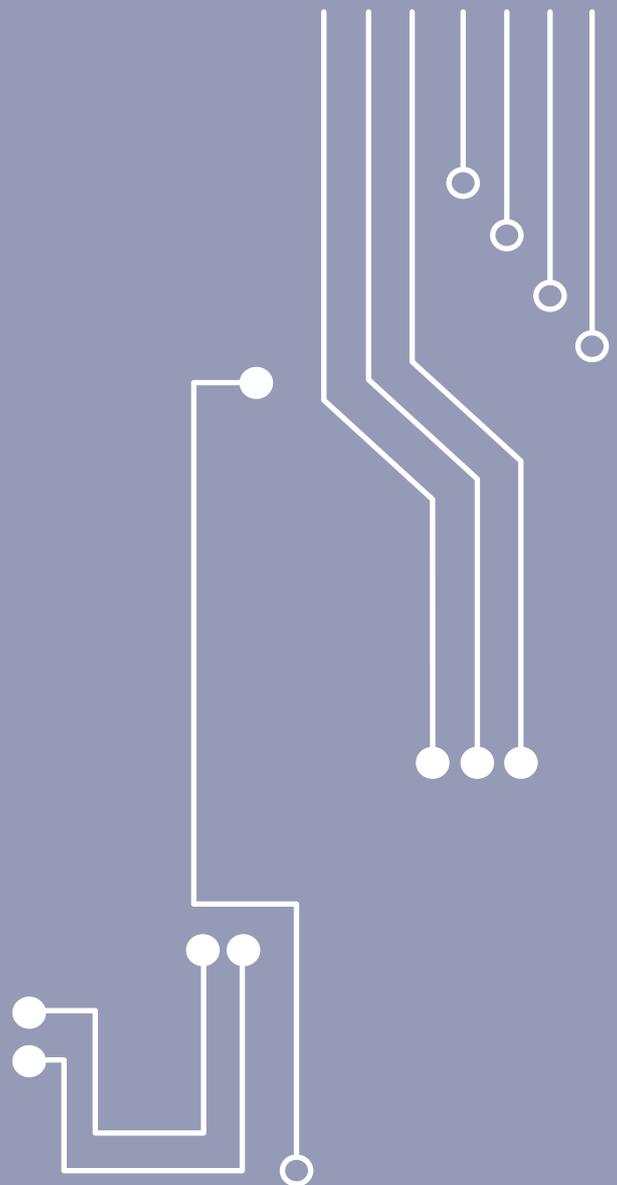

Implementing circular economy in Mexico: Recommendations for strategies against obsolescence of smartphones & textiles

September 2021

Policy instruments

Business models

Greenhouse gas savings



Contact

Titel

Implementing circular economy in Mexico: Recommendations for strategies against obsolescence of smartphones & textiles.

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1 Why we need to extend product lifespans and usage times

Definition of Circular Economy

Background on product groups in focus

Definition of obsolescence

Why we need to extend product lifespans and usage times...

Our predominantly linear production systems, which have to satisfy growing consumer demands, are associated with the consumption of large amounts of **resources and energy**, leading to **various environmental** problems, such as the emission of climate-damaging greenhouse gases. Assuming the current linear patterns of consumption & production, global materials use is projected to more than double from 79 giga tones (Gt) in 2011 to 167 Gt in 2060.¹ Knowing that a large share of greenhouse gas emissions is directly or indirectly linked to materials management and use², increasing material use will in all likelihood jeopardize the **global climate goals** of the Paris agreement.

One of the critical consumption trends that is responsible for increasing greenhouse gas emissions and aggravating other environmental problems, such as biodiversity loss, is a **decrease in the usage time as well as the total lifespan** of products.³ This premature **obsolescence**, in turn, leads to a faster replacement of products and increased material consumption, thus reinforces the previously described problems of a linear production.

Additionally, obsolescence results in a growing mountain of waste.⁴ Currently, according to conservative estimates by the Mexican Secretariat of Environment and Natural Resources, waste generation in **Mexico amounts to more than 44 million tons (Mt) annually, and this number is expected to increase to 65 Mt by 2030**. With current practices, about 90% of waste ends up in open landfills.⁵ In response to this issue, the “Visión nacional

hacia una gestión sustentable: cero residuos agenda” describes the need to comply with the waste management hierarchy, in which the prevention, reduction and reuse of waste come before recycling, energy recovery and landfilling (see Fig. 1).⁶

Therefore, it is necessary that the lifespan and usage time of products be extended and that the predominantly linear economy be replaced by a circular economy. **This can also make an important contribution to national climate protection goals**. For example, a study conducted for the European region showed that extending the lifespan of notebooks by 5 years could save 5 Mt of greenhouse gases.⁷

The aim of this document is to draw attention to necessary reforms of the legal and economic framework in the area of “circular economy”, waste prevention and product obsolescence. In addition, the potential of the circular economy for climate change mitigation will be highlighted. **Therefore, approaches for extending the usage time and lifespan for products are shown using the example of smartphones and textiles**. Globally existing measures from the area of **policy and legislation** as well as suitable **business models** are presented and **barriers and drivers** for dissemination of the selected models are identified. Life cycle assessment studies will be used to estimate the **greenhouse gas saving potential** for Mexico that results from extending the usage times of smartphones and textiles. Finally, the results will be used to formulate **recommendations** for implementing the circular economy aspects of **waste prevention and lifespan extension** in Mexican waste and product policies.

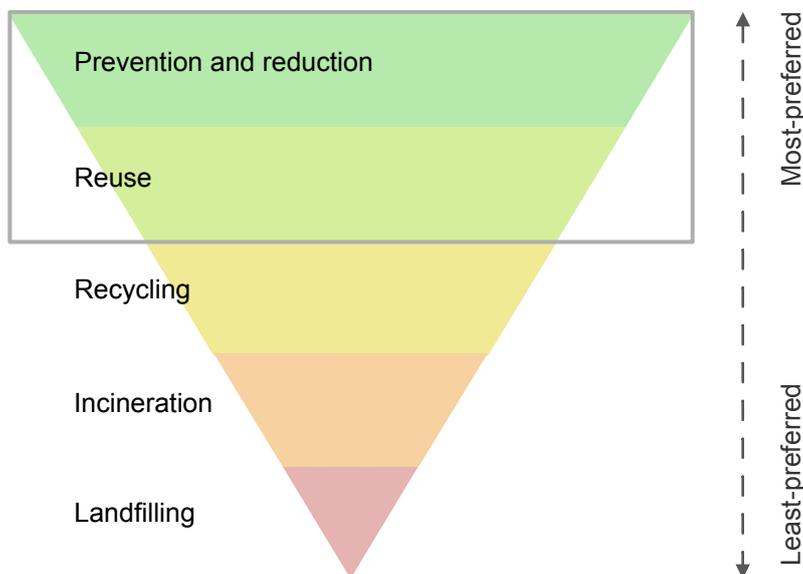


Fig. 1: The waste hierarchy according to the Waste Framework Directive of the European Commission

The five-level waste hierarchy establishes a basic order of priority. From top to bottom, the five levels are waste prevention measures, preparation of waste for reuse, recycling, other (especially energy) recovery, and disposal.⁸ In this context, the prioritization was determined from the perspective of sustainability. The waste hierarchy can help to **avoid greenhouse gas emissions, reduce pollutants, save energy and conserve resources**. It is integrated in the EU Waste framework directive and legally binding for all EU member states.

The focus in this document is on the two „most-preferred“ levels of the waste hierarchy: **the prevention and reduction and the reuse**. Only these two levels extend lifespans and the usage times of products.

Definition of Circular Economy

Circular economy (CE) is a concept that is gaining popularity among policy makers and many businesses as an environmentally friendly alternative to the linear economy. Although the term and concept of CE is widely discussed internationally, a standardised definition is still lacking. The European Commission suggests to define CE as following: “In a circular economy, the value of products and materials is maintained for as long as possible. **Waste and resource use are minimised**, and when a product reaches the end of its life, it is **used again to create further value**. This can bring major economic benefits, contributing to innovation, growth and job creation”⁹

Hence, CE is more than mere waste management. It seeks to close resource loops in our current linear production systems by reusing and recycling materials instead of primarily extracting finite resources to produce new materials. The idea of closed resource cycles is further explained by the concept “closed loop systems”, which is described below.

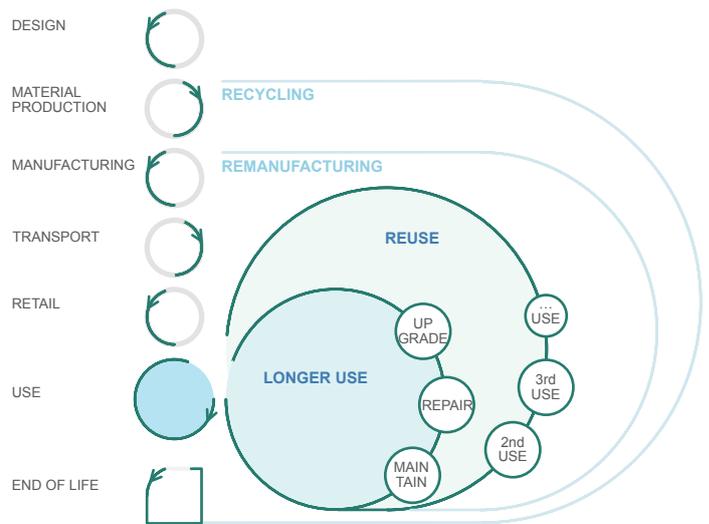


Fig. 2: Circular economy system diagram according to the Ellen MacArthur Foundation (2017)

The closed loop systems

Stahel (2010) introduced the “closed loop systems” that distinguishes two fundamentally different types of loops within a closed loop system: **(1) reuse of goods**, and **(2) recycling of materials**. The reuse of goods means an extension of the utilization period of goods through the design of long-life goods; the introduction of service loops to extend an existing product’s life, including reuse of the product itself, repair, reconditioning, and technical upgrading, and a combination of these.¹⁰

Building on Stahel (2010), Bocken (2016) defined two fundamental strategies towards the cycling of resources, which are slowing resource loops and closing resource loops¹¹:

Slowing resource loops: Through the design of long-life goods and product-life extension (i.e. service loops to extend a product’s life, for instance through repair, remanufacturing), the utilization period of products (usage

time) is extended and/or intensified, resulting in a slowdown of the flow of resources.

Closing resource loops: Through recycling, the loop between post-use and production can be closed, resulting in a circular flow of resources.

However, currently recycling only contributes to closing resource loops to a limited extent. This is, among other things, due to insufficiently collected and separated waste, the lack of technologies for recycling some metals and the dissipative use of raw materials.

Bocken (2016) distinguishes the two approaches from a third approach towards reducing resource flows:

Resource efficiency or narrowing resource flows, aimed at using fewer resources per product.

The focus of this document lays on slowing resource loops and reuse of goods.

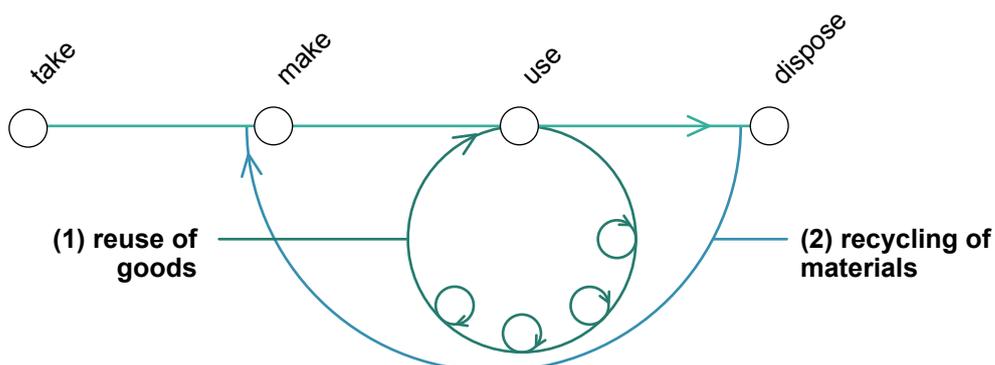


Fig. 3: The closed loop system according to Stahel (2010)

Background on Product Groups in Focus

Product fact sheet - 4 reasons why extending the lifespan and usage time matters

	Smartphones	Textiles
Increasing use	In Mexico, currently about 70% are owners of a smartphone and this number is expected to increase by 10 million more within the next 5 years. ¹²	With the rise of the fast fashion industry, there has been a significant growth in the production of clothing. Looking at Mexico, the sales of clothes increased by 36% between 2012 and 2017. ¹³ On a global level the total amount of clothes produced doubled between 2000 and 2015. ¹⁴
Decreasing product lifespans	Besides an increasing consumer demand, a very rapid replacement of devices by newer models has been observed: a survey done in Mexico found, that 71% of all respondents changed their smartphones in the last 18 months, indicating a relatively high frequency of device replacement. ¹⁵	Another effect of the fast fashion industry is that an item of clothing is worn less and less often. Worldwide, the average number of times a garment is worn before it is no longer used has decreased by 36% compared to 15 years ago. ¹⁶
High environmental impacts	At the current average usage time of 2.5 years, the life cycle of a smartphone is associated with the emission of 200 kg of CO ₂ - equivalents. ¹⁷ But climate-damaging greenhouse gas (GHG) emissions are not the only problem. Smartphones are using a variety of metals, several of which are listed in the EU's list of critical raw materials, such as for example cobalt, indium and palladium. ¹⁸ In addition to the economic risks of supply shortages, mining activities in current practice are often accompanied by high environmental and social impacts.	The fashion industry accounts for around 4% of emissions globally, equivalent to the combined annual GHG emissions of France, Germany and the United Kingdom. More than 70% of the emissions come from upstream activities, particularly energy-intensive raw material production, preparation and processing. The remaining 30% are generated by downstream activities such as transport, packaging, retail operations, usage and end-of-use. ¹⁹
Low recycling rates	According to the current state of the art, a large percentage of the metals contained in smartphones are lost during recycling due to low collection rates and lacking recycling technologies for several metals. Hence, they have to be primarily mined again during new production. This means renewed burdens on the environment and the climate. ²⁰	Currently, worldwide only 1% of all textiles collected are being recycled into new textiles again. Reasons for low recycling quotes are the use of chemicals and complex fibre mixtures, that inhibit recycling but also missing collection and sorting activities. Furthermore, introducing recycled fibres could be more costly than using primary materials, thus also the economic appeal might be missing. ²¹

Against this background, one aspect becomes clear: the problems listed above will exacerbate if we continue to operate and consume in the linear system of take - make - use - dispose. Slowing down and closing our resource cycles is an important approach to solving the problem. **Therefore, this document will explore the policy and legal frameworks and business practices that are necessary to extend the usage times and lifespans of products.**

Definition of Obsolescence

Obsolescence refers to the aging of a product so that it no longer serves its purpose of satisfying a particular need. Obsolescence can occur in different ways and is therefore divided into the four categories, as shown in table 1.

The division into different types of obsolescence also makes one aspect clear: a product can reach the end of its usage time even before the end of its lifespan (i.e. before the loss of functional capability or the occurrence of a final defect). This is the case, for example, if it is technically obsolete or out of fashion.

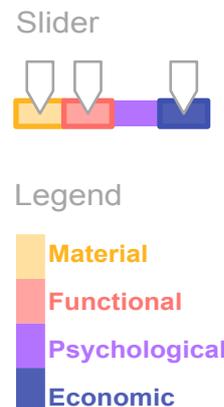
The **usage time** describes how long a device stays in the use phase. This includes second and third use of the devices by passing them on or reselling them. Whereas the **lifespan** is the average time from the initial marketing to the final defect of a device.²³ Against this background, both the extension of the lifespan and the usage time should be taken into account when it comes to extending the life cycle of products. After all, it is not sufficient to strengthen the longevity of products if they become waste before reaching the end of their lifespan.

Table 1: The four different types of obsolescence²⁴

Material obsolescence	Functional obsolescence	Psychological obsolescence	Economic obsolescence
Material obsolescence is due to the poor performance of materials and components. Product obsolescence is manifested, for example, in the rapid deterioration of strength properties e.g., due to environment-induced corrosion.	Functional obsolescence is caused by the rapidly changing technical and functional requirements of a product (e.g., the interoperability of software and hardware of different electronic devices).	The third type of obsolescence includes pre-mature aging of products due to fashions, new technical trends, and consumption patterns.	In the case of economic obsolescence the use of product-related resources, necessary repairs and maintenance is economically less attractive than buying a new product. This type of obsolescence is enhanced by short product development times, rapid price deterioration, repair-unfriendly design, high repair costs, and lack of availability of spare parts, tools, and repair services.

The instruments and business models presented in the following chapters are accompanied by a **coloured slider** (see right side) to indicate which type of obsolescence is being tackled. A small legend at the bottom of the page reminds which color stands for which type of obsolescence. Several types of obsolescence may apply at the same time.

