish, organize, and finance packaging waste management systems and label packaging to facilitate collection and recycling.

Other proposed bills comprise the "WEEE Management Bill" to establish minimum environmental protection measures for the management of electrical and electronic equipment waste, the "National Registry of Ecologically Designed Products" as a voluntary certification program for companies whose products possess qualities or characteristics that reduce their environmental impact throughout their lifecycles, and the bills for "Modifications to Incandescent Lamp Import".

There is no information about voluntary initiatives from consumer good companies and other companies for fostering recycling and/or an EPR system for packaging. However, many producers and importers of packaged goods welcome the EPR initiative; particularly the multi-national ones. Moreover, the informal worker cooperatives generally have a positive attitude toward the EPR initiative, although they also fear losing the opportunity to collect waste for their livelihood.

Critical issues to implementing an EPR system

Establishing an EPR system has many promising aspects, such as the positive attitudes of both the industry and informal worker cooperatives. This reflects the current formulation of the EPR that is gaining momentum in Argentina.

However, there are also some hurdles, aside from the general problem of corruption. The lack of communication within the recycling and waste management sector, for example, makes it harder to agree on common ground and potential approaches. Moreover, communications among stakeholders can deteriorate.

Finally, the political situation is currently somewhat unstable, and future developments could either stabilize the potential introduction of an EPR system or have the opposite effect.

Conclusion – evaluation of a successful EPR implementation in Argentina

Based on the current situation and developments, and despite existing problems and hindering factors, it makes sense for Argentina to pursue the introduction of an EPR system, given the progress already made. The country has a suitable window of opportunity for the establishment of an EPR system.

The following table summarizes the results for Argentina.

Table 22: Summary Framework conditions for EPR in Argentina

	Influencing criteria	Good	Mediocre	Not good	Explanations
General situation	a) Political situation		X		Relatively unstable due to price fluctuations, unemployment
	b) Legal and regulatory framework	X			Sound legal basis; defines responsibilities
	c) Income level and GDP		X		High income country, but also high levels of poverty
	d) Corruption		X		Corruption is somewhat significant (40/100 points)
	e) Education and living standards		X		Relatively high HDI, however also high levels of poverty
	f) Geographical situation		X		Majority lives in the cities and urban areas; rural areas only very scarcely populated without accesses to a good infrastructure
Waste management situation	g) General waste management structure		X		Over 90% access to waste collection; waste segregation only in a few places, landfilling / open dumping prevalent practices
	h) Financing of waste management			X	No information
	i) Recycling of packaging waste			X	Almost nonexistent
	j) Technical competences		X		Varies across country
	k) Public awareness		X		Slowly rising awareness and protests against environmental degradation caused by poor waste practices; environmental education in primary school
	l) Controlling and monitoring systems			X	Information usually not up to date; problem of corruption
	m) Importance of the informal sector	X			"Cartoneros" have an important role
	n) Experiences and data availability			X	Not known. Statistical data is usually outdated
Current status of EPR	o) EPR laws for packaging		X		Exists for pesticide containers
	p) EPR laws for other fractions			X	Not known
	q) Initiatives from the industry			X	No initiatives known
	r) Initiatives of the government	X			EPR law in preparation; several proposals discussed for packaging waste and WEEE
	s) Support through external experts			X	One workshop in 2018 which also covered the aspect of EPR
Other remarks					

For contacts please see Annex 12.

5.13 Mexico

Mexico borders the North Pacific Ocean in the east and the Gulf of Mexico and the Caribbean Sea in the west. Its surface area covers 1,196,380 km² and is home to more than 129 million people [162]. The terrain is dominated by rugged mountains and thus has generally high elevations. The only exceptions are the coastal lowlands. In total, Mexico has over 9,000 km of coastlines. Natural hazards threatening Mexico include volcanoes and earthquakes in the center of the country and in the south as well as tsunamis along the Pacific coast in the west and hurricanes along the coasts of the Caribbean Sea and the Gulf of Mexico [163]. Nevertheless, the World Risk Index assesses Mexico's risk as "middle" [8].

Most of the population lives in the middle of the country between the states of Jalisco and Veracruz. Additionally, approximately a quarter of the population lives in and around Mexico City. In total more than 80% of the entire population lives in urban areas [163].

Mexico is a federal presidential republic, divided into 32 provinces [163]. After the election of the leftist candidate Obrador as president in 2018, Mexico's politics will likely shift decisively to the left for the first time in decades. Moreover, many expect that the government's role in the Mexican economy as well as the spending on social programs and infrastructure will be increasingly paired with a restructured approach to combat record drug trade-related violence. The Political Risk Index assesses the country's stability as "relatively unstable," and many investors remain wary due to potentially erratic policy formation under the new government [5]. Moreover, corruption reaches very high levels – with a score of 28/100, Mexico is globally ranked in 138th place [10]. Also, poverty remains an important issue, as more than 43 % of the population lived below the NPL [162].