The slider indicates which type of obsolescence can be combated with the presented measure. E.g. here: Material, functional and economic obsolescence



Endnotes

1. OECD (2018): Global Material Resources Outlook to 2060. Available online at <https://www.oecd.org/environment/waste/highlights-global-material-resources-outlook-to-2060.pdf>, checked on 7/11/2021
2. Haigh, L., de Wit, M., von Daniels, C., Colloricchio, A. and Hoogzaad, J. (2021) *The Circularity Gap Report 2021*. Available online at <https://www.circularity-gap.world/2021>, checked on 4/13/2021
3. Prakash, Siddharth; Dehoust, Günther; Gsell, Martin; Schleicher, Tobias; Prof. Dr. Stamminger, Rainer (2016): Einfluss der Nutzungsdauer von Produkten auf ihre Umweltwirkung: Schaffung einer Informationsgrundlage und Entwicklung von Strategien gegen „Obsoleszenz“ (11). Available online at https://www.umweltbundesamt.de/sites/default/files/medien/378/publikationen/texte_11_2016_einfluss_der_nutzungsdauer_von_produkten_obsoleszenz.pdf, checked on 4/14/2021.
4. Prakash, S., et. al., (2016): Einfluss der Nutzungsdauer von Produkten auf ihre Umweltwirkung: Schaffung einer Informationsgrundlage und Entwicklung von Strategien gegen „Obsoleszenz“
5. Secretaría de medio ambiente y recursos naturales (SEMARNAT) (2019): Vision Nacional Hacia Una Gestión Sustentable: Cero Residuos. Available online at https://www.gob.mx/cms/uploads/attachment/data/file/435917/Vision_Nacional_Cero_Residuos_6_FEB_2019.pdf, checked on 4/13/2021.
6. SEMARNAT (2019): Vision Nacional Hacia Una Gestión Sustentable: Cero Residuos.
7. European Environmental Bureau (2019): Coolproducts don't cost the earth. Report Briefing. Available online at: <https://mk0eeborgicuyptuf7e.kinstacdn.com/wp-content/uploads/2019/09/Coolproducts-briefing.pdf>, checked on 9/14/2021
8. Guideline for the application of the waste hierarchy according to § 6 of the Closed Substance Cycle Waste Management Act (KrWG), available online at: https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Abfallwirtschaft/krwg_leitfaden_abfallhierarchie_bf.pdf, checked on 9/14/2021
9. European Commission (EC) (2020): Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. A new Circular Economy Action Plan - For a cleaner and more competitive Europe (No. COM (2020) 98). Brüssel, Belgium.
10. Stahel, W. (2010). *The performance economy*. Springer.
11. Bocken, N. M., De Pauw, I., Bakker, C., & Van Der Grinten, B. (2016). Product design and business model strategies for a circular economy. *Journal of industrial and production engineering*, 33(5), 308-320.
12. Statista (2020): Número de usuarios de teléfonos móviles inteligentes en México de 2015 a 2025. Available online at: <https://es.statista.com/estadisticas/1077622/usuarios-de-smartphone-en-mexico/>, checked on 4/13/2021.
13. Caballos, F. R. (2018): Crece el mercado de la ropa y el calzado en México en 2017. Fashion Network. Available online at https://mx.fashionnetwork.com/news/Crece-el-mercado-de-la-ropa-y-el-calzado-en-mexico-en-2017_941769.html, checked on 7/11/2021
14. Botta, V (2021): Durable, repairable and mainstream - How ecodesign can make our textiles circular. Available online at <https://ecostandard.org/wp-content/uploads/2021/04/ECOS-REPORT-HOW-ECODESIGN-CAN-MAKE-OUR-TEXTILES-CIRCULAR.pdf>, checked on 7/11/2021
15. Deloitte (2019): *Estudio: Hábitos de los consumidores móviles en México, 2019: El desarrollo de los dispositivos móviles no se detiene y promete un escenario de nuevas posibilidades para los consumidores*. Available online at <https://www2.deloitte.com/content/dam/Deloitte/mx/Documents/technology/Global-Mobile-Consumer-Survey.pdf>, checked on 7/11/2012
16. Ellen MacArthur Foundation (2017) *A new textiles economy: Redesigning fashion's future*. Available online at https://www.ellenmacarthurfoundation.org/assets/downloads/publications/A-New-Textiles-Economy_Full-Report.pdf, checked on 7/11/2012
17. Rüdener, I.; Prakash, S. (2020): Ökonomische und ökologische Auswirkungen einer Verlängerung der Nutzungsdauer von elektrischen und elektronischen Geräten. Available online at <https://www.oeko.de/publikationen/p-details/oekonomische-und-oekologische-auswirkungen-einer-verlaengerung-der-nutzungsdauer-von-elektrischen-und-elektronischen-geraeten>, checked on 5/3/2021
18. European Commission (2020): Study on the EU's list of Critical Raw Materials – Final Report
19. Berg, A., Granskog, A., Lee, L. and Magnus, K. (2020) *Fashion on climate*. Available online at <https://www.mckinsey.com/~media/mckinsey/industries/retail/our%20insights/fashion%20on%20climate/fashion-on-climate-full-report.pdf>, checked on 7/11/2021
20. Rüdener, I.; Prakash, S. (2020): Ökonomische und ökologische Auswirkungen einer Verlängerung der Nutzungsdauer von elektrischen und elektronischen Geräten.
21. Botta, V (2021): Durable, repairable and mainstream - How ecodesign can make our textiles circular.
22. + 23. Prakash, S., et. al., (2016): Einfluss der Nutzungsdauer von Produkten auf ihre Umweltwirkung: Schaffung einer Informationsgrundlage und Entwicklung von Strategien gegen „Obsoleszenz“
24. Bertling, J., Hiebel, M., Pflaum, H. and al, e. (2014) 'Arten und Entstehungstypen frühzeitiger Produktalterung', *Umweltmagazin*, Nr.3, pp. 60–61.

2

Policy Instruments

Introduction
Overview
Good Practices

Policy Instruments - Introduction

The duration of the usage time and lifespan of products can be promoted by policy measures and instruments at different stages of a product's life cycle. The following overview is a listing of such instruments and measures that have been applied in different countries around the world. In the figure, they were assigned to the life cycle stages of a product through which they can influence the extension of the usage time or lifespan of products. The design phase represents the greatest potential for enabling the durability, reparability and reusability of products.

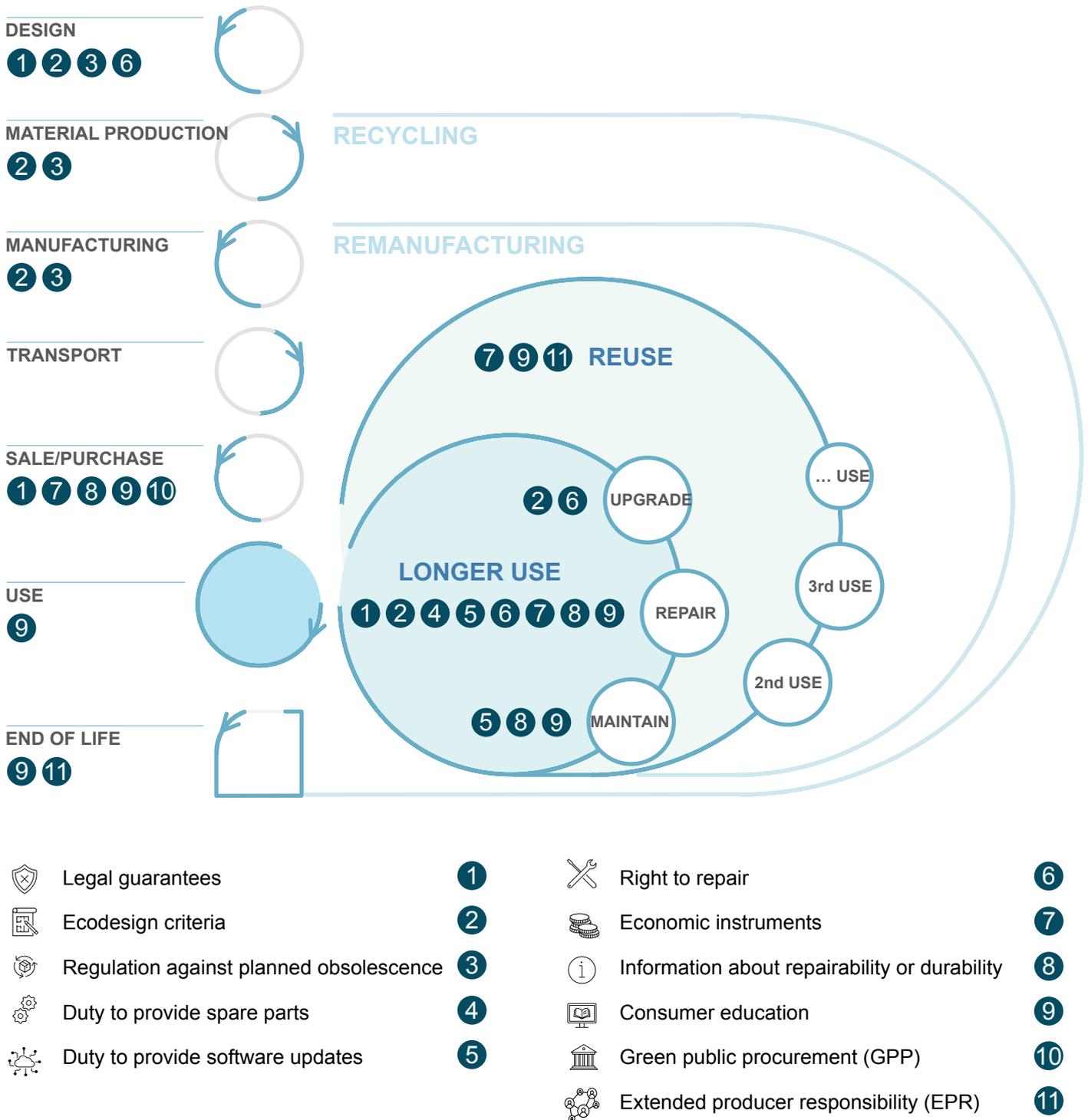


Fig. 4: Mapping of instruments in life cycle stages where they can influence product lifespan. Based on Circular economy system diagram, Ellen MacArthur Foundation (2017) <https://sustainabilityguide.eu/>

Policy Instruments - Overview

General idea

Implications on the lifespan of a product



Legal guarantees

Regulates the legal claims of the buyer against the seller within the framework of a purchase contract in case the seller delivers defective goods or goods that do not conform to the contract. It may include **repair, replacement, price reduction or refund**. The length of the legal guarantee can be determined by national law and therefore vary from one country to another. Besides the legal guarantee the manufacture or seller can also give a commercial warranty that might exceed the length of the guarantee required by law. However, the commercial warranty is a **voluntary promise** to the buyer where conditions are determined by the seller or manufacturer, whereas the guarantee rights are **stipulated by law**.

Guarantee law affects product quality by **making the seller liable for defects** in a product. Longer guarantee periods could serve as an **incentive** to manufacture products that are more **durable or less defect-prone and easy to repair**. To achieve this effect, it would be reasonable to make the guarantee period dependent on the **expected lifespan**. Further-more, the duration of the **reversed burden of proof** (the buyer of an allegedly defective item does not have to prove that the item was defective when it was handed over to the buyer, but this is presumed by law) can incentivize the producers to improve the durability and reparability of their products and to make spare parts more available.



Ecodesign criteria

The expected product lifespan as well as the ability to extend the lifespan through repair is largely determined by the **design**. Setting **mandatory design criteria** results in the removal of poorly performing products from the market, while driving innovation in the design of **durable and repairable** products. Relevant ecodesign approaches are design for **disassembly**, design for **durability**, and design for **repair or remanufacturing**.

By considering **ecodesign approaches** in the **design phase**, the durability and reparability of a product can be improved and thus its usage time extended. These design approaches consider e.g., the material selection (physical durability, reparability), the feasibility to exchange components (modular design), stylistic durability (classic design), and user behavior (maintenance).



Regulations against planned obsolescence

A ban on planned obsolescence can be enshrined in law and make manufacturers liable to prosecution if planned product obsolescence is proven. Planned obsolescence is the **deliberate and active limiting** of the lifespan of a product by the manufacturer in order to increase the sales rate through premature replacement needs.

A criminal provision prohibiting planned obsolescence may serve primarily to **deter potential perpetrators** of such practices or to **raise awareness** of the importance of reasonable product lifespan. However, there are **various hurdles** in implementing such regulations: In particular, proving that a product's lifespan has been intentionally shortened with the aim of increasing the replacement or exchange rates of the same is very difficult. Manufacturers can argue that the alleged practices do not serve to shorten the usage time, but are based on other motives, such as maintaining functionality. Thus, the desired effect of such regulations may be limited.



General idea

Implications on the lifespan of a product



Duty to provide spare parts



The duty obliges manufacturers or importers of products to **keep spare parts available and accessible** for a certain period of time. The obligation may also include making spare parts and repair information available to independent repairers. As of today, especially independent repairers often complain about having no access to original spare parts. This category is part of the category „Right to Repair“.

The availability and accessibility of spare parts contribute towards **increasing the reparability** of products and thus helping to extend the products' lifespan. In order to effectively promote repair activities, the period of time during which spare parts are to be kept available should be clearly defined and communicated to the customer. Also, after the production process of a particular product has ceased this period should continue for several years.



Duty to provide software updates



Similar to the requirement for the provision of spare parts, the aim here is to establish a **right to the provision of software updates for digital devices**. This obliges manufacturers to update their products regularly and thus maintain the **functionality** and **IT security** of the devices and services in the long term. This category is part of the category „Right to Repair“.

If support for older operating systems is discontinued, security-relevant operating system and software updates are no longer available and the use of the digital device becomes **unsafe** (e.g., susceptibility to Trojans and viruses). The consequence is that **the device is replaced even though its technical life is not yet exhausted**. The obligation to provide software updates is an important instrument against **software obsolescence** and can align the lifespan of hardware and software so that digital devices remain usable for longer.



Right to repair



The Right to repair was born in the United States and refers to the **"repair monopoly"** of the Original Equipment Manufacturers (OEMs), that they create, for example, by withholding spare parts and repair information or by designing products difficult to repair. Consumers should have the right to repair or modify their products, and should not have to rely solely on the manufacturers' repair services. Therefore the right to repair movement fights for the **equality of all repairers** (e.g., authorized repair shops, independent repair shops, repair initiatives etc.). This implies that spare parts and information on repair are made available to everyone.

The current widespread repair monopoly of OEMs is accompanied by the **extinction of repair shops**, and reduces the possibility of repairing the product close to the consumer, which is a common preference when it comes to repairs. It also reduces the likelihood of repair after the guarantee period has expired. A **non-discriminatory access** to, among other things, spare parts and thus the improvement of the profitability of repair as a financial relief for independent repair shops can increase access to repair services and their **cost effectiveness**. It can therefore contribute to consumers choosing to have defective products repaired rather than replaced.



Economic instruments



Reducing taxes on repair services increases the **profitability** of repair services for both customers and repair service providers. This can **lower the barrier** to having a repair done and the repair service infrastructure will be strengthened. An **improved repair infrastructure**, in turn, facilitates access to repair services and can lead to more consumers having their product repaired.

By providing financial support for repairs, **profitability and competitiveness** are increased in comparison to the mere replacement of a defective product. This can contribute to products being **used longer** and **replaced less often**.



General idea

Implications on the lifespan of a product



Information on repairability or durability

The provision of product information creates **transparency**, enabling consumers to make more **conscious decisions**. Information about the repairability and durability of a product can be an additional criterion in the purchase decision, which can also have a **steering effect** if customers prefer repairable and durable products over others, thus strengthening their position in the market. **Labels or indexes** are usually used to provide this type of information.

By simply providing this information, the choice is made possible to **opt for a certain product quality**. Consequently, purchasing behavior may change, as can attitudes towards defects and the maintenance and care of a product. Products labelled with a good repairability are likely to be better cared for, maintained and repaired. At the same time, the number of products with very poor repairability and durability is expected to decrease, and instead repairable and durable products will become more competitive. Thus, products with very poor durability and repairability may be **forced out of the market**, similar to the case with energy efficiency classes.



Consumer education

Consumer education is about **creating transparency** on the one hand and **influencing consumer behavior** on the other. Through various campaigns and educational initiatives, consumers are informed about the effects of their purchasing behavior or which production and distribution methods they (would) support with the purchase of a product.

Through awareness training, **consumption patterns can be influenced** in the sense of sustainability, e.g. the longer use of products, reuse or the use of second-hand products can be promoted. Disclosure of unsustainably produced products should give the customer the opportunity to decide not to buy them.