Due to the anti-Mexican rhetoric of the current US government under Trump, Mexico is shifting from its former focus on trade with the US to more diversified and intensified trade with Europe and Asia [164].

Assessment of the current EPR status for managing packaging waste

Legal basis and current situation

Mexico has **no established EPR system**. To promote waste management, Mexico has a regulatory framework and public policy instruments, such as the National Program for the Prevention and Integral Management of Waste. The country seeks to use these to promote valorization and minimize the impact on the environment and human health. Likewise, it has signed a corresponding international agreement to manage waste and chemical substances of global priority, thus complementing the integral management at the national level [165].

However, this traditional approach has not supported the minimization or adequate disposal of waste. In Mexico, **final waste disposal in open dumps or landfills** prevails, which, in several cases, does not operate efficiently. This is caused by the **lack of adequate budget and infrastructure available** for waste management, coupled with an **inefficient management of resources**, the lack of clear rules and market incentives for waste valorization by private agents, the geographical dispersion of the very large population within the national territory, and complex geographical conditions in terms of logistics. The above is reflected in disruptions in the social fabric, informality, poverty, and health concerns [165].

An additional barrier for waste management is related to the category conferred by the General Law for the Prevention and Integral Management of Residues (LGPGIR), as well as the powers and attributions granted to the different orders of government, from the Constitution itself [165].

According to local experts, EPR is an issue that has stalled and there is no progress in Mexico with this concept. In large part, this is due to the opposition of large elements of the business sector as well as the weakness of the Mexican authorities in the face of this opposition. All that currently exists is a "**shared responsibility**" arrangement. The shared responsibility ("*Responsabilidad Compartida*") is a guiding principle in the General Law for the Prevention and Integral Management of Residues (LGPGIR). According to this principle, every actor in the supply chain must assume responsibility for a well-functioning waste management system. Thus, this principle is different from EPR, which is based on the responsibility of the producers and importers of goods like packaging. There are, however, also private industry-led initiatives pushing the implementation of an EPR system.

Collection and disposal

Municipal entities take care of **urban solid waste disposal**. Special handling waste is the responsibility of the state authorities and hazardous waste is handles at the federal level. In this sense, the municipalities, as constitutionally empowered authorities for the provision of the public service of the cleaning, collection, transfer, treatment and final disposal of waste, often resent the budgetary and social burdens of handling this obligation [165].

There is **inequality in the coverage of the collection and disposal** service at the national level. The localities with populations greater than 10,000 inhabitants enjoy a service coverage of 80% on average, and localities of fewer than 10,000 inhabitants have a coverage of only 23% of services. On the other hand, in rural areas there are 143 municipalities that do not have any service at all. In this sense, the southern region, composed of Veracruz, Guerrero, Oaxaca and Chiapas, which is where there are many municipalities with fewer than 10,000 inhabitants, is the region with the lowest coverage, at 69% [165]. Furthermore, many municipalities face a budgetary deficit when it comes to financing the inadequate waste collection and the landfills /dumpsites. However, expectations suggest this situation will be improved under the new government from 2019 onwards [166].

Regarding final disposal services, the INEGI reports for 2010 list 238 sanitary landfills in which 70% of the waste generated is available, while in 1,643 reported open dumps, 25% of the waste is available. The rest (5%) is waste that is recycled or recovered. However, the operation of landfills and dumps is inadequate and represents a risk to the health of the population and the environment. The Secretariat of Environment Contaminated Sites Computer System (SISCO) identified that at least 277 final disposal sites (dumps or landfills) present conditions like those of a contaminated site. This documentary identification needs to be updated and confirmed in the field, in order to propose the type of sanitation or remediation plan required and to mitigate the risk it represent to the population of each locality [165].

Recycling of waste is estimated to be around 3-5 % [165] [166].

There is a slow development of professionalization in the waste management sector fostered by increasingly strict public regulation as well as the increased level of commitment from the private recycling sector. However, large numbers of informal workers (so-called *pepenadores*) oppose this trend.

Figure 26: Typical dumpsite in Mexico (on the left, sorted plastic waste (on the right) [165]

Figure 27: Sorting plants in Mexico [165]

Critical issues to implementing an EPR system

Opposition to an EPR exists in the business sector. Their argument is that Mexico is not prepared for such a plan and that it would be economically unfeasible. Therefore, not much available documentary information exists. Nevertheless, this topic is no longer taboo and in the past few months has been discussed in public forums with chambers and business associations.

Initiatives and organizations promoting EPR

According to a local waste expert, many discussions about **circular economy** take place, but **EPR is not mentioned in most of them**.