Green public procurement

The public sector has enormous **purchasing power**. This can have a **steering effect** through compliance with sustainable procurement criteria, for example by considering the environmental soundness and durability of products in public procurement and thus **promoting the market position** of such products in a more targeted manner. However, Green public procurement (GPP) is **mostly voluntary** but many countries are on the way to make it a mandatory instrument.

Durable and repair-friendly products can be preferred in the procurement decisions by formulating specific technical specifications, awarding extra points and referring to the **compliance with the criteria** of ambitious third-party labelling schemes. Purchasing durable and repair-friendly products helps in saving life-cycle costs and thus prevents wastage of public/ tax-payers money.



Extended producer responsibility

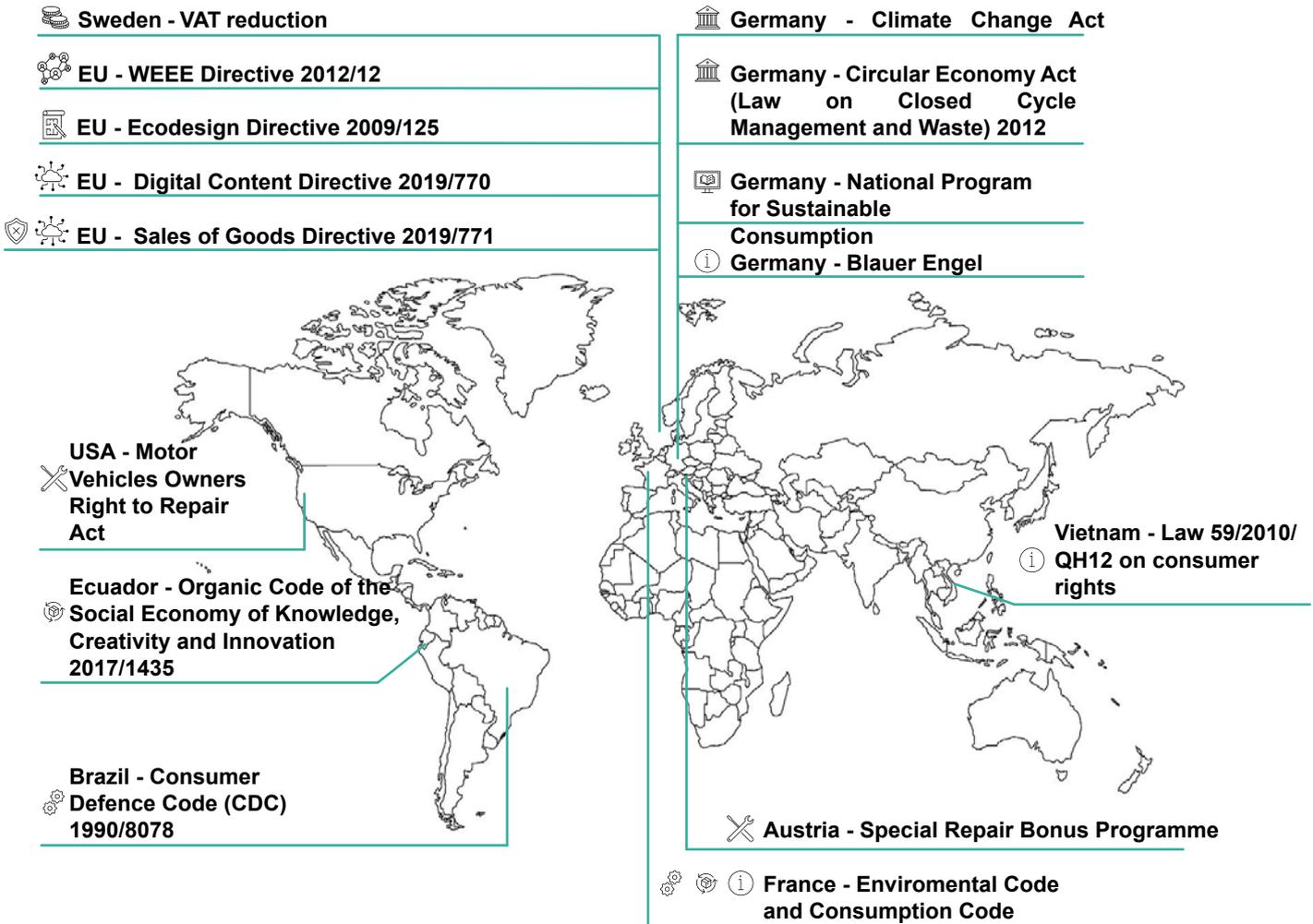
Extended producer responsibility (EPR) is a policy approach under which producers are given a significant **responsibility for the end of life** management of post-consumer products. The intention is to shift the responsibility and financial burden of managing the product's end-of-life from taxpayers to producers. Producers can fulfill their responsibility either by directly managing the treatment of their post-consumer products (e.g. reuse, buyback or recycling programs) or by delegating this task to a so called Producer Responsibility Organisations (PROs). In the latter, these organisations are paid an EPR fee by producers, which is based on the amount of products they have put on the market. The money is mainly used for paying waste management costs for collection, sorting as well as treatments for recycling and recovery of post-consumer products.

EPR internalizes the indirect environmental costs at the end of the life of a product by making producers responsible for the end-of-life stage of their products (treatment or disposal). The intention is to provide **incentives to prevent waste at the source**, promote product design for the environment, e.g. by making it easier to reuse or recycle, and support public **recycling and material management**.



Policy Instruments - Good Practices

This chapter presents good implementation examples from different countries for each of the previously described instruments. Figure 5 shows an overview of measures already implemented at the global level. The list does not claim to be complete and is intended primarily as a guide.



-  Legal guarantee
-  Ecodesign criteria
-  Regulations against planned obsolescence
-  Duty to provide spare parts
-  Duty to provide software updates
-  Right to repair
-  Economic instruments
-  Information on reparability or durability
-  Consumer education
-  Green public procurement
-  Extended producer responsibility

Fig. 5: Global overview on good practice examples of policy instruments extending usage times and lifespans of products

Legal guarantees

European Union - Sales of Goods Directive 2019/771¹

The Sales of Goods Directive and Guarantees Directive stipulates, that consumers are guaranteed for at least 2 years on new products, which protects them if goods are defective or do not have the characteristics described in the advertising.

The legal guarantee on used goods is one year. In the event of a lack of conformity, the consumer can have the goods brought into conformity or receive a proportionate reduction in the price. In order to have the goods brought into conformity, he/she can choose between repair and replacement.

However, some member states prescribe a longer guarantee period, than required by the European directive. For example, in Finland and the Netherlands the length of the legal guarantee is based on the expected lifespan rather than a singular specified number of years. Iceland and Norway impose a statutory guarantee period of 5 years for goods with a longer expected life span (e.g., white goods). In France, repaired products benefit from a six-month extension of the guarantee period.

In addition, the directive provides that during the first year after purchase, the burden of proof of a defect or non-conformity rests with the seller. France even extended this period to 2 years, i.e. the entire period of the statutory guarantee period.

Ecodesign criteria

European Union - Ecodesign Directive 2009/125²

The Ecodesign Directive establishes a framework to set mandatory ecological requirements for energy related products (ErP) sold in all 27 Member States.

The aim is to oblige manufacturers of ErPs to reduce energy consumption and other negative environmental impacts at the design stage. Setting minimum performance standards for products removes poorly performing products from the market while driving innovation in the design and manufacture of environmentally friendly products.

The directive lists the following ecodesign parameters that contribute to improving durability and reparability, as well as reuse: number of materials and components used, use of standard components, time necessary for disassembly, complexity of tools necessary for disassembly, use of component and material coding standards for the identification of components and materials suitable for reuse and recycling; extension of lifespan as expressed through: minimum guaranteed lifespan, minimum time for availability of spare parts, modularity, upgradeability, reparability.

Since 1 March 2021, some product groups, such as washing machines, refrigerators, dishwashers, monitors and lighting, must meet certain reparability requirements as part of newly introduced resource efficiency regulations: for example, they should be able to be disassembled with

conventional tools so that they can be repaired not only by authorized repair shops or the manufacturers, but also by consumers. In addition, certain spare parts must be kept in stock and information must be provided on how to repair. For the case of refrigerating appliances, manufacturers are also obliged to make a mandatory statement on the length of the commercial warranty.

The aim of the Directive is to extend the product lifespan and thus to contribute to resource conservation and to reducing the amount of e-waste. So far, however, the Ecodesign Directive has only set mandatory lifespan requirements for vacuum cleaners and lighting products. Only products fulfilling the Ecodesign Directive requirements will carry the CE (fr. "Communauté Européenne") marking and have access to the EU market.

Regulations against planned obsolescence

France - Consumption Code³

Article L213-4-1 of France's Consumer Code defines planned obsolescence as any technique by which a marketer deliberately seeks to shorten the lifespan of a product in order to increase its replacement rate. The law stipulates a prison sentence of two years and a fine of 300,000 euros. The amount of the fine may be increased in proportion to the benefits derived from the infringement to 5% of the average annual turnover calculated on the last three annual turnovers known at the time of the facts.

Ecuador - Organic Code of the Social Economy of Knowledge, Creativity and Innovation 2017/1435⁴

Under the section "Obsolescencia programada" planned obsolescence and its practices are defined and regulatory guidance is given in Articles 64 to 66 for public bodies to combat such practices. Among other things, incentives and requirements for regular preventive and corrective maintenance are to be established; there is to be an obligation to provide information on the most common defects and to stock and manufacture spare parts to remedy such defects; and a voluntary durability certificate is to be introduced. A random inspection of planned obsolescence of goods purchased by public institutions shall be carried out annually and the resulting report submitted to the Superintendence of Market Power Control, the National Public Procurement Office and the National Secretariat for Public Administration and other competent authorities.

Duty to provide spare parts

Brazil - Consumer Defence Code (CDC) 1990/8078⁵

Manufacturers and importers must ensure the supply of components and spare parts until the manufacturing or importation of the product ceases. Once production or importation ceases, the supply must be maintained for a reasonable period of time.

France - Consumption Code³

Article 19 L111-4 stipulates, that manufacturers of household electrical appliances, small computer and telecommunication equipment, monitors and screens, must keep spare parts available for at least five years from the date the last unit of the model in question was placed on the market.

In addition, **article 25 L441-4** prohibits any agreement or practice intended to restrict the access of a repair professional to spare parts, instruction manuals, technical information, or other tools, equipment, or software that enable the repair of products.

Duty to provide software updates

European Union - Digital Content Directive 2019 /770⁶ and Sales of Goods Directive 2019/771

The two directives introduce the duty to provide software updates into **European contract law**. The necessary provisions of the Directives were to be adopted and published by the Member States by 1 July 2021. The regulations must be applied as of 1 January 2022.

Article 8 (2) of the Digital Content Directive and article 7 (3) of the Sales of Goods Directive stipulate, that the trader of **digital contents or digital services** shall ensure that the consumer is informed of and supplied with updates, including security updates, that are necessary to keep the digital content or digital service in conformity. The duty applies for the period of time:

(a) during which the digital content or digital service is to be supplied under the contract, where the contract provides for a continuous supply over a period of time; or

(b) that the consumer may reasonably expect, given the type and purpose of the digital content or digital service and taking into account the circumstances and nature of the contract, where the contract provides for a single act of supply or a series of individual acts of supply

Right to repair

USA - Motor Vehicles Owners Right to Repair Act⁷

The first "Right to Repair" (R2R) law was enacted in Massachusetts in 2012 in response to a "Right to Repair" movement that arose after car manufacturers restricted independent mechanics' access to repair information and tools. The law required automobile manufacturers to provide repair tools and information to independent repairers. Although the law only took effect in Massachusetts, the Alliance of Automobile Manufacturers and the Association for Global Automakers, along with the independent repair industry, signed a memorandum of understanding in which they voluntarily committed to provide similar access to repair information and tools throughout the United States.

Based on the success of this campaign, the current repair movement led by the Repair Association (TRA) is fighting for the right of consumers to repair or modify their **electronics** themselves or through independent repairers of their choice (**'Electronics Right to Repair'**). This implies that OEMs make tools, parts, and manuals needed for repairs available to independent repair shops.

Economic instruments

Austria - Special Repair Bonus Programme⁸

Private individuals with their main residence in Upper Austria were eligible to receive funding for the repair of selected electrical appliances (electric stove or oven, television, dishwasher, cell phone, refrigerator and freezer, washing machine). Only labor and material costs for repairs by specialized companies were eligible. The amount of the grant was 50% of the eligible gross repair costs, up to a maximum of 100 euros per appliance. By subsidizing the repair of electrical appliances, barriers to using a repair service were lowered. Term of the program ran from Sept. to Dec. 2019 and Jan. to Dec. 31st, 2021. The funding amount was 500,000 €.

Sweden - VAT reduction for second-hand and repairer businesses and tax relief for consumers who use repairs⁹

Sweden reduced VAT for second-hand and repair businesses from 25% to 12%. Additionally, consumers can claim 50% of the labour costs for repairs of large household appliances at homes in the income tax return (up to 2,400 €).

Informations on reparability or durability

Germany - Blauer Engel¹⁰

The "Blauer Engel" (Blue Angel) label is awarded to products and services that meet high standards in terms of environmental, health and usage properties. The evaluation takes into account the **entire life cycle** and includes **specific criteria for each product group**, which must be met for the label to be awarded.

These criteria are reviewed every three to four years and are based on current technical developments. In this way, companies are required to make their products more and more environmentally friendly.

The Blue Angel serves as a model for the **ISO 14024** standard - an international standard on which many new eco-labels worldwide are based today. Eco-label programs that operate according to ISO 14024 (so-called **TYPE I eco-labels**) meet high standards in terms of the level of ambition and relevance of the criteria, as well as the independence, control and transparency of the development and award process.

Excursion: The French Repair Index

The index has been in force since the beginning of 2021 and obliges manufacturers to inform consumers about the reparability of their products through the index. The aim is to enable buyers to easily and quickly assess the reparability of electronic devices and take it into account in their purchasing decisions. At the same time, the mandatory labelling is an incentive for manufacturers to make their products as repairable as possible and to make spare parts and information available and accessible. The policy goal of the Repair Index is to increase the current repair rate of electrical appliances from 40% to 60% within 5 years.

The index rates the reparability of a product on a scale of 0 to 10. The rating currently takes into account the following five criteria: Access to information - Ease of disassembly - Access to spare parts - Price of spare parts - Product specific features (varies from product group to product group).

The achieved repair "score" has to be displayed directly the



Fig. 6: Examples of the French Repair Index

product or packaging as well as at the point of sale (for example next to the product price). The criteria were elaborated on the basis of five pilot products (smartphones, laptops, washing machines, televisions, lawnmowers). On the long run, the French government aims to apply the index to all electrical and electronic equipment.

From 2024, the government wants to transfer the experience and values of the reparability index into a durability index that includes further criteria such as robustness and reliability of a product.

France - Environmental Code¹¹

Article 16 L 541-9-2 stipulates that manufacturers, importers, distributors or other marketers of electrical and electronic equipment shall communicate, free of charge, to the sellers of their products and to any person requesting it, the "reparability index" of such equipment and the parameters by which it was established. This index is intended to inform the consumer about the ability to repair the product in question.

France - Consumption Code³

Article 19 L111-4 provides that manufacturers or importers of electrical and electronic equipment inform sellers about professional repairers about the availability period of spare parts.

Vietnam - Law 59/2010/QH12 on consumer rights¹²

The law obliges the manufacturer, seller to provide point of sale information on availability of repair services, spare parts, guarantee procedures and repair manuals.

Consumer education

Germany - National Program for Sustainable Consumption¹³

The program aims to contribute to the achievement of Sustainable Development Goal (SDG) 12: "responsible consumption and production". It shows how the necessary

change in society and the economy towards sustainability is to be achieved.

General measures on product lifespan include strengthening consumer information, such as user-friendly operating instructions or repair information, at national level. Imparting knowledge about ecological, economic and social impacts of consumer behavior as well as competence development are seen as a central basis for sustainable consumption.

There are various campaigns and aids for consumers, on the basis of which consumer education is advanced. In the ICT sector, campaigns such as the bundling of purchasing aids within the information platform EcoTopTen aim to support green public procurement. But also the development and production of sustainable products are promoted: The federal ecodesign award honors outstandingly designed, sustainable products, services and concepts. The aim is to promote environmentally friendly changes in development and production as well as in consumer behavior.

Measures in the area of clothing include providing information in a consumer-friendly manner about the (non-)sustainability of production and distribution channels in the textile chain, e.g. as part of campaigns and educational offerings. Also, the awareness of recommendable sustainability seals is increased, supporting their use and promoting their visibility in the market, e.g. through public procurement measures and the consumer portal "Siegelklarheit".