For instance, in January 2019, the national environment secretariat SEMARNAT published a "National Vision Towards Sustainable Management: Zero Waste," whose general objective is to transform the traditional plan of waste management into a circular economy model for the rational use of natural resources and promotion of a sustainable development in the country. The roadmap is as follows:

1. Diagnosing infrastructure, capacity, regulatory framework, and waste management in the country

2. Closing of final disposal destinations (open dumps and landfills) that do not comply with the regulations
3. Designing the technical and financial assistance platform for waste management in the states
4. Creating, adopting, and operating models for the sustainable management of waste
5. Transforming open dumps in material banks and the creating markets for recycled raw materials, thus fostering the remanufacturing and recycling industry
6. Avoiding of the waste of food and taking advantage of the organic and energetic potential of the waste.

However, EPR is only mentioned once under the heading “shared responsibility” *("Corresponsabilidad")* and in the context of the Circular Economy [165].

There are also initiatives below the national level: Quintana Roo, a Mexican state of the Yucatan Peninsula, approved its Circular Economy Law with EPR on 05/29/2019. However, the final approval and publication is missing [167].

The Circular Economy Action Plan of Mexico City represents a circular economy approach without EPR, but with several elements typical of an EPR system in it. This plan seeks to reduce the generation of waste and single-use products, improve collection and create new recycling infrastructures as some of its strategic lines. In order to become a more sustainable city and implement a strategy to reduce the effects of climate change, the Government of Mexico City recently presented the "Action Plan for a Circular Economy." The city will make an initial investment of 14 million euros for infrastructure and to transform the 12,700 tons of solid waste it generates daily through a recycling process that allows it to be reincorporated into new production processes [168].

Finally, a senate initiative to modify the Mexican waste law does exist and focuses in particular on the subject of plastics. It explicitly names EPR as an instrument. This initiative is at the national level. However, according to the local waste management experts, it is unlikely this initiative will become law.

Aside from these government initiatives, the previously noted **private sector-led initiative** of ECOCE is a voluntary EPR plan set up by several multinational and regional consumer good companies for PET bottles. Moreover, ECOCE pushes proper collection, sorting and recycling through education and awareness raising. It also lobbies for EPR implementation [169]. Generally, industry opposition is slowly changing due to a change in perception as an industry-owned EPR system does not forward the collected levies to the government, which is the main reason for their opposition against an EPR system.

Conclusion – evaluation of a successful EPR implementation in Mexico

The political situation is not very stable in Mexico. Particularly, tense trade relations with the United States of America is strongly affecting the domestic economy and economic stakeholders currently oppose EPR systems as they are concerned that the government will misuse the collected levies. Thus, it is only possible to implement voluntary initiatives of individual companies in the short run as political actors are currently not taking specific steps toward an EPR law. However, the public’s environmental awareness is rising, which is why the political actions might be implemented at a later time, depending on whether the political and economic situation will stabilize.

Other factors for consideration are summarized in the table below.

Table 23: Summary Framework conditions for EPR in Mexico

	Influencing criteria	Good	Medio-cre	Not good	Explanations

General situation	a) Political situation		**X**		Relatively unstable due to current political and economic tensions and developments
	b) Legal and regulatory framework		**X**		General regulatory framework and international agreements and a national vision of "zero waste"
	c) Income level and GDP	**X**			In Mexico, compulsory education is required and school attendance is free. Mexico's economy is heavily dependent on the US but on a good level
	d) Corruption			**X**	Corruption is on a very high level
	e) Education and living standards			**X**	More than 40% are poor people; no good healthcare and middle education.
	f) Geographical situation		**X**		Mountains, earthquakes, tsunamis, and hurricanes.
Waste management situation	g) General waste management structure		**X**		The final disposal of waste in open dumps or landfills and some initiatives.
	h) Financing of waste management		**X**		Significant lack of budget
	i) Recycling of packaging waste		**X**		Slow development of professionalization in waste management.
	j) Technical competences		**X**		Low or middle level
	k) Public awareness	**X**			Awareness raising concerning human rights defenders and the environment.
	l) Controlling and monitoring systems		**X**		No information
	m) Importance of the informal sector		**X**		Large group of informal workers
	n) Experiences and data availability			**X**	No good data base
Current status of EPR	o) EPR laws for packaging			**X**	No law in discussion
	p) EPR laws for other fractions			**X**	Not known
	q) Initiatives from the industry		**X**		Parts of the industry are currently against an EPR system (due to concerns about mis-use of collected funds); however, a voluntary system for PET bottles (ECOCE) is currently in place
	r) Initiatives of the government			**X**	Not known
	s) Support through external experts			**X**	A little bit in discussion; for example, with the German chamber of industries
Other remarks					

For contacts please see Annex 13.

5.14 Colombia

Colombia is located at the northern part of the South American continent, where it borders the Caribbean Sea and Pacific Ocean. Due to its location, the topography is characterized by coastal lowlands as well as the eastern lowland plains, which are called Llanos and cover 60% of the country's entire surface. In between, the country is shaped by the Andes leading to a hilly and mountainous landscape [170]. The topographic division is also reflected in the distribution of the 49 million inhabitants [171]. The majority of the residents live in the area of the costal lowlands and foothills of the Andes while the Llanos are only sparsely populated [170]. The risk of natural hazards is assessed as "middle" according to the World risk Index due to volcanic activity and earthquakes [8].

Due to the Andes, Colombia's infrastructure lacks nation-wide integration, particularly in regards to roads and railways. Thus, air travel is the most important and best developed form of travelling for passengers while waterways are the dominant transport system for cargo. In 2002, only 24% of all roads were paved and landslides and washouts often block roads, which exacerbates the situation [172].

Colombia is a presidential republic with 32 administrative departments and the capital district of Bogotá. The Colombian government achieved peace in 2016 with the guerrilla group FARC after decades of war that resulted in more than 200,000 casualties. The peace talks with the guerrilla group ELN started in 2017. However, after an attack in 2018, the talks stopped [173]. Overall, the security environment has arguably become more tenuous despite the 2016 peace deal [5].

The country has steadily strengthened its economy by implementing a solid macroeconomic framework. The post-conflict reconstruction efforts could further support the growth through increased investments, particularly in the agriculture and energy sectors. Due to the political situation in neighboring Venezuela, Colombia is currently receiving a large influx of migrants. Colombia has taken a leading role in adopting an open borders policy and implemented a good provision of humanitarian services including education, health, and employment services [174]. Overall, the Political Risk Index rates the Columbian situation as "relatively unstable" due (i) the Venezuelan crisis and the spending, (ii) the lingering political debate over the implementation of the FARC deal, and (iii) surging coca production fueling organized criminal activities. Nevertheless, Colombia is adhering its investor-friendly policies and fiscal discipline to improve the business environment. Colombia is also focusing on fighting corruption [5]. According to the CPI, Colombia ranks 99th with 36 out of 100 points, which indicates corruption is a significant issue [7]. This value has slightly worsened compared to the pervious years [10]

Assessment of the current EPR status for managing packaging waste

Since Colombia is planning to become a member of the OECD countries [175], it has initiated many measures and actions in recent years to improve waste management. As part of this, it **introduced EPR for packaging waste.**

Complementing its efforts to become a member of the OECD and associated efforts to improve the waste management situation, the Ministry of the Environment began to implement an EPR system for packaging. It did this by introducing EPR as an instrument within Colombia's framework of the National Policy for the Integral Management of Solid Waste (Conpes 3874/16), to start the transition to a circular economy [176].

Thus, in July 2018, the government officially passed Resolution 1407/2018, which **obligates all producers** to create so-called Environmental Management Plans (named *Plan de Gestión Ambiental* or PGA) for their packaging and subsequent packaging waste. It outlines the further treatment and use of packaging waste and pursues actions (e.g., through projects, alliances, or agreements) with other involved actors to push the waste management goals as defined in Resolution 1407. Moreover, producers are also obligated to use the existing waste infrastructure. **Manufacturers and importers** must support

and participate in the Environmental Management Plans of the producers, as well as contribute research and innovative packaging designs [176].

Other roles defined in the resolution, are (i) **marketers** must provide sufficient space for collection, execute the Environmental Management Plans of the producers, and inform consumers of the collection and return system for packaging waste. Additionally, (ii) **managers** must assume responsibility for raising awareness among consumers about waste separation and deliver the separated material to the processing companies for recycling it into raw materials or for manufacturing new goods. Finally, (iii) **municipalities** have a vital role as they ensure the communication between the consumers and the measures defined in the Environmental Management Plans, and to raise awareness by supporting respective programs and projects [176].

This resolution also introduced **mandatory waste separation** of the packaging waste at the source and to dispose of this separated packaging waste at collection points provided by the producers [176].

This envisioned EPR system is not the first Colombia has introduced – an EPR system for WEEE already debuted in 2013 [172].

Collection, recycling, and disposal

The municipal waste composition comprises 60% organic waste, 20% recyclable waste and 20% non-recyclable waste. The recovery of recyclables from the municipal waste is mostly done by the **informal sector**, which manages to recycle 7% of the municipal waste. The remaining 93% goes into landfills. Disposing waste at unregistered landfills or waste plants has been forbidden since 2005. Consequently, an increasing number of municipalities dispose of their waste in regional landfills [177].