Green public procurement

Germany - Circular Economy Act (Law on Closed Cycle Management and Waste) 2012¹⁴

According to the waste hierarchy formulated in the circular economy law, waste prevention has priority over recycling and other recovery like energy recovery and landfilling. Accordingly, authorities must observe certain criteria when designing work processes, procuring or using materials and consumer goods, in construction projects and other contracts. For example, they must give preference to products that meet specified criteria such as durability or reparability. One of the criteria is that products must be durable, easy to repair, reusable and recyclable.

This obligation must be fulfilled insofar as the products are suitable for the intended use, no unreasonable additional costs are incurred as a result of their procurement or use, sufficient competition is ensured, and no other legal provisions conflict with this.

Climate Change Act (KSG)¹⁵

Chapter 5: Public administration as a Role Model (Public Procurement, climate neutrality of federal public administration until 2030)

§ 13 KSG: Public procurers must contribute to the objective and the targets of the Climate Change Act. The following has to be considered in public procurement processes:

- Obligation to prefer climate friendly products
- Obligation applies to all phases of procurement
- Consideration of life-cycle costs and economic costs of climate change

Extended producer responsibility

European Union - Directive on waste electrical and elec-tronic equipment (WEEE) 2012/19/EU¹⁶

At the European level, the Waste Framework Directive enables Member States to set up EPR systems. In addition, the waste stream-specific waste electrical and electronic equipment (WEEE), end-of-life vehicles (ELV), batteries and accumulators (B&A) Directives and the packaging and packaging Waste Directive (PPWD) make it mandatory for Member States to enforce EPR for these waste streams. The WEEE Directive, which came into force in 2012, regulates the trade, take-back and proper disposal of WEEE within the EU.

The introduction of producer responsibility aims to ensure that electrical and electronic equipment is designed and produced in such a way that its repair, possible upgrading, re-use, disassembly and recycling are fully considered and facilitated.

The Directive places the following responsibilities on producers:

Collection and take-back (article 5): The collection and recycling of WEEE (equivalent or similar equipment) is to be organised by producers themselves or with the support of a take-back scheme (Compliance and Take Back Scheme, CTBS). This means that producers have to operate a take-back solution either directly or indirectly in a country and offer take-back logistics to end-users and businesses.

Proper Treatment (article 8): producers or third parties acting on their behalf have to set up systems to provide for the recovery of WEEE using best available techniques. The systems may be set up by producers individually or collectively.

Recovery targets (article 11): for the purpose of calculating recovery targets, producers or third parties acting on their behalf keep records on the weight of WEEE, its components, materials or substances when leaving (output) the collection facility, entering (input) and leaving (output) the treatment facilities and when entering (input) the recovery or recycling/ preparing for re-use facility.

Financing (article 12 & 13): producers provide at least for the financing of the collection, treatment, recovery and environmentally sound disposal of WEEE. EPR is also being discussed for textiles (see Circular Economy Action

Endnotes

1. European Union - Sales of Goods Directive 2019/771, available online at <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:32019L0771>, checked on 5/8/2021
2. European Union - Ecodesign Directive 2009/125, available online at <https://eur-lex.europa.eu/legal-content/DE/ALL/?uri=CELEX%3A32009L0125>, checked on 5/10/2021
3. France - Consumption Code, available online at <https://codes.droit.org/PDF/Code%20de%20la%20consommation.pdf>, checked on 5/8/2021
4. Ecuador - Organic Code of the Social Economy of Knowledge, Creativity and Innovation 2017/1435, available online at http://www.diputados.gob.mx/LeyesBiblio/pdf/113_241220.pdf, checked on 5/23/2021
5. Brazil - Consumer Defence Code (CDC) 1990/8078, available online at <https://legado.justica.gov.br/seus-direitos/consumidor/Anexos/guia-do-consumidor-estrangeiro-ingles.pdf>, checked on 5/22/2021
6. European Union - Digital Content Directive 2019 /770, available online at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32019L0770>, checked on 5/8/2021
7. USA - Motor Vehicles Owners Right to Repair Act, available online at <https://www.congress.gov/bill/112th-congress/house-bill/1449>, checked on 5/18/2021
8. Austria - Special Repair Bonus Programme, available online at https://ec.europa.eu/info/sites/default/files/2021-austria-stability-programme_en.pdf, checked on 6/10/2021
9. Sweden - VAT reduction for second-hand and repairer businesses and tax relief for consumers who use repairs, available online at https://portal.research.lu.se/portal/files/77933910/Promoting_the_repair_sector_in_Sweden_2020_IIIEE.pdf, checked on 7/3/2021
10. Germany - Blauer Engel, available online at <https://www.blauer-engel.de/en>, checked on 5/10/2021
11. France - Environmental Code, available online at <https://www.legifrance.gouv.fr/codes/id/LEGITEXT000006074220/>, checked on 5/27/2021
12. Vietnam - Law 59/2010/QH12 on consumer rights, available online at <https://english.luatvietnam.vn/law-no-59-2010-qh12-dated-november-30-2010-of-the-national-assembly-on-protection-of-consumer-rights-57542-Doc1.html>, checked on 5/23/2021
13. Germany - National Program for Sustainable, available online at https://www.bmu.de/fileadmin/Daten_BMU/Pools/Broschueren/nachhaltiger_konsum_broschuere_en_bf.pdf, checked on 5/10/2021 Consumption
14. Germany - Circular Economy Act (Law on Closed Cycle Management and Waste) 2012, available online at https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Abfallwirtschaft/kreislaufwirtschaftsgesetz_en_bf.pdf, checked on 5/21/2021
15. Germany - Climate Change Act (KSG), available online at <https://www.bmu.de/gesetz/bundes-klimaschutzgesetz>, checked on 5/27/2021
16. European Union - Directive on waste electrical and electronic equipment (WEEE) 2012/19/EU, available online at https://ec.europa.eu/environment/topics/waste-and-recycling/waste-electrical-and-electronic-equipment-weee_de, checked on 5/3/2021
17. European Union - Circular Economy Action Plan, available online at https://ec.europa.eu/environment/topics/circular-economy/first-circular-economy-action-plan_de, checked on 7/3/2021
18. European Union - Sustainable Product Initiative, available online at https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12567-Sustainable-products-initiative_de, checked on 5/21/2021

3

Business Models

Product as a Service
Second-Hand
Repair & Remanufacturing
Sufficiency & Design Strategies

Product as a Service



Fairphone

Nudie Jeans

Second Hand



Halle 2

Sellpy

Repair & Remanufacture



iFIXIT

Repair Rebels

Sufficiency & Design Strategies



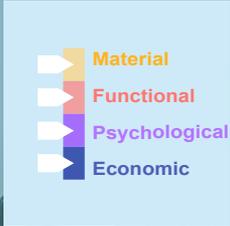
SHIFT Phone

Patagonia

This section introduces business models that help to slow down resource loops by extending the time products are being used. Each model is first characterized on a theoretical level considering the potential on extending the usage time and lifespan of a product. Furthermore good practice examples for each product group are highlighted and finally drivers and barriers for their implementation and diffusion are identified.

Product as a Service

Product as a service (PaaS) models (or product-service systems) represent a marketable service offering composed of a tangible product component and an intangible service component, which together serve to satisfy a customer need.¹ Depending on the value-added share of product and service within the PaaS, three types of product-service systems can be distinguished, which can be broken down into further sub-categories as illustrated below.² The greater the proportion of service components in the offering, the greater the focus of the value proposition is on service delivery (access and performance) rather than ownership.³ The table below defines the three types of PaaS models and outlines their potential impact on a product's lifespan.

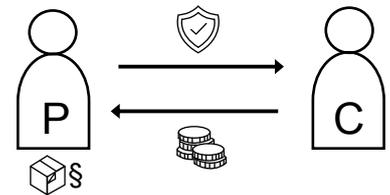
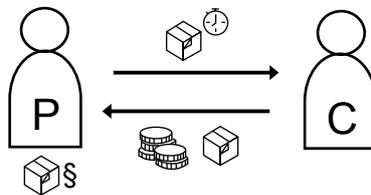
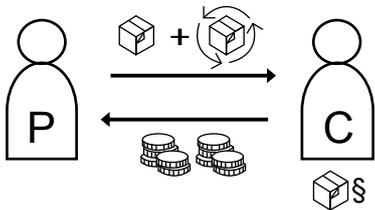


Product oriented	Use oriented	Result oriented
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Product-oriented PaaS offer a service component in addition to the product being sold. The service can consist of a product-related service, such as in the case of maintenance and repair services and take-back agreements or product-related advice and consultancy. Product sales continue to be the main focus of this type of PaaS and, compared to pure product sales, only an accompanying service is added.^{4,5}

The use-oriented variant aims to ensure the availability and operability of the product for the customer. Ownership of the product remains with the supplier, who authorizes the customer to use the product for a specified period. All activities that serve to ensure the functionality of the product (repairs, maintenance, servicing, etc.) are usually taken over by the supplier of the product. Three Subcategories are: Leasing; Renting or Sharing; and Pooling.^{6,7}

In this type of PaaS, the provider and the client agree on a service outcome, i.e. a predefined product does not necessarily have to be part of the service. The provider is free to decide how the service outcome is delivered.⁸



Potential to extend the lifespan

The provision of services in addition to pure product sales can have a positive impact on the lifespan, depending on the type of service. In particular, contractually guaranteed maintenance and repair services can contribute to the durability of the product. Furthermore, take back agreements can enhance reuse and recycling of materials and components or remanufacturing of products. However, the degree to which this PaaS model can contribute to the extension of the lifespan strongly depends on the service offered. See the example "Nudie Jeans" on the next page.

Potential to extend the lifespan

The service provider retains ownership and responsibility for the product, incentivising the design and manufacturing of high-quality, low-maintenance and durable products. As the product remains with the service provider at the end of the use phase, it is easier to reuse materials and components or refurbish the product for a next life cycle. As products are used sequentially or in parallel by several customers and an intensification of use takes place, there is potential for increasing resource efficiency compared to individual product purchases, as less products are needed to serve the same number of consumers. See the example "Fairphone" on the next page.

Potential to extend the lifespan

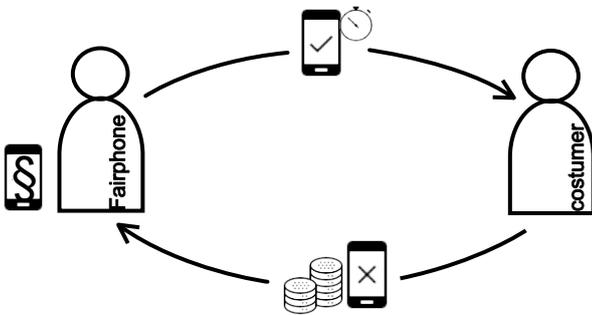
The provider is responsible for all costs occurring during the life cycle of the product (maintenance, repair, EoL costs...) which provides a powerful incentive to design a product that is durable and less defect-prone, of which elements can be re-used after the products' usage time. In addition, this also provides an incentive for the provider to continuously improve the product, taking life cycle performance into account.

FAIRPHONE

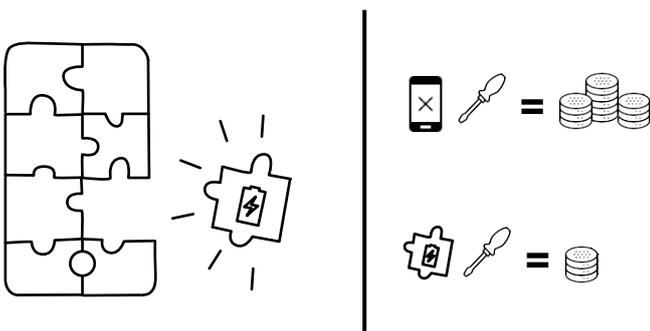
AS A SERVICE: A BUSINESS-TO-BUSINESS

Fairphone launched a pilot project in 2018 called Fairphone-as-a-Service (FaaS), which aims to provide innovative business-to-business offerings for companies based on:

- Access to functioning Fairphone devices for the customer's employees
- Services around the maintenance and updates of devices
- One fixed monthly fee
- Guaranteed end-of-use take-back of devices



As with use-oriented PaaS, Fairphone retains ownership of their devices, enabling circular strategies such as maintenance, repairs, refurbishment and recycling to prolong the lifespan of devices and optimise value creation.

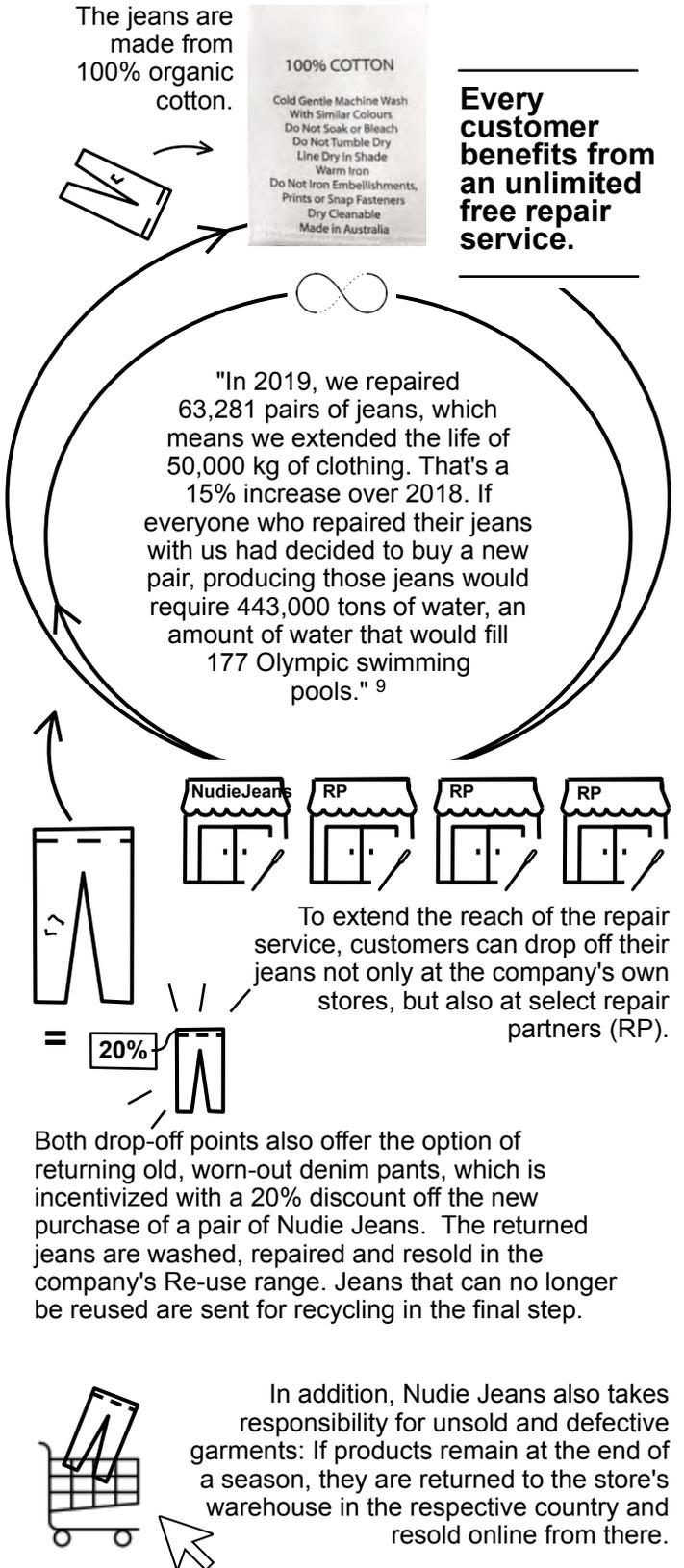


The most important factor enabling these circular activities from a financial and technical perspective is the **modular design** of Fairphones. This allows each individual module of the smartphone to be removed and repaired or replaced without having to send in the entire device. The company claims that replacing a module is significantly cheaper than repairing non-modular phones. Fairphone thus manages to close the currently existing gap between the economic and technical lifespan of smartphones, thus extending their usage time.

NUDIE JEANS

SUSTAINABLE DENIM BRAND

Nudie Jeans is a sustainable denim brand from Sweden, with stores in Europe, Asia, North America and Oceania. It is a product oriented PaaS-Type.



Second-Hand Markets

The Business Model “second-hand Markets” means the sale of already used products. Previous owners give away or sell their used products to second, third or fourth users. The original model of selling used clothing in so-called Second-Hand stores has now become a complex system of different business models. The owner of used, no longer wanted products has a variety of possibilities to give them a new/longer life instead of disposing them. Meanwhile, especially in Europe and the USA, the target groups for used products have changed and expanded considerably. More and more larger companies are getting into the distribution of used products and making a profit. The market value of the second-hand apparel market worldwide in 2020 was estimated to be worth 27 billion U.S. dollars.¹⁰ In comparison: the overall global textile market size was projected at 1000.3 billion U.S.



There are many different reasons and ways to use second-hand products. The following table tries to characterize the second-hand market according to typical inputs (where do the used products come from), storage types (where are the products stored before being sold), sales (where or by whom they are sold), target group (who uses the second-hand products), and occasion/ looks. The table does not claim to be complete and serves mainly to give an overview of second-hand markets and their complexity and diversity.

Input	Storage	Sale	Target Group	Occasion/ Look
donation by parcel	the previous owner	flea market	homeless	nothing special
personal delivery	the second-hand company	social department stores	financially weak people	subcultural scene
from abroad	the second-hand shop	second-hand store	collectors (historical)	non-commercial
sale from previous owner to company	flea market stand	vintage/retro store	people critical of consumption	nonconform
none (goods remain with the previous owner until they are sold)	collection station	online platform (operated by the company)	young people	anti-aesthetic
returns or unsold products		online platform (served by previous owner)	parents	shabbylook
product take-back via instore/ online collection and resale			special sizes	special occasions (wedding,...)
				children's fashion
				pregnancy fashion

Tab 2.: Characterization of second-hand markets by input, storage, sale, target group and occasion/ look

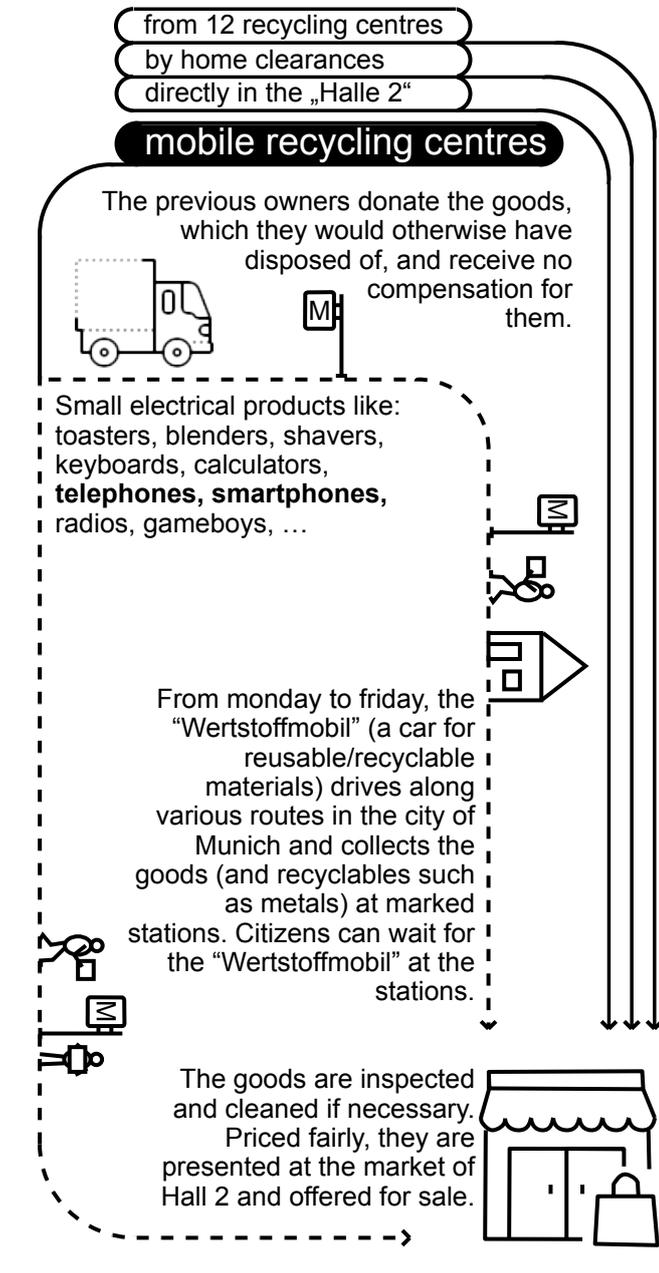
Potential to extend the lifespan

The significance for the usage time and the lifespan is obvious: through second-hand markets, products can be given a 2nd, 3rd, etc. cycle of use. On the one hand, this keeps the product in the cycle longer, and on the other hand, it can avoid the need for a new purchase. In this way the material flow from production to disposal/recycling is slowed down and emissions as well as resource expenditures can be saved. For example: the life cycle of a second-hand jeans is associated with 23 kg greenhouse gas (GHG) emissions, while traditional ownership (buying new) causes 34 kg GHG emissions.¹²

HALLE 2

CITY CLEANING - SECOND-HAND-SYSTEM

“Halle 2” (Hall 2) offers used goods in good condition and affordable prices. It is a second-hand system and market place operated by the public waste management company from the City Munich (“Abfallwirtschaftsbetrieb München - AWM”) in the south of Germany.



The second-hand system is local and easily integrated into a particular city or neighborhood. It is conceivable to implement it on a smaller or larger scale.

In the case of Munich, the system is operated by the public company “AWM” (the waste management company from Munich). However, it is also well conceivable as a private entrance.

SELLPY

SECOND-HAND-SHOP FOR CLOTHES

Sellpy is a second-hand business model, that facilitates selling used clothes. The previous owner does not donate his used clothing, but sells it. Unlike other business models, Sellpy takes care of storage, documentation, description, price estimation and complete communication with interested parties. At the same time, the previous owner retains control and can still change prices, for example.



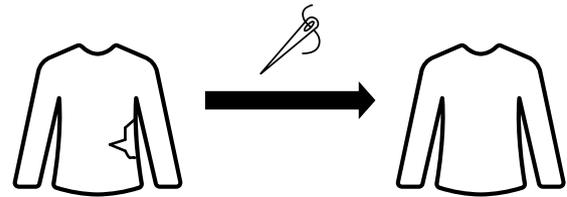
This business model makes the second-hand world particularly low-threshold. Through a very simple handling in both selling and buying it becomes more attractive to give products a second life.

Repair and Remanufacturing

- Material
- Functional
- Psychological
- Economic

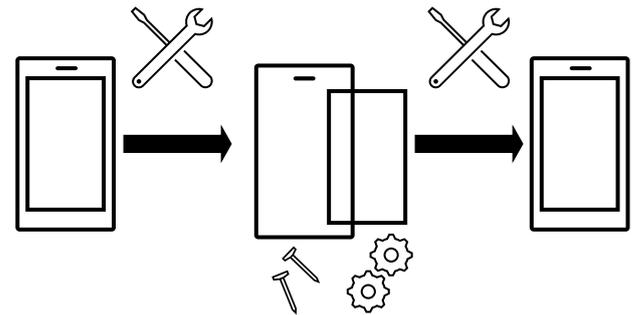
Repair

refers to activities that fix damages or defects of an item in order to bring it back into a good or sound condition. The link between extending service life and repair is clear: products whose functionality or appearance can be maintained through repair can also be used for longer.



Remanufacturing

is a process in which a product is disassembled, cleaned and rebuilt according to the specifications of the original product, using a combination of reused, repaired and new parts.¹³ Manufacturers exploit the residual value of products and are able to provide the customer with an affordable, "as good as new" product through remanufacturing or repair. Consistent product take-back is often a prerequisite for the remanufacturing business model. Take-back systems and cooperations (e.g. with retailers, logistics companies and collection points) can meet this requirement. The business model can be used by the manufacturer of the product itself, or by companies that use the residual value in products or components manufactured by other companies that are still functional, broken or discarded. Remanufacturing reduces environmental impacts by retaining the geometrical form of the product, thus allowing a "rebirth" of material usage that preserves both economic and environmental values.¹⁴



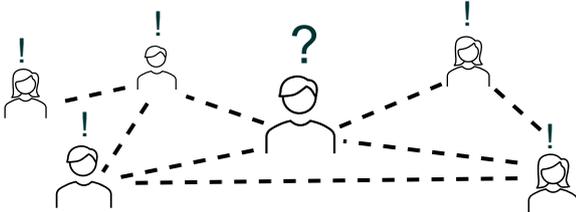
iFIXIT

WEBSITE FOR REPAIR INFORMATION

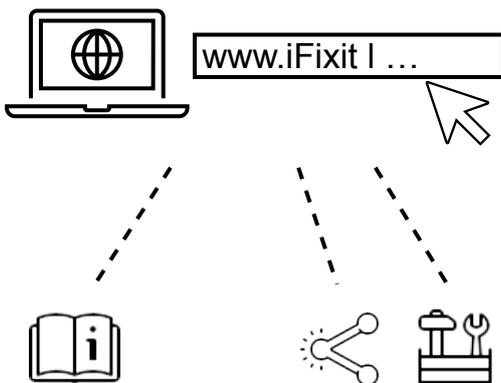
iFixit is a US company that provides a wiki-based website with information about repair and also sells spare parts and repair toolkits.



On the platform, individuals can create repair instructions for a device, which can be used, edited and improved by all other users.



In addition, the platform provides an answer forum where users can post their device-specific repair questions and have them answered by a worldwide community of repair experts.

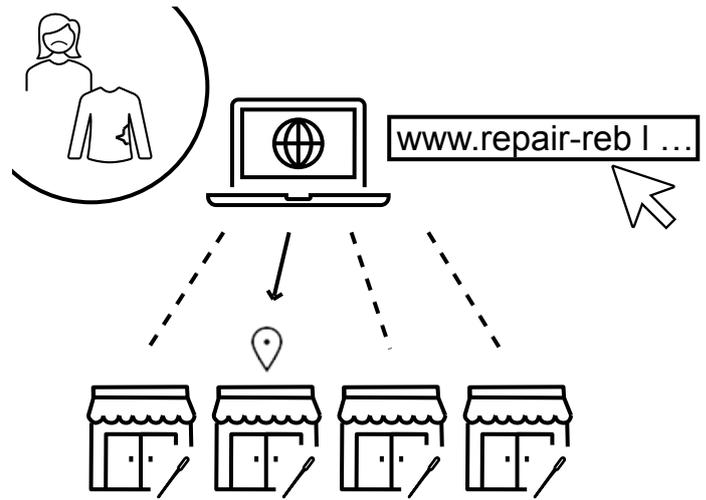


Over 74,000 free repair instructions for over 34,000 devices, (IT-equipment, household appliances, vehicles, clothing and medical equipment)

REPAIR REBELS

LOCAL REPAIR COOPERATIONS

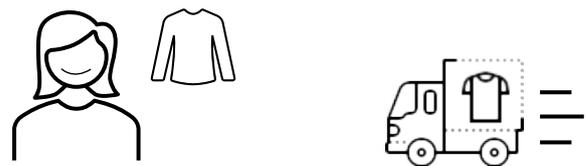
Is a German start-up that has developed a platform on which consumers can find suitable repairers for their garments. The start-up cooperates with various local tailors and shoemakers.



The customer can book the appropriate repair for his garment on the platform and the garment to be repaired (but also bags, shoes and accessories) ...



...the garment will be picked up at the customer and brought to a suitable tailor/ shoemaker. After the repair, the garment is returned to the owner. Thus, the customer is relieved of any effort associated with the repair of a garment and at the same time the local repairers are strengthened.



Sufficiency and Design Strategies



Business models that incorporate longevity in their value proposition aim to deliver high-quality, long-lasting products, and high levels of service, that seek to enable long lifespan e.g., through repair and maintenance. A key factor enabling longevity is the product design. Bocken et. al (2016) gave an overview on design strategies enabling longevity and the possibility for product lifespan extension. These design strategies are listed and explained in the table below (see Table 2). The products are often sold with a high upfront price in order to cover the long- term service and product warranty cost over the product lifespan absorbed by the manufacturer (value capture). Sufficiency business furthermore pursue a "non-consumerist approach to sales". This means that there is an active attempt to reduce consumption by end users, for instance through a non-consumerist approach to advertising and sales (e.g. no overselling, no sales commissions). To encourage "sufficiency" behavior among consumers, durable products are sold that might incorporate different design strategies (such as upgradability, reparability etc.). A high level of service to maintain the functionality of the product for as long as possible can be an additional offer to pure product sale.¹⁵

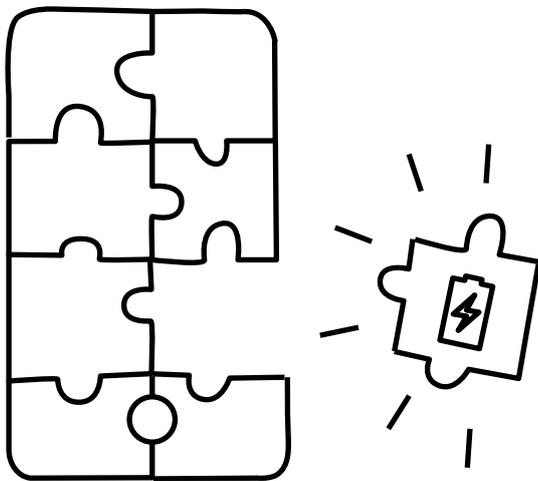
Design for longevity	Designing a product with long usage times.
Design for attachment and trust	Also called "design for emotional durability" – intents to create products, that will be loved and trusted longer.
Design for reliability and durability	Designing reliable products means to ensure, that a product will operate for a specified period without any constraints such as defects or failures. A durable design refers to physical durability of a product and strongly depends on the material selection used to manufacture the product.
Design for product life extension	This strategy intents to extend the usage time of a product through service offerings such as reuse, maintenance, repair and technical upgrading.
Design for ease of maintenance and repair	Enables an easy maintenance (retaining the functional capabilities of a product through inspections and/or servicing tasks) or repair (restoring a product to a good constitution after a defect or a decay) of products.
Design for upgradability and adaptability	Design for upgradability and adaptability allows to expand or modify products throughout their use phase to keep up with customer expectations. Upgrades enable products to adapt to changing conditions, improve their functionality and enable them to extend their usage time even after the introduction of new technological standards and functional requirements.
Design for standardization and compatibility	Intents to create products with parts or interfaces that fit other products.
Design for dis- and reassembly	Enables to easily dis- and reassemble a product.

Tab. 3.: Design strategies enabling longevity and the possibility for product lifespan extension (Bocken et. al 2016)

SHIFT PHONE

SMARTPHONES WITH MODULAR DESIGN

Shift Phone is a German company that manufactures smartphones with modular design. All of the aforementioned design strategies are used. For example, the memory is easily expandable and the battery is replaceable (design for upgradability and adaptability). The modular design also makes repairs easier and



Shift Phone supports sufficiency thinking with its design, but also in its communication with consumers. Another special feature is the device deposit introduced in 2016: For the purpose of waste avoidance, end consumers are supposed to send defective devices back to the company to ensure proper disposal or reuse in second or third hand.

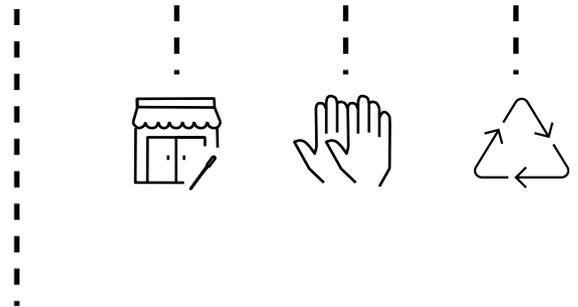


PATAGONIA

SUSTAINABLE OUTDOOR CLOTHING

Patagonia is an outdoor clothing business that pledges to 'build useful things that last, to repair what breaks and recycle what comes to the end of its usage time. It promotes 'sufficiency' by asking customers to only buy what is needed and will last, make repairs, reuse and recycle anything else and consider second-hand products.

REDUCE REPAIR REUSE RECYCLE



In this sense, they have launched a Common Threads Initiative to encourage repair and reuse of its clothing sold promoting it with the iconic "Don't buy this jacket" advertisement.



Patagonia collaborates with iFixit and eBay to make it easy for customers to either repair products to increase the lifespan, or resell the products when they no longer want them through an established and credible second-hand marketplace.