This practice has been heavily criticized by the OECD as it incentivizes landfilling as much waste as possible. Due to Colombia's motivation to join the OECD, it passed Resolution 720 in April 2016, issued by the public agency for water and sanitation CRA (*Comisión de Regulación de Agua Potable y Saneamiento Básico*). As envisioned in this resolution, the overall generated waste quantities should be reduced while the recycling of the remaining waste increases. As one part of this plan, private disposal service providers in cities with more than 5,000 inhabitants must provide monetary incentives to consumers for waste prevention and waste separation. Moreover, competition should be strengthened to achieve greater investments in modern waste technologies [177].

In most cities, most of the waste (97%) is collected and disposed, and 24% in the rural areas. Nevertheless, many open dumpsites exist, particularly in the poorer provinces like Amazonas, Chocó, or Putumayo. In these provinces, fewer than 50% of the municipalities use the official system [177].

Recycling generally occurs on a low level, accounting for about 19% of the collected solid waste. One example of a recycling initiative is the "*Conceptos Plasticos*," which manufactures bricks from plastics to build houses [178].

In Colombia, roughly 40% to 60% of the recycled solid waste is collected by informal recyclers. Solid waste management utility companies traditionally were not recycling sites. They would merely separate the recyclable materials and offer them to recycling sites and in a few cases, operate recycling plants. Low revenues and a lack of social security are issues affecting recyclers.

Other than that, recycling processes have other issues such as a lack of tax incentives for the use of recycled materials or regulations obligating manufacturers to use a certain amount of recycled materials.

Initiatives and organizations promoting EPR

The **Ministry of Environment and Sustainable Development**, through **Resolution 1407** of July 26, 2018, regulated the environmental management of packaging waste and packaging paper, cardboard,

plastic, glass, and metal. This normative instrument was issued within the framework of the National Policy for the Integral Management of Solid Waste (Conpes 3874/16), whose claim on solid waste is to provide inputs for the transition from a linear model to a circular economy model. It also seeks to prevent the generation of waste and optimize the use of resources so that the products remain as long as possible in the economic cycle and make the most of their raw material and energy potential. One of the instruments adopted by this Resolution is EPR plan (abbreviated as REP in Spanish) as post-consumption waste management. It aims to promote environmental improvements for complete lifecycles of the product systems, to extend the responsibilities of the manufacturers of the product to several phases of the total cycle of its useful life, especially to its recovery, recycling and final disposal.

However, as it has been approximately a year since its implementation, manufacturers and importers **are still in the process of developing and establishing an environmental management plan** that they must present to the National Environmental Licensing Authority no later than December 31, 2020. The effective implementation of the plan will subsequently begin in 2021, and the first advances will be presented to the environmental authority in 2022. Manufacturers are mandated to use at least 30% recycled materials in the manufacture of their packaging [179].

In Colombia there are also other normative provisions referring to the extended responsibility of the producer. For example: Law 1672 of 2013 "*which establishes the guidelines for the adoption of a public policy for the integral management of Waste Electrical and Electronic Equipment (WEEE) and dictates other provisions,*" enshrines the producer's extended liability as a guiding principle of the policy. It assigns obligations and responsibilities to all the actors in the chain, including manufacturers and importers, marketers, consumers, and WEEE managers.

Critical issues to implementing an EPR system

While the Colombian government introduced the EPR system for manufacturers and importers, it is not entirely clear yet how the financial aspect of the EPR system will be handled. The general idea of the EPR system is that manufacturers and importers are responsible for the packaging waste they place in the market. They are supposed to make financial contributions to waste collection and management, according to the types and amounts of waste they place in the market.

However, in terms of the Colombian regulation, it is not clear yet how EPR will be handled. It may be established like a tax incentive. In that case, however, the fees will be paid to the tax authorities and the amount generated from them used as a general part of the budget instead for the waste management purposes. In case a PRO is established, the fees will pay for EPR system participation (*see chapter 4.7*).

Conclusion

In general, the implementation of an EPR system may lead Colombia on a path to a more sustainable solid waste management system. In that case, informal waste collection will become formal. Starting from 2021, when the Environmental Action Plan of the manufacturers will successively be installed within the waste management system. It will thus become evident how well Colombian businesses and consumers adapt to the innovations and what affect the plan will have on existing issues like excessive landfilling.

However, the law implemented in 2018 does not clearly state how the fees, which are integral to the EPR system, will be arranged. They may be installed as additional taxes for manufacturers to be paid to the tax authorities; they may also be fees to be paid to an independent or governmental PRO that governs the money and uses it for projects related to waste management and education.

Also, as a functioning waste collection system is integral to the EPR, it is crucial to establish an adequate waste collection system, especially in poorer regions such as Amazonas, Chocó, or Putumayo. Therefore, adequate product labelling and consumer information should be provided.