Drivers and Barriers for the different Business Models

	Drivers	Barriers
Product as a Service (PaaS)	<p>One important advantage from the company's point of view is the potential to improve customer relations, since the increased service share also means increased customer contact. This also enables more differentiated insights into the usage behavior and needs of customers, which can result in new ideas for innovations or the improvement of service performance.¹⁶ On the other hand, customers can benefit from comprehensive services and cost or time savings, as activities such as repairs, maintenance, disposal, etc., are taken over by the provider.¹⁷</p>	<p>PaaS models (with the exception of the product-oriented variant) offer ownership-free consumption. The focus is no longer on sales, but on product use. It is precisely the lack of ownership of the product that poses one of the greatest challenges for the widespread distribution of such models: the availability, access and individual freedom of use of the product can be significantly limited for the customer compared to product ownership. Due to the lack of ownership, product attachment is also usually very low, which can lead to careless handling of the product and thus to accelerated wear and tear of the product.¹⁸</p>
Second-Hand (SH) Markets	<p>Technological developments of digitalization and ever greater use of the internet in buying and selling are playing to the SH market. Above all, information and communication channels are being shifted to the internet, thus enabling a different range, networking and convenience. This favors efficient access to a large selection of low-priced products. Parallel to this, a shift in the values, mindsets and behaviors of consumers worldwide increased the acceptance for SH goods. Environmental awareness and the striving for sustainable consumption are driving the business model forward.¹⁹</p>	<p>Customers consider products with an second or third lifecycle to be less attractive, as shown by various studies. Uncertainties about product performance, status, and quality face buying a used product versus a new one. Accelerated innovation cycles act contrary to long product life cycles - new product development is too often linked to 'fast-moving products' that are worn out after a short time.²⁰</p>
Repair and Remanufacture	<p>Repairers would benefit from the introduction of a "Right to Repair" and the duty to provide spare parts. Economic incentives such as reduced taxation would further enhance the profitability of repair.</p> <p>The introduction of Extended Producer Res-ponsibility may act as a driver for the diffusion of remanufacturing business models.²¹ From a company's point of view, remanufacturing offers the potential to open up new forms of value creation through reduced material costs, which can lower overall costs and make this attractive for manufacturers.²²</p>	<p>The profitability of repair is relatively low for the various market participants (customers, repairers, retailers and manufacturers), especially for low-value products. In the ICT sector, high product complexity and unfavorable design make repair a costly and time-consuming endeavour. Business models built on repair and remanufacture services are heavily reliant on cooperation and collaboration with other market stakeholders, which is a challenge in a highly competitive market. Access to spare parts and storage costs present another barrier, both for repair and remanufacture. Remanufacturer use used products and its components of which performance status, quality and lifespan are unpredictable, posing a major financial risk due to potential hidden costs.²³</p>
Sufficiency and Design	<p>Drivers that promote business models focused on design and sufficiency strategies for durable products may be premium margins on high-quality products, high levels of customer loyalty, and new repair and service markets.²⁴</p>	<p>Since these products are usually much more expensive, access is limited.²⁵ However, as it can be seen in the Shift Phone example, this is not necessarily the case.</p>

Endnotes

1. Mont, Oksana (2002): Clarifying the concept of product–service system. In: *Journal of Cleaner Production* 10 (3), S. 237–245. DOI: 10.1016/S0959-6526(01)00039-7.
2. Tukker, Arnold (2004): Eight types of product–service system. Eight ways to sustain-ability? Experiences from SusProNet. In: *Bus. Strat. Env.* 13 (4), S. 246–260. DOI: 10.1002/bse.414.
3. Bocken, Nancy M.P.; Mugge, Ruth; Bom, Colin A.; Lemstra, Hidde-Jan (2018): Pay-per-use business models as a driver for sustainable consumption. Evidence from the case of HOMIE. In: *Journal of Cleaner Production* 198, S. 498–510. DOI: 10.1016/j.jclepro.2018.07.043.
4. Gandenberger, Carsten (2016): Potenziale und Grenzen zur Steigerung der Res-sourceneffizienz durch innovative Produkt-Dienstleistungssysteme. Fraunhofer ISI (RohPolRess-Kurzanalyse, 9).
5. Wimmer, R.; Kang, M. J.; Tischner, U. (2008): Erfolgsstrategien für Produkt-Dienstleistungssysteme. Hg. v. Bundesministerium für Verkehr, Innovation und Technologie, bmvit. Wien (Berichte aus Energie- und Umweltforschung, 35/2008).
6. Gandenberger, Carsten (2016): Potenziale und Grenzen zur Steigerung der Ressourceneffizienz durch innovative Produkt-Dienstleistungssysteme.
7. Tukker, Arnold (2004): Eight types of product–service system. Eight ways to sustain-ability? Experiences from SusProNet.
8. Tukker, Arnold (2004): Eight types of product–service system. Eight ways to sustain-ability? Experiences from SusProNet.
9. Nudie Jeans (2021) Available online at: <https://www.nudiejeans.com/>, checked on 6/13/2021
10. M. Shahbandeh (2021): Value of the secondhand market worldwide from 2012 to 2025. Available online at: <https://www.statista.com/statistics/826162/apparel-resale-market-value-worldwide/>, checked on 7/21/2021
11. Grand View Research (2021): Textile Market Size, Share & Trends Analysis Report By Raw Material (Wool, Chemical, Silk), By Product (Natural Fibers, Polyester), By Application (Household, Technical), By Region, And Segment Forecasts, 2021 - 2028. Available online at: <https://www.grandviewresearch.com/industry-analysis/textile-market/methodology>, checked on 9/21/2021
12. Levänen, J., Uusitalo, V., Härri, A., Kareinen, E. and Linnanen, L. (2021) 'Innovative recycling or extended use? Comparing the global warming potential of different ownership and end-of-life scenarios for textiles', *Environmental Research Letters*, vol. 16, no. 5, p. 54069.
13. Johnson, M. R. & McCarthy I. P. (2014) Product Recovery Decisions within the Context of Extended Producer Responsibility. *Journal of Engineering and Technology Management* 34, 9-28
14. Bocken, Nancy M. P.; Pauw, Ingrid de; Bakker, Conny; van der Grinten, Bram (2016): Product design and business model strategies for a circular economy. In: *Journal of Industrial and Production Engineering* 33 (5), S. 308–320. DOI: 10.1080/21681015.2016.1172124
15. Bocken et. al. (2016): Product design and business model strategies for a circular economy.
16. Mont, Oksana (2002a): Clarifying the concept of product–service system.
17. Mont, Oksana (2002b): Drivers and barriers for shifting towards more service-oriented businesses. Analysis of the PSS field and contributions from Sweden. In: *The Journal of Sustainable Product Design* 2 (3/4), S. 89–103. DOI: 10.1023/B:JSPD.0000031027.49545.2b.
18. Demyttenaere, Klara; Dewit, Ivo; Jacoby, Alexis (2016): The Influence of Ownership on the Sustainable Use of Product-service Systems - A Literature Review. In: *Proce-dia CIRP* 47, S. 180–185. DOI: 10.1016/j.procir.2016.03.071.
19. Yrjölä, M., Hokkanen, H. and Saarijärvi, H. (2021) 'A typology of second-hand business models', *Journal of Marketing Management*, vol. 37, 7-8, pp. 761–791.
20. Hansen, Erik G; Fichter, Klaus; Lüdeke-Freund, Florian (2020): Circular Business Models: Overcoming Barriers, Unleashing Potentials. Available online at: https://static1.squarespace.com/static/5b52037e4611a0606973bc79/t/60a633d025c8aa6d5b5e2f69/1621504987694/GM+EN_Executive+Summary.pdf, checked on 7/22/2021
21. Johnson, M. R. & McCarthy I. P. (2014) Product Recovery Decisions within the Context of Extended Producer Responsibility.
22. Bocken et. al. (2016): Product design and business model strategies for a circular economy.
23. Hansen, Erik G; Fichter, Klaus; Lüdeke-Freund, Florian (2020): Circular Business Models: Overcoming Barriers, Unleashing Potentials.
24. Bocken et. al. (2016): Product design and business model strategies for a circular economy.
25. Bocken et. al. (2016): Product design and business model strategies for a circular economy.

4a

Focus on Mexico

Policy Instruments



Legal guarantee



Right to repair



Ecodesign criteria



Economic instruments



Regulations against planned obsolescence



Information on reparability or durability



Duty to provide spare parts



Consumer education



Duty to provide software updates



Green public procurement



Extended producer responsibility

This chapter will examine the extent to which the policy instruments already presented are established in Mexico. The same categories will be examined (see above) as in the previous chapters. These are the policy instruments that currently exist, such as initiatives, standards, pending bills, programs and guides. All of the policy instruments listed in this chapter can have a direct or indirect impact on the lifespan and usage time of products in Mexico. The list does not claim to be complete.

Policy Instruments in Mexico

Legal guarantees

Federal Consumer Protection Law ¹

Article 77.- the guarantee may not be less than sixty days from the delivery of the goods or the full provision of the service.

Article 81.- In the event that the product has been repaired or subjected to maintenance and the same presents deficiencies attributable to the author of the repair or maintenance within ninety calendar days after delivery of the product to the consumer, **the consumer shall be entitled to have it repaired or maintained again at no cost.**

If the warranty period of a new product is longer than ninety calendar days, **the new warranty period that applies after the repair amount also a minimum of ninety calendar days.**

Article 83.- The time that the repairs carried out under the warranty are not computable within the term of the same. When the good has been repaired, the warranty shall begin with respect to the replaced parts and shall continue with respect to the rest. **In the case of replacement of the good, the warranty period shall be renewed.**

Article 92.- Consumers shall be entitled, at their choice, to the replacement of the product or to the refund of the amount paid, against delivery of the purchased product, and in any case, to a bonus, in the following cases:
II. If the good does not correspond to the quality, brand, or specifications and other substantial elements under which it was offered or does not comply with the official Mexican standards;
III. If the repaired good is not in a suitable condition for its use or destination, within the warranty period;

Ecodesign criteria

Federal Consumer Protection Law ¹

Chapter I

Purpose of the Law and Powers of the Authorities

Article 7.- The following are powers of the Federation:

VI. Adopt the official Mexican standards that establish, among other things, the **criteria of environmental and technological efficiency.** Materials that make up products (...), that become waste when disposed of, shall comply with these standards. The standards shall take into account the **principles of reduction**, recycling and reuse in the handling of these materials.

XV. Promote the research, development and application of technologies, equipment, materials, systems and processes that **prevent, reduce, minimize and/or eliminate the release into the environment and the transfer**, from one to another of pollutants from the integral management of waste;

NMX-SAA-14062-IMNC-2010, Gestión ambiental- Integración de aspectos ambientales en el diseño y desarrollo de productos ²

This Mexican standard describes the current concepts and practices related to the integration of environmental aspects in the design and development of products and services. This Mexican Standard provides guidance to an organization on general principles, policy, strategy and activities related to internal and external environmental communication.

It is applicable to all organizations regardless of their size, type, location, structure, activities, products and services, and whether or not they have an environmental management system. This standard is voluntary.

Regulations against planned obsolescence

LXIV/2PPO-56/99640 ³

Pending

The bill reforms and adds various provisions of the Federal Law on Consumer Protection, regarding the prohibition of the sale of products with programmed obsolescence.

Duty to provide spare part

Federal Consumer Protection Law ¹

Article 80. Producers shall ensure and be liable for the **timely supply of parts and spare parts, as well as for the repair service**, during the term of the guarantee and thereafter, during the time the products continue to be manufactured, assembled or distributed.

By means of official Mexican standards, the Ministry of the Economy (Secretaría de Economía, y Procuraduría) may provide that **certain products must be supported with a longer guarantee period with respect to the supply of parts and spare parts**, taking into account the durability of the product.

Duty to provide software updates

-

Right to repair

-

Economic Instruments

-

Information on reparability or durability

Federal Consumer Protection Law ¹

Article 33.- The information on imported products shall express their place of origin and, if applicable, **the places where they can be repaired, as well as the instructions for their use and the corresponding guarantees**, under the terms set forth in this law.

Consumer education

El Programa Especial de Producción y Consumo Sustentable (2014 - 2018) ⁴

The program aimed to combine measures to promote environmental protection, economic growth and social equality. Therefore, it involves all production and service sectors to adopt behaviors that reduce dependence on natural resources, the generation of emissions and waste, promote recycling and reuse of materials, and make their production chains sustainable. An important strategy for achieving the objectives set out in the program includes education and communication on sustainable production and consumption practices.

Programa Escuela Verde ⁶

The Department of Environment and Natural Resources (SEMARNAT) has developed the Green School Program, which encourages educational communities to promote comprehensive actions that help reduce their impact on the environment and mitigate and adapt to climate change. The program is divided into six action lines: Education for Sustainable Consumption and Waste Management; Sustainable Water Management; Efficiency in Electricity Consumption; Sustainable Health and Lifestyles; Environmental Education; and Community Environmental Action.

Schools participating in the program are willing to promote environmental management processes and incorporate sustainability criteria into student education and community participation.

Green public procurement

Ley de Adquisiciones, Arrendamientos y Servicios del Sector Público (LAAPS) ⁷

This law regulates the public procurement of goods and services. **Article 22 (III)** stipulates, that agencies and institutions shall establish procurement, leasing and services committees with the following tasks: The committees shall determine aspects of environmental sustainability, including the evaluation of technologies that reduce greenhouse gas emissions and energy efficiency. These must be taken into account when acquiring, leasing and providing services, with the aim of optimising and sustainably using resources to reduce financial and environmental costs.

Proyecto de Cooperación Triangular “Integración Regional para el Fomento de la Producción y Consumo Sustentable en los países de la alianza del Pacífico” ⁸

Under a triangular cooperation arrangement between Mexico, the Pacific Alliance and Germany, support was given for the design and implementation of national programs on sustainable production and consumption in the recipient countries. The measure promotes the development of instruments to institute and strengthen agreements on sustainable procurement between the public and private sectors. The project ran from 2014 to 2017. Results included:

- summary of current situation, systems, regulations and existing initiatives in the field of sustainable public

purchasing.

- proposal of at least 10 products and 5 strategic services for the country that could be used as pilot cases in sustainable public purchasing processes.
- proposing sustainability criteria for use in the purchase of goods and services identified as a strategy, taking into account their harmonisation with the current legal framework.

During the project, a list of ten goods and five services identified as suitable to include sustainable criteria for public procurement was defined. Among them, textiles and desktops, laptops, monitors / displays. Durability and reparability are not considered as criteria here.

Extended producer responsibility

General Law for the Prevention and Integral Management of Waste. ⁹

Article 28.- The following shall be obliged to formulate and execute the management plans, as appropriate:

III. **Large generators and producers, importers, exporters and distributors of products that when discarded become urban solid waste or special handling waste** that are included in the lists of waste subject to management plans in accordance with the corresponding official Mexican standards; plastic packaging waste, including expanded polystyrene; as well as importers and distributors of used tires, under the principles of recovery and shared responsibility, and

IV. **Large generators and producers, importers, exporters and distributors of batteries and electric batteries** that are considered special handling waste in the corresponding official Mexican standard.

Article 29.- The management plans applicable to consumer products that when discarded become hazardous waste, shall consider, among others, the following aspects:

I. **The procedures for their collection, storage, transportation and shipment** for recycling, treatment or final disposal, which are foreseen to be used;

II. The strategies and means through which **consumers will be informed of the actions they must take to return the listed products to the suppliers or to the collection centers** intended for such purpose, as the case may be;

III. The procedures through which the **consumers will be informed of the precautions that, if applicable, they must adopt in the handling of the products that they will return to the suppliers**, in order to prevent or reduce risks, and

IV. Those responsible and the parties involved in their formulation and execution.

In any case, when formulating the management plans applicable to consumer products, **the establishment of unnecessary technical barriers to trade or discriminatory treatment that affects their commercialization shall be avoided**.

NORM NOM-161-SEMARNAT-2011 ¹⁰

The norm is mandatory nationwide for large generators of special/urban solid waste; and for large generators (and producers, importers, exporters and distributors) of products that, when discarded, are considered to be special waste subject to a handling plan.

Endnotes

1) Federal Consumer Protection Law - Ley Federal de Protección al Consumidor (LFPC) available online at http://www.diputados.gob.mx/LeyesBiblio/pdf/113_241220.pdf, checked on 8/10/2021

Regulations of LFPC available online at http://www.diputados.gob.mx/LeyesBiblio/regley/Reg_LFPC_191219.pdf, checked on 8/10/2021

2) Mexican standard “NMX-SAA-14062-IMNC-2010”, Environmental management-Integration of environmental aspects in the design and development of products.

Available online at http://dof.gob.mx/nota_detalle.php?codigo=5143090&fecha=18/05/2010, checked on 8/23/2021

3) Mexican pending bill “LXIV/2PPO-56/99640”

4) El Programa Especial de Producción y Consumo Sustentable (2014 - 2018) available online at <https://www.gob.mx/semarnat/documentos/programa-especial-de-produccion-y-consumo-sustentable>, checked on 13/8/2021

6) INECC (2020): Programa Escuela Verde, available online at: <https://www.gob.mx/inecc/documentos/programa-escuela-verde>, checked on 9/29/2021

7) LEY DE ADQUISICIONES, ARRENDAMIENTOS Y SERVICIOS DEL SECTOR PÚBLICO, available online at: https://www.oas.org/juridico/spanish/mesicic3_mex_anexo28.pdf, checked on 9/28/2021

8) Proyecto de Cooperación Triangular “Integración Regional para el Fomento de la Producción y Consumo Sustentable en los países de la alianza del Pacífico”, available online at <https://www.gob.mx/sfp/acciones-y-programas/contrataciones-publicas-sustentables>, checked on 9/28/2021

9) General Law for the Prevention and Integral Management of Waste - Ley General para la Prevención y Gestión Integral de Residuos (LGPGIR) Available online at http://www.diputados.gob.mx/LeyesBiblio/pdf/263_180121.pdf, checked on 8/10/2021

Regulations of LGPGIR available online at http://www.diputados.gob.mx/LeyesBiblio/regley/Reg_LGPGIR_311014.pdf, checked on 8/10/2021

10) NORM NOM-161-SEMARNAT-2011

4b

Focus on Mexico

Business Models

Product as a Service



Phonerental
Bebelogy

Second Hand



Troquer
Amazon renewed

Repair & Remanufacture



Arreglaló
FIXIT

Sufficiency & Design Strategies



Alejandra Raw Project
Lanix

This chapter will examine the extent to which the business models already presented are established on the Mexican market. The same categories will be examined, i.e. second-hand markets, repair market, PaaS businesses and businesses related to design and sufficiency strategies. Each business model is examined separately once for smartphones and once for clothing. An overview of the diffusion and relevance of the business model on the Mexican market is given and an example from the Mexican business community is presented.