Municipalities are obligated to support the Environmental Action Plan and support awareness programs and educational projects concerning waste management.

The following summarizes the finding in this section.

Table 24: Summary Framework conditions for EPR in Colombia

	Influencing criteria	Good	Mediocre	Not good	Explanations
General situation	a) Political situation		X		The overall political stability is relatively unstable or mediocre. The border area with Venezuela is not safe.
	a) Legal and regulatory framework		X		There is a certain basis of law. The government has initiated a lot of measures and actions in the recent years to improve their waste management
	b) Income level and GDP			X	Over the last years, the country steadily strengthened its economy through a solid macroeconomic framework.
	c) Corruption		X		Columbia is focusing on fight corruption.
	d) Education and living standards			X	A significant part of the population lives below the poverty line.
	e) Geographical situation			X	Colombia's infrastructure lacks a nationwide integration particularly in regards to roads and railways. Many roads are unpaved.
Waste management situation	b) General waste management structure				Most of the waste goes to landfills or dumps
	f) Financing of waste management		X		By the municipalities. For the inhabitants there should be incentives for waste separation.
	g) Recycling of packaging waste			X	On a low level.
	h) Technical competences			X	Not very high.
	i) Public awareness		X		There are some environmental projects
	j) Controlling and monitoring systems				*No information*
	k) Importance of the informal sector		X		Recycling is mostly by the informal sector.
	l) Experiences and data availability				*No information*
Current status of EPR	c) EPR laws for packaging	X			The environmental management of packaging waste is regulated by Resolution of 2018.
	m) EPR laws for other fractions		X		There are official guidelines for WEEE.
	n) Initiatives from the industry				There are a lot of recycling initiatives.
	o) Initiatives of the government		X		Government is supporting recycling projects.
	p) Support through external experts				*No information.*

For contacts please see Annex 14.

5.15 Turkey

Turkey is located both on the European continent and the Asian continent, bordering the Black Sea, Mediterranean Sea, and Aegean Sea, with approximately 7,200 km of coastline. The topography is characterized by the high central plateau with some high mountain ranges and narrow coastal plains [180]. Natural hazards include earthquakes, flooding events and landslides. However, according to the World Risk Index the overall risk is “low” [8].

There are 80 million people living in Turkey [181], and more than 90% of the population lives in the urban areas. The most densely populated area is around the Bosporus in the northwest, where 20% of the population lives in Istanbul. Urban centers remain small and scattered throughout the interior with the exception of Ankara. An overall pattern of peripheral development exists, particularly along the Aegean Sea coast in the west, and the Tigris and Euphrates River systems in the southeast [180] Overall, the infrastructure system across Turkey is well-developed.

Since 1982, Turkey has been a parliamentary democracy with a powerful president and prime minister. Geographically, only 3% of the country is located on the European continent, however, in terms of culture, the country aligns itself closely with Europe.

In September 2010, a referendum decision resulted in the most comprehensive constitutional change since 1982. A separation of powers only exists to a limited extent. Through a constitutional referendum in 2017, the parliamentary system was scheduled to be transformed into a presidential system by the end of 2019. Through this act, the Council of Ministers as the highest executive body has been abolished and the directly elected president remains as the only leading position in the executive branch. Furthermore, the president’s influence on the courts has been expanded and the special rights of the armed forces have also been almost completely abolished. Through the end of a state of emergency in July 2018 after the attempted coup in July 2016, the associated limitations and special regulations were to have ended. However, some of the special regulations have become permanent. Several foreign offices have issued warnings concerning an increased threat of arrest, which has caused insecurities among potential foreign business partners.

Current President Erdogan is also increasing his influence over the country’s finances, appointments of central bankers, and the sovereign wealth fund. Overall, the political risk is assessed as “relatively unstable” [5]. Corruption is assessed with a score of 41/100 points (rank 78 globally), meaning that corruption is an issue [10].

Assessment of the current EPR status for managing packaging waste

Current development and legal basis

The development of the legal framework for EPR and packaging waste management started with the Solid Waste Control Regulation in 1991. As defined in this regulation, there were certain recovery obligations for some sectors; only the sales packaging of certain products was covered and paper and cardboard were excluded. From 1991 to 2005, the companies fulfilled their obligations in cooperation with collectors and sorters. There were some obligations for the local authorities; however, they were not clearly defined. This period can be described as a "**voluntary phase**" for the local authorities. Due to the EU accession negotiations in 2005, Turkey’s improvement in the waste management sector started to gain significant momentum.

The long cooperation in the field of waste management between Turkey and the EU has led to a **gradual alignment of the Turkish waste legislation** to the legal framework of the EU as well as a step-wise modernization of waste infrastructure [182]. Thus, the corresponding articles of the Solid Waste Control Regulation and the EU Directive 94/62/EC on Packaging and Packaging Waste are aligned in the **Packaging & Packaging Waste Control Regulation**, which entered into force at the beginning of 2005. The new regulation for packaging waste originally covered all packaging types and the obligations of all parties including the local authorities were clearly defined. In June 2007, the regulation was revised

in regard to the extended period of the recovery rates, voluntary marking, and simplified declaration forms. In August 2011, the regulation was revised again. In this revision, some new definitions such as "supplier" were added. The solution alternatives for packers, fillers and importers are defined as authorized recovery organizations and/or municipalities and/or deposit implementation. The evolution of the waste management plan was also recognized by the EU in its progress report in 2015 in regard to aligning the environmental legislation. However, it has also been criticized that enforcement remains weak, particularly in regard to waste management [182].

As the latest development, a **mandatory EPR system** for collection and recycling packaging materials has been introduced through regulation No. 28035. According to this regulation, the responsibility falls on producers of packaging as well as supermarkets whose space exceeds 200 m². To put this system into practice, the **PROs** ÇEVKO, TÜKÇEV and PAGÇEV are responsible for recycling the packaging waste. ÇEVKO was founded as a non-for-profit organization to push the implementation of a sustainable recycling system by 14 leading industry companies in 1991. In 2005, ÇEVKO was authorized by the Ministry of Environment & Forestry as the PRO for packaging waste (TÜKÇEV was authorized in 2010; PAGÇEV in 2014). ÇEVKO also works together with municipalities in creating municipal waste management plans and is responsible for introducing the Green Dot in Turkey.

Waste collection and disposal

Although there are **waste separation** systems in many urban areas, the predominant part of Turkey, has no waste separation; only mixed waste is collected. The problem is the lack of appropriate and comprehensive systems for waste segregation at the source, waste collection, and recovery/recycling. However, municipalities lack the required funds to establish such systems as well as the needed awareness [182].

The **informal sector** has an important role in waste collection, specifically for recyclables like paper and cardboard, PET, and foils as well as other mono-material plastics. The informal sector is particularly active in the densely populated urban and commercial areas.

Landfilling is the most common form of disposal in Turkey. Each year, more than 17 million tonnes of municipal waste go into sanitary landfills and 9 million tonnes end up in unsanitary ones. However, the practice of landfilling faces problems since the generated waste quantities have significantly increased in the past years while the availability of landfilling space is now insufficient. Even though landfilling is not a sustainable solution for Turkey, no other viable alternative exists. Other small-scale options include open burning, burying, and dumping in water bodies. Turkey is attempting to end the practice of landfilling, whose numbers have considerably decreased in recent years [182]. The country's first lady, Emine Erdoğan, launched a zero-waste campaign under the auspices of the Turkish Presidency. The campaign has received nationwide support as it raised public awareness on proper sorting of the waste and the use of waste as compost in agriculture [183].

Recycling

There are a few recycling plants for packaging waste, and some of them focus on high-quality recycling for plastic packaging waste. One example is the EUCertPlast certified recycling plant Korozi Ambalaj SAN VE TIC A.S. for flexible PE films [64]. In total, an estimated 10% of waste in Turkey is recycled or recovered [184]. According to official figures published in Turkey, out of the 236,000 tons of plastic bottles sold in 2017, 140,000 tons were recycled. In the first quarter this year, 17,500 tons of plastic bottles were recycled to be used again [183].

However, most of the material treated in the recycling plants originates from abroad, as plastic waste is imported from other countries to Turkey. According to the German Federal Statistical Office, Germany exported 18,000 tonnes of plastic waste to Turkey in 2017, while the exported quantities rose to 50,000 tonnes in 2018 [184]. The entire amount of imported plastic waste was 126,964 tonnes in 2017 and 270,340 tonnes in 2018 [65]. This increase reflects China's ban on plastic imports [184].

Critical issues to implementing an EPR system

The current economic and currency turbulence negatively affects the trade in recyclables and threatens the progress made in the past. The current political development of the central government is creating a growing distance to the values and requirements of the EU, which are expected to also affect the waste management sector. Despite the huge engagement of the private sector, multiple activities and legal frameworks are currently under revision due to this political development. Moreover, an **increased centralization and nationalization** of waste management measures is expected.

A **lack of enforcement** has been and still is strongly affecting implementation, as only approximately 25,000 out of 75,000 obligated companies are registered with the Ministry of Environment, while only 5,000 companies actively participate and pay. However, enforcement has generally increased in the past years.