Product as a Service



Smartphones & Clothing

Overview

Product service systems, such as rental, leasing or sharing models, still seem to be a **small niche market** in the area of private clothing and smartphone consumption in Mexico. Yet, Mexico has the most sharing economy initiatives in the Latin American region, along with Brazil.¹ However, a study by the 'Instituto de Empresa de Madrid', revealed, that most of these initiatives are represented in other sectors than the clothing and telecommunications sector.²

COLLABORATIVE ECONOMY BY SECTOR

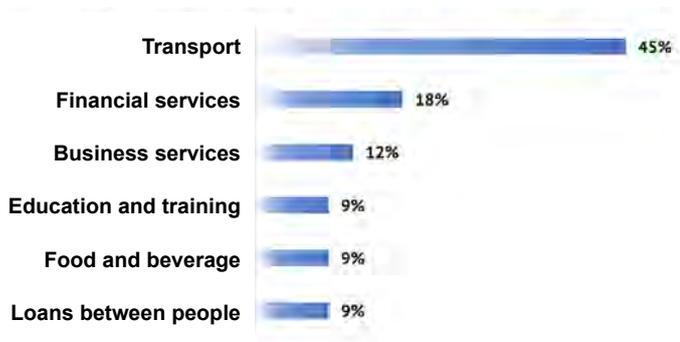


Fig. 7: Sector in which sharing economy operates, multiple answers. (Data for Mexico)

While rental, leasing or sharing models are very difficult to find in the telecommunications sector, some companies already exist in the fashion sector (e.g. 'DelDesfile', 'Conspiración Moda' y 'Retop'). The main focus of these business models seems to be on renting **luxury clothing or clothing for special occasions**, and less on everyday clothing. The rental of baby clothes is an exception here.

Example Smartphones

Phonerental

...is currently the leading company in the mobile and satellite phone rental market in Mexico. It provides mobile services for use in Mexico with coverage throughout the country and in more than 190 countries.

Example Clothing

Bebelogy

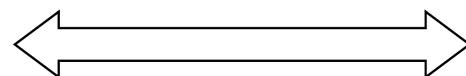
The idea of Bebelogy arose from the problem of parents having to buy new clothes for their baby at every few months. The company's argument is that the **frequent renewal of clothes is expensive and harmful to the environment**.



Subscribe online and choose your baby's size according to its weight and measurement.



Select your clothings and recieve it a few days later at strategically located points in the CDMX.



You have the option of one change of clothes per month.

Second-Hand Markets



Clothing

Overview

Mexico is supplied with \$30 million worth of second-hand clothing by its northern neighbor USA, that also is known to be the world's top supplier of second-hand clothing, disposing of an average of 36 kilos of clothing per person every year.³

Using second-hand textiles in Mexico is quite a common praxis. According to a survey done for this document, 40% of Mexicans are using second-hand clothes. However, the majority of them got their second-hand clothes from friends or relatives (63%) and not by buying them in a shop.* While the **pandemic** caused sales to plummet for many physical stores, **online second-hand clothing retailers seemed to have benefited** from it:

'Troquer', an online platform for buying and selling used clothing, saw an 80% increase in the number of sellers of clothing and accessories from the start of the pandemic in March 2020 to October 2020 compared to last year's period.⁴ Another Mexican online platform for trading used clothing, 'GoTrendier', has seen annual growth of between 200 and 300% since its launch in 2016. With the pandemic, their sales increased by 40%, while **traditional retail sales decreased by 60%**.⁵

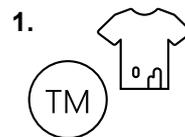
In addition to the commercial buying and selling of second-hand clothes, giving away clothes that are no longer worn **among acquaintances, friends and family members** is a very common practice in Mexico. However, this type of second-hand use will not be considered further in this analysis, as the focus here is only on business models.

Example

Troquer

Against the current background of the pandemic and the temporary lockdowns, as well as appeals to the population to largely restrict physical contacts, an **online market** is presented here. However, physical markets such as flea markets or vintage shops also play an important role in the second-hand clothing market.

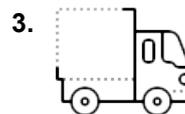
Troquer is a Mexican platform for the sale of second-hand luxury items.



The user has to specify the degree of use/condition and brand of the item in advance



A pricing algorithm then automatically calculates the value of each piece, taking into account its brand, model and/or material.



The piece is delivered to Troquer where it is reviewed by a curator.

* Mind that only 50 Mexicans participated in the survey. Thus, the results are only indicative and not necessarily representative of the population as a whole.

Second-Hand Markets



Smartphones



Overview

According to a survey by Deloitte, **43%** of Mexican smartphone users pass on their old phone to another user. Of these, **17% resold their device**, while **26% gave it away to family members or friends**.⁶ In another survey, even more than 50% of the smartphone users interviewed said they had handed over their old device to a new user.⁷

It can be concluded from this that **a large proportion of Mexican smartphones are given a second life**. However, the majority of used devices are apparently passed on to acquaintances, while the commercial route of selling and buying, which is examined here, is used less frequently.

There are some online markets where **private** individuals can advertise their used equipment and resell it directly to interested parties. However, such a purchase decision is often accompanied by various **uncertainties**: the device could be stolen, it could have functional defects that are withheld by the seller, or it could not be an original device (but a "clone").⁸ The buyer is often not protected against these potential dangers and has to rely on the claims of the seller. We talk about **"used phones"** in this case.⁹

Another option to buy secondary smartphones is with **"refurbished"** phones. These are used phones that were returned to the vendor or manufacturer, that then performs diagnostic testing, makes repairs, cleans the phone and repackages it for sale at a discount. If these refurbished phones than are certified as **"pre-owned"**, they additionally come with a limited warranty. "Pre-owned" phones offer the highest degree of reassurance.¹⁰

Example

Amazon renewed

...sells tested and **refurbished** products. All products on Amazon Renewed are covered by the Amazon Renewed **warranty**. During the one-year warranty period, buyers are eligible for a replacement or refund for their product if it does not perform as expected.

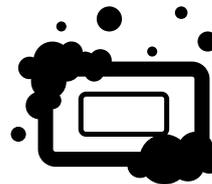


The refurbishment usually includes a full diagnostic test....

...replacement of defective parts...



...thorough cleaning and inspection...



and repackaging by seller or manufacturer.



Repair and Remanufacture



Clothing

Overview

Tailor shops are important points of contact for repairing clothing. Finding data describing the Mexican repair market for clothing posed a challenge in this study. However, a survey conducted for the purpose of this document indicates that more than 40% repair their clothes always or most of the time.*

Example

Arreglaló

...is a franchise recognized throughout Mexico that specializes in the **standardization** and **professionalization** of garment tailoring and repair. The company sees itself as crisis-proof, as it already experienced during the economic crisis in 2009 that people tend to repair instead of buying new in financially difficult times.

Do you repair damaged clothing, or do you send it in for repair?

[n = 52]

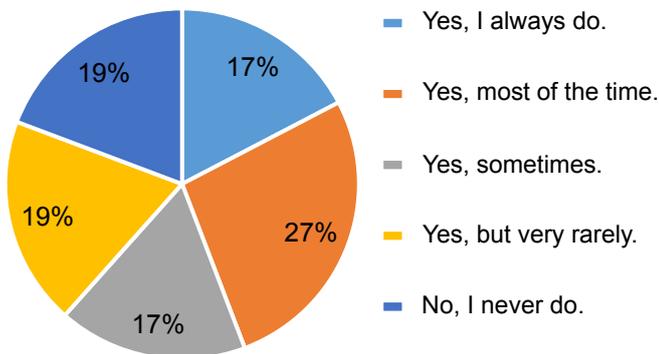
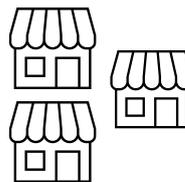


Fig. 8: Frequency of damaged clothing repairs in Mexico (based on 50 survey respondents).



The most common works are related to a **usage time extension**: hemming, changing buttons and zips, adjusting trousers, blouses and shirts, with prices ranging from 8 to 280 pesos.



Arreglaló consists of a network of more than 100 branches in 23 states of the Republic.

* Mind that only 50 Mexicans participated in the survey. Thus, the results are only indicative and not necessarily representative of the population as a whole.

Repair and Remanufacture



Smartphones

Overview

In Mexico, there are many **unofficial repair stores** for electronic devices. Finding a repair offer is less of a problem here than the **security** of the repair itself. It can happen that a cell phone handed in for repair is returned repaired but incomplete because components have been removed as spare parts for another cell phone. Thus, there is a lack of legal and trustworthy repair offers.

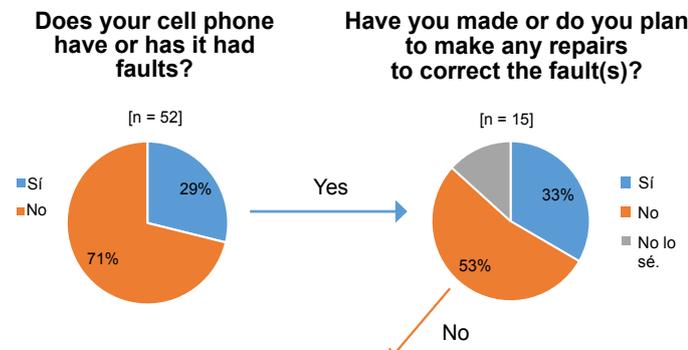
According to a survey conducted for the purposes of this document, only 33% of Mexicans surveyed who had ever had a defect in their smartphone had it repaired. Thus, the majority did not have it repaired.* The most frequently given reason for not having a repair was that it was too time-consuming. The second most frequently cited reasons were that a repair would be too expensive and that replacing the broken smartphone was preferred over a repair.

Example

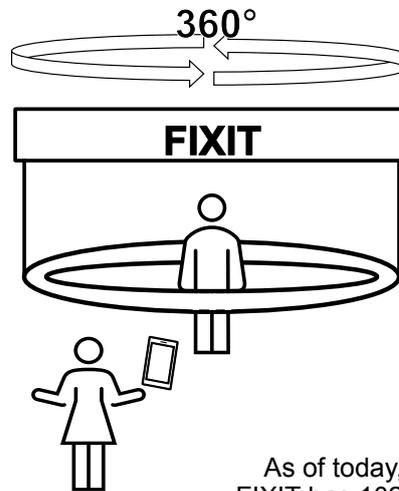
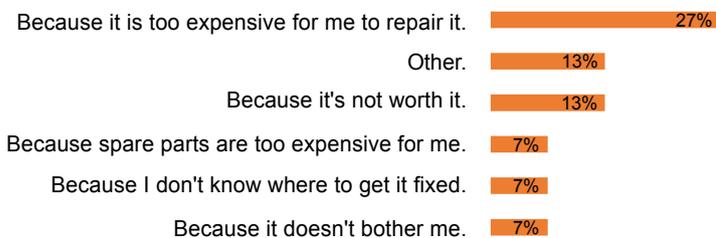
FIXIT

...was born out of **people's need of a trustworthy repair service.**

As a response to this urge of reliability, their shops are located inside of malls; **comfortable and reachable** business fluent spaces.



Why didn't you repair the fault(s)?



The repair service is offered in little repair kiosks with a **360-degree view** design, enabling the customer to directly observe the repair process.

As of today, FIXIT has 102 stores and is represented in 15 Mexican states.



Fig. 9: Repair behavior of smartphone users in Mexico (based on 50 survey respondents).

* Mind that only 50 Mexicans participated in the survey. Thus, the results are only indicative and not necessarily representative of the population as a whole.

Sufficiency and Design Strategies



Clothing

Overview

Clothing companies dedicated to producing sustainable and durable clothing represent a growing niche in Mexico.¹¹ Brands dedicated to sustainable design such as 'Amor & Rosas', 'Someone Somewhere' and 'Oni Original' use recycled materials, natural fibre fabrics and produce their garments in a way that makes them more durable.¹²

Looking at sufficiency business models, the Mexican traditional fashion production companies are to be mentioned. Clothing produced by hand and locally is a counter-proposal to fast fashion and represents a sustainable and responsible consumption.¹³

In 2019, there were 43,861 companies operating in the traditional fashion sector in Mexico, according to the National Institute of Statistics and Geography of Mexico (INEGI). These companies generated 10% of the GDP of the manufacturing sector. Ninety percent of them are small and micro enterprises, which shows that it is a very fragmented market. They are mainly located in Mexico City (24.5 %), the State of Mexico (19.4 %) and Puebla (8.7 %).¹⁴

Example

Alejandra Raw Project

...is a Mexican company that tries to promote sufficient and sustainable fashion by producing **atemporal collections** and contributing to a more aware and just fashion culture.

Their clothings are based on...



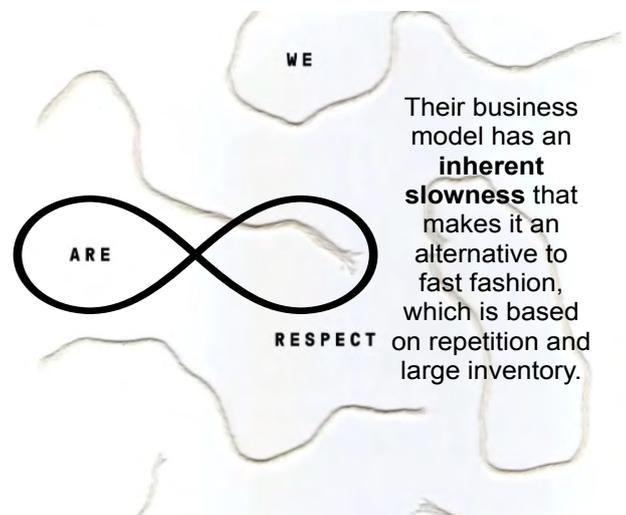
... natural raw materials



... artisanal production processes



... unique design



Sufficiency and Design Strategies



Smartphones

Overview

In Mexico, there are a handful of smartphone manufacturers, among them Lanix, M4Tel, STF, Nyx Mobile, Senwa, Solone, Bmobile, F2 Mobile, Inco y OnePlus. Some have physical stores in the country, others only sell through e-commerce or retail sites. However, according to this research, only one brand focuses on sustainable design. In addition, there are also international brands on the Mexican market that produce sustainable smartphones. These include Fairphone and Shiftphone, both of which have already been mentioned in this document.

In addition, an ECO rating system for smartphones was introduced in Mexico. The seal assesses the environmental impact of the entire manufacturing, use and recycling process of mobile phones. The rating is based on 100 criteria that analyse social and environmental aspects, resulting in a final score on a scale of 1 to 5 (1 being the worst rating). The aim is to provide users with detailed and transparent information about the devices they want to acquire to help them make more sustainable consumption choices. ^{15,16}

The Eco Rating initiative was jointly launched by Deutsche Telekom, Orange, Telefónica (under the O2 and Movistar brands), Telia Company and Vodafone. At European level, Eco Rating was rolled out across Europe in June 2021 and includes phone models from 12 operators. Grupo Telefónica wants to extend this initiative to all the countries where it is present in order to establish this seal worldwide and make it a global standard.

Although the rating system is not a business model, it is mentioned here as a sufficiency strategy.

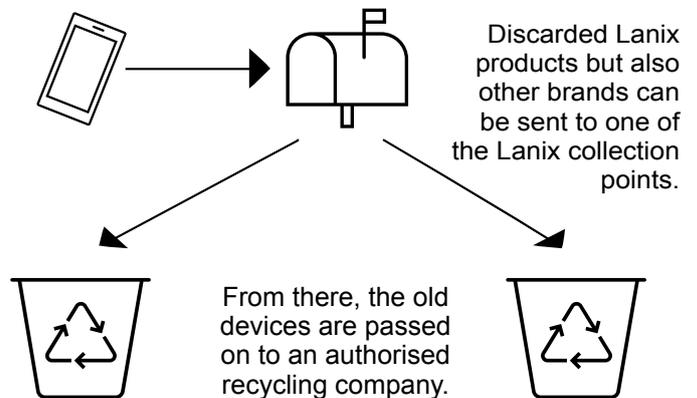
Example

Lanix

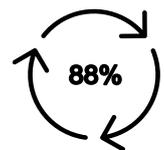
...is a Mexican company, manufacturer and national distributor of computer equipment and mobile phones founded and based in Hermosillo, Sonora.