Initiatives and organizations promoting EPR

As noted earlier, current developments are changing the voluntary EPR system into a mandatory one. Moreover, it is expected that this system will be more centralized and nationalized given current political developments. The work of first lady Emine Erdoğan is also fostering this shift.

There are smaller initiatives in Istanbul that promote collection. First, there is an initiative called Pugedon that installed machines that give out one portion of dog food in return for one empty, recyclable plastic bottle. The costs for the dog food are balanced by the revenues from the bottles [185]. Second, empty plastic bottles and beverage cans can also be exchanged for public transport tickets. In 2018, 25 such machines have been put up across Istanbul. The plastic bottle and beverage cans are exchanged for a monetary value corresponding to the volume of the bottle (2 to 6 Turkish cents), which is deducted from the ticket price. One ticket (260 Turkish cents) equals 28 1.5-liter bottles [186].

Conclusion for Turkey

The current system is not very effective and does not deliver satisfying results, as a lot of recyclables are still deposited in landfills or dumped elsewhere. There are several plastic recyclers that recycle on a high-quality level. However, most of them process quantities received from foreign countries. The recycling industry operates partly according to very high standards and seeks greater engagement with other entities. In contrast, the government wants to increase the centralization of waste management and its influence on this sector. In this regard, first lady Emine Erdoğan took the patronage for the launch of the zero waste campaign.

The effects of current developments on competition are not clear at the moment. There are hints that the central government is planning to ban the existing initiatives in the industry regarding the current EPR system and replace them with a centralized system that regulates the collection, recovery and recycling of waste directly through the centralized government. The results are summarized in the following table.

Table 25: Summary Framework conditions for EPR in Turkey

	Influencing criteria	Good	Mediocre	Not good	Explanations
General situation	a) Political situation		**X**		Development of centralization and nationalization; stronger influence of national government
	b) Legal and regulatory framework		**X**		Strongly based on EU Directives
	c) Income level and GDP		**X**		Middle income level
	d) Corruption		**X**		41/100 points according to CPI, corruption is an issue
	e) Education and living standards	**X**			High education and good living standards in many regions.
	f) Geographical situation	**X**			High urbanization
Waste management situation	g) General waste management structure		**X**		Comprehensive legislation, but weak in implementation, partly waste segregation in urban areas; landfilling as dominating disposal
	h) Financing of waste management		**X**		Lack for a good infrastructure.
	i) Recycling of packaging waste		**X**		Approximately 10% of waste is recycled; recycling of imported waste fractions
	j) Technical competences	**X**			Overall high, also of recycling plants
	k) Public awareness		**X**		Slowly rising
	l) Controlling and monitoring systems		**X**		Insufficient controlling.
	m) Importance of the informal sector		**X**		Important in urban areas
	n) Experiences and data availability				*not known*
Current status of EPR	o) EPR laws for packaging		**X**		In place, results however not satisfying
	p) EPR laws for other fractions				*does not exist*
	q) Initiatives from the industry		**X**		Active, wants to engage more; threat that current initiatives might be banned from government
	r) Initiatives of the government		**X**		Wants to increase influence on sector; impact on competition and further development currently not clear
	s) Support through external experts				*not known*
Other remarks					

For contacts please see Annex 15.

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7 Appendix

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Annex 12 – Contacts Argentina

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E-Mail:	info@kaltenbach-energy.com
Website:	Kaltenbach-energy.com

Organization:	**Cámara de Industria y Comercio Argentino-Alemana Deutsch-Argentinische Industrie- und Handelskammer**
Address	Avenida Corrientes 327 AR - C1043AAD Buenos Aires
Contact Person:	Annika Klump (Medio Ambiente y Energía / Umwelt und Energie)
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Annex 13 – Contacts Mexico

Contacts Mexico

Organization:	**GIZ**
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Contact Person:	Gustavo Solórzano; Expert on waste management (very helpful); he prepares also studies for UNEP
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Organization:	International Consultant on the Environment
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and also Andreaas Elmenhorst. (Please see the contact Chile)

Annex 14 – Contacts Columbia

Contacts Columbia

Contact Person:	Carolina Marín López, Adviser to the Commission "Comisión de Regulación de Agua Potable y Saneamiento Básico – CRA" (expert tariff plan for waste),
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Contact Person:	E-waste in Colombia: Miriam Frisch, Advisor, Proklima International, GIZ,
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Contact Person:	E-waste in Colombia: Daniel Ott, Director América Latina, Reverse Logistic Group (RLG),
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Organization:	**Consultant AIDIS**
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And also Andreas Elmenhorst (Please see the contact Chile)

Annex 15 – Contacts Turkey

Contacts Turkey

Organization:	**CEVKO Environmental Protection ans Packaging Waste Recovery Foundation (PRO in Turkey)**
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Organization:	**EXPRA**
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