The company has an ISO 14001 certified environmental management system and strives to manufacture its products in an environmentally friendly manner.



The company itself has over 88% of its generated waste recycled.



Endnotes

1. Fondo Multilateral de Inversiones; IE Business School (2016): *Economía colaborativa en América Latina*. Available online at <https://publications.iadb.org/es/economia-colaborativa-en-america-latina>, checked on 8/19/2021
2. Fondo Multilateral de Inversiones; IE Business School (2016): *Economía colaborativa en América Latina*.
3. Forbes (2017) 'Ropa de segunda mano, un mercado de 4,300 mdd al año', *Forbes México*, 6 April 2017. Available online at <https://www.forbes.com.mx/ropa-segunda-mano-mercado-4300-mdd/>, checked on 8/23/2021
4. Cantera, S. (2020) 'Pandemia impulsa el mercado de ropa y accesorios de segunda mano', 29 October 2020. Available online at <https://www.eluniversal.com.mx/cartera/pandemia-impulsa-el-mercado-de-ropa-y-accesorios-de-segunda-mano>, checked on 8/23/2021
5. Ayala, M. L. (2020) 'Crece venta de ropa usada por plataformas digitales en el país', *América Retail*, 28 October 2020. Available online at <https://www.america-retail.com/mexico/crece-venta-de-ropa-usada-por-plataformas-digitales-en-el-pais/>, checked on 8/23/2021
6. Deloitte *Estudio: Hábitos de los consumidores móviles en México, 2019: El desarrollo de los dispositivos móviles no se detiene y promete un escenario de nuevas posibilidades para los consumidores*. Available online at <https://www2.deloitte.com/content/dam/Deloitte/mx/Documents/technology/Global-Mobile-Consumer-Survey.pdf>, checked on 7/11/2021
7. Michaca, G. (2019): 'Smartphones de "segunda mano", ventana de riesgo', *consumoTIC*, 29 November 2019. Available online at <https://www.consumotic.mx/tecnologia/smartphones-de-segunda-mano-ventana-de-riesgo/>, checked on 8/23/2021
8. Rmn, E. (2015) '¿Compras un smartphone usado? Mira estos consejos', *Xataka México*, 2 June 2015. Available online at <https://www.xataka.com/celulares-y-smartphones/compras-un-smartphone-usado-mira-estos-consejos>, checked on 8/23/2021
9. Verizon (2021): *How to Choose a Phone: Certified Pre-Owned vs. Refurbished vs. Pre-Owned*. Available online at <https://www.verizon.com/articles/certified-pre-owned-refurbished-and-used-phones-guide/>, checked on 8/23/2021
10. Verizon (2021): *How to Choose a Phone: Certified Pre-Owned vs. Refurbished vs. Pre-Owned*.
11. Dannemann, V. (2020): 'México ante el desafío de la moda sostenible', *DW*, 15 February 2020. Available online at <https://www.dw.com/es/m%C3%A9xico-ante-el-desaf%C3%ADo-de-la-moda-sostenible/a-52384810>, checked on 8/24/2021
12. Espinosa, A. (2019): 'Moda ecológica: vestir sin dañar el planeta', *Newsweek Mexico*, 10 November 2019. Available online at <https://newsweekspanol.com/2019/11/moda-ecologica-vestir-sin-danar-planeta/>, checked on 8/24/2021
13. Dannemann, V. (2020): 'México ante el desafío de la moda sostenible'
14. ICEX (2020): 'Moda sostenible en México'. Available online at <https://www.icex.es/icex/es/navegacion-principal/todos-nuestros-servicios/informacion-de-mercados/paises/navegacion-principal/el-mercado/estudios-informes/ficha-sector-moda-sostenible-mexico-2020-doc2020867892.html?idPais=MX>, checked on 8/24/2021
15. Movistar: Eco Rating. Available online at <https://www.movistar.com.mx/ecorating>, checked on 8/24/2021
16. Reinhardt, M. (2021): 'Einführung eines neuen branchenweiten Eco Ratings für Mobiltelefone'. *Telekom Medien*, 25 May 2021. Available online at <https://www.telekom.com/de/medien/medieninformationen/detail/einfuehrung-eines-neuen-branchenweiten-eco-ratings-fuer-mobiltelefone-628098>, checked on 8/23/2021

5

Green House Gas Savings

Smartphones

Textiles

Order of magnitude of
savings

This chapter examines how many greenhouse gas (GHG) emissions (expressed in CO₂ equivalents (CO₂e)) could potentially be saved in Mexico if the two product groups (smartphones and textiles) were used longer. To calculate the potential savings, two things need to be known: first, how many GHG emissions are associated with the product groups at current usage times, and second, how many would be associated with extended usage times. The GHG emissions of a product can be calculated using a life cycle analysis (LCA). During a LCA, all phases of a product's life cycle can be examined in terms of the emissions associated with them: From raw material extraction, production, transportation, through the use phase to end-of-life treatment.

For calculating the GHG saving potential, LCA data from existing studies were used that have examined GHG emissions for the life cycle of a smartphone and a pair of jeans (chosen as representatives example for "textiles"). However, the studies only provide data for one unit quantity of the product (i.e., one smartphone and one pair of jeans). In order to make statements about how large the savings could be for Mexico, the data therefore still had to be extrapolated to the Mexican population.

The climate impact of a smartphone

What difference does usage time extension make to the climate?

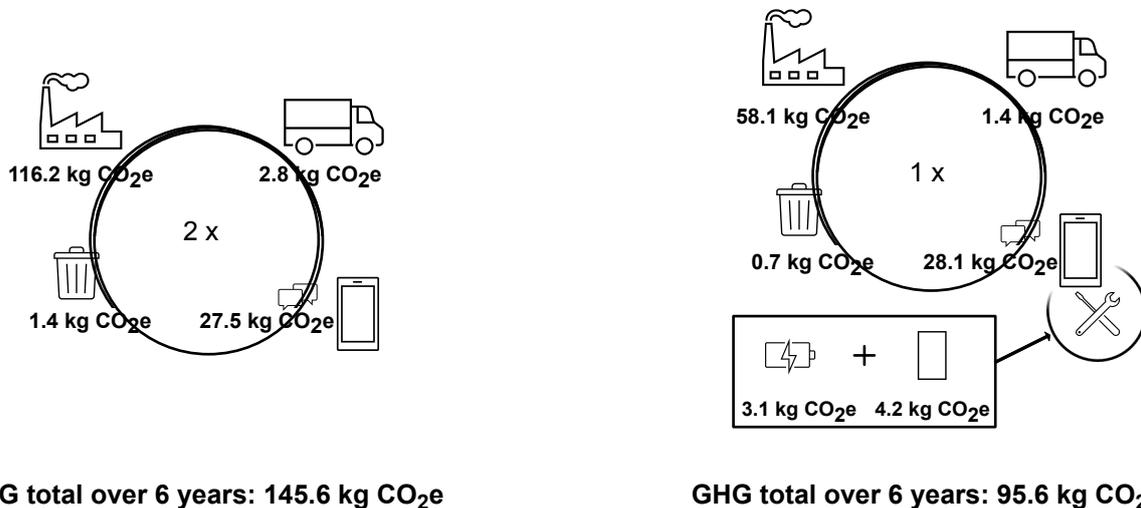


Source: Apple 2020

Using existing LCA data for an iPhone 12¹, this section compares **how many GHG (expressed in CO₂ equivalent (CO₂e)) are generated over six years** if a user replaces his or her smartphone **every three years** (as is the case in Mexico today) or if he/she uses it **for the full six years**. In the later, it is assumed that the user will need to **replace the smartphone's battery and display** once to maintain the device's functionality. In this case, the GHG emissions associated with the production of a new battery and a new display are also taken into account. To calculate emissions during the use phase, electricity consumption was assumed to be 10 kWh/yr per device and emissions were calculated using projected emission factors for the Mexican electricity mix from 2021 - 2026². It is assumed that electricity consumption of a smartphone decreases by 1.5% annually with technological progress³. This was considered in the first scenario, two smartphones in 6 years.

Scenario 1: Two Smartphones in 6 years

Scenario 2: One Smartphone in 6 years



A doubling of the usage time leads to a **saving of around 50 kg of greenhouse gases** over the observation period of 6 years. This corresponds to an annual saving of around 8 kg CO₂e per user. There are about **84.4 million smartphone owners** in Mexico. Figure 10 shows **how much greenhouse gases could be saved if 30% of Mexican smartphone users would decide to extend the period of use from 3 to 6 years** (see Fig. 10).

Emissions of respective Scenario ■
Savings through extended use □

If 30% of Mexicans were to choose a **repair** or, a **second-hand** device instead of buying a new one, and thus consume one smartphone instead of two within 6 years, this would save around **1.3 million tonnes of CO₂e** over this period. This corresponds to an annual saving of 0.2 million tonnes of CO₂e.

GHG emissions over 6 years

[in million tonnes CO₂e]

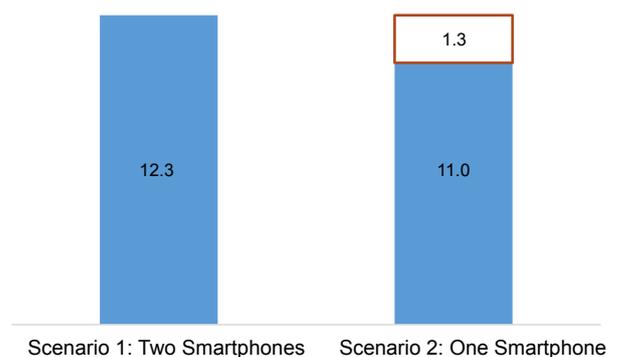


Fig. 10: GHG total for Mexican smartphones over a 6-year period.

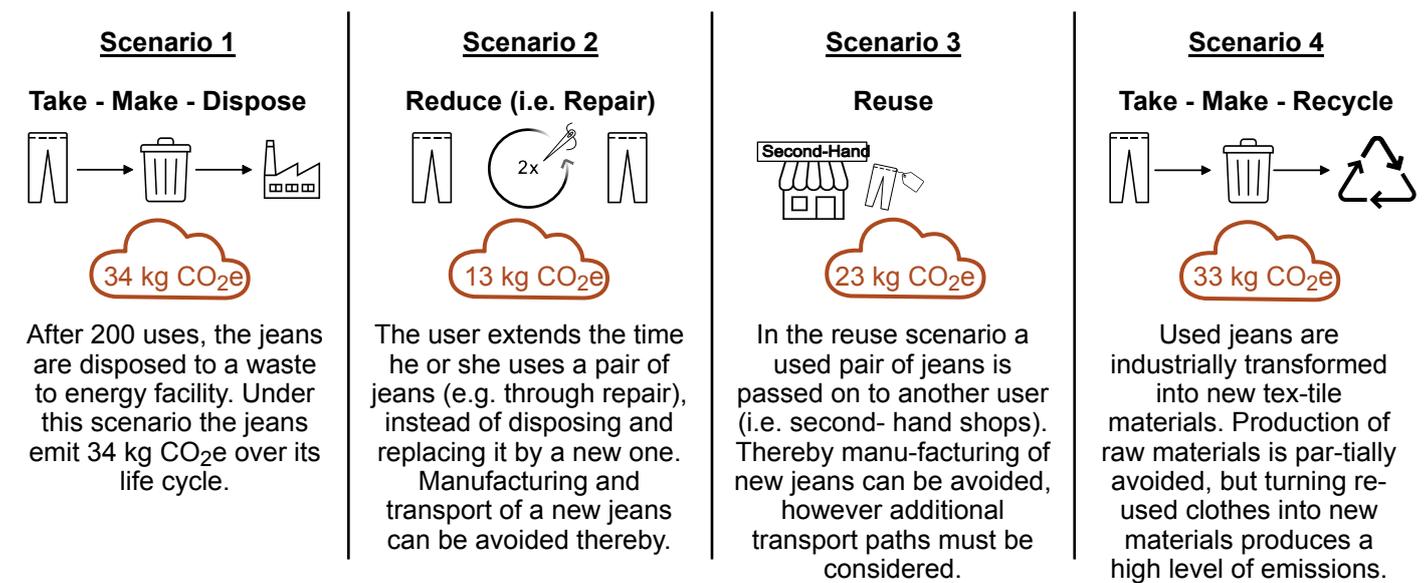
The climate impact of textiles

Does extending the time a jeans is worn contribute to climate protection?

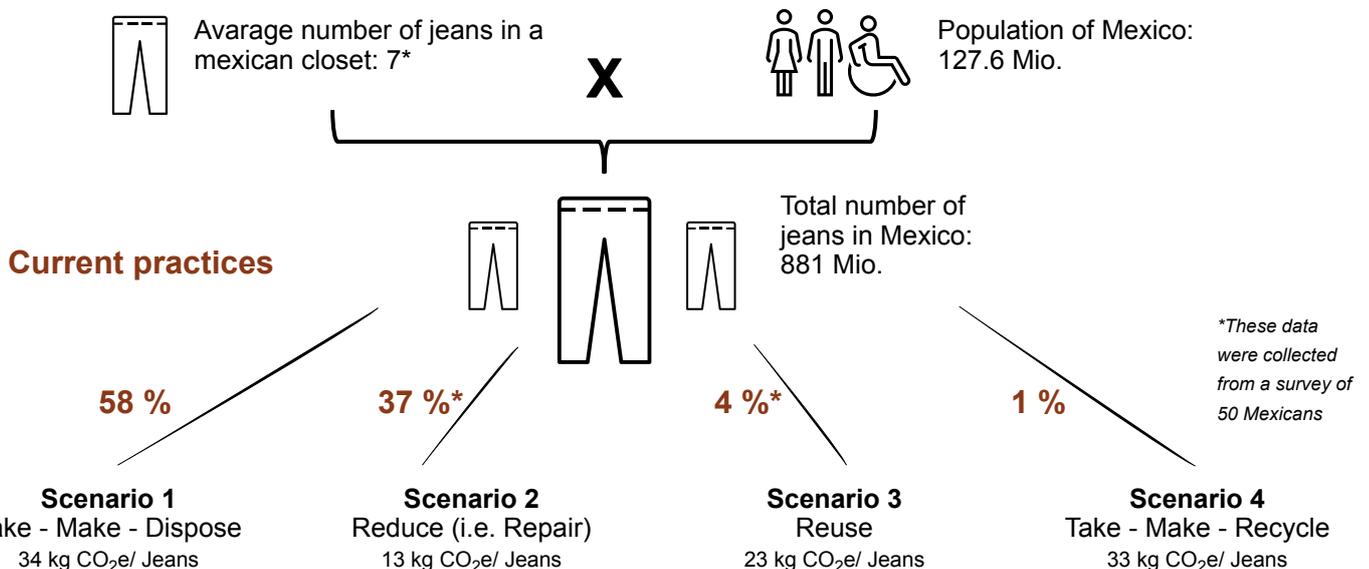


The **usage time and end-of-life management** of a pair of jeans has an influence on the greenhouse gas emissions (expressed in CO₂ equivalent (CO₂e)) that can be attributed to its life cycle. Here, an existing study⁴ on the climate impact of a pair of jeans under different use and end-of-life scenarios is used to show **how much CO₂e can potentially be saved by extending the usage time**. The examined scenarios, in which the jeans were worn longer, are compared to the scenario in which the jeans are disposed of after an average use of 200 times. In this last case, the jeans can either be incinerated in a waste-to energy facility or recycled.

Greenhouse gas emissions of a pair of jeans under different scenarios of use & end-of-life⁴



In order to estimate the greenhouse gas saving potential for Mexico, it is necessary to know **how many jeans are included in each scenario**. To this end, a survey was carried out to determine how many pairs of jeans an average Mexican user owns and how many of them were used for longer (scenario 2) and as second-hand (scenario 3). For scenario 4, it is assumed that only 1% of textiles are recycled back into textiles.⁵ Based on the difference between the total stock of jeans in Mexico and those that enter into scenario 2,3, and 4, the amount of jeans that enter into scenario 1 can be calculated.



* Mind that only 50 Mexicans participated in the survey. Thus, the results are only indicative and not necessarily representative of the population as a whole.

The climate impact of textiles

Knowing how many jeans are included in each scenario and how much greenhouse gases are associated with each scenario, the greenhouse gas emissions for the Mexican jeans stock under current practices can be calculated (see Fig. 11). The saving potential resulting from enhanced usage times (improved practices) is calculated based on the assumption that the **proportion of jeans being repaired and worn longer (scenario 2) could increase to 50%**, and **the proportion being reused (scenario 3) to 30%**. Accordingly, 19% of jeans would go to final disposal after one lifespan (scenario 1) and 1% would be recycled (scenario 4).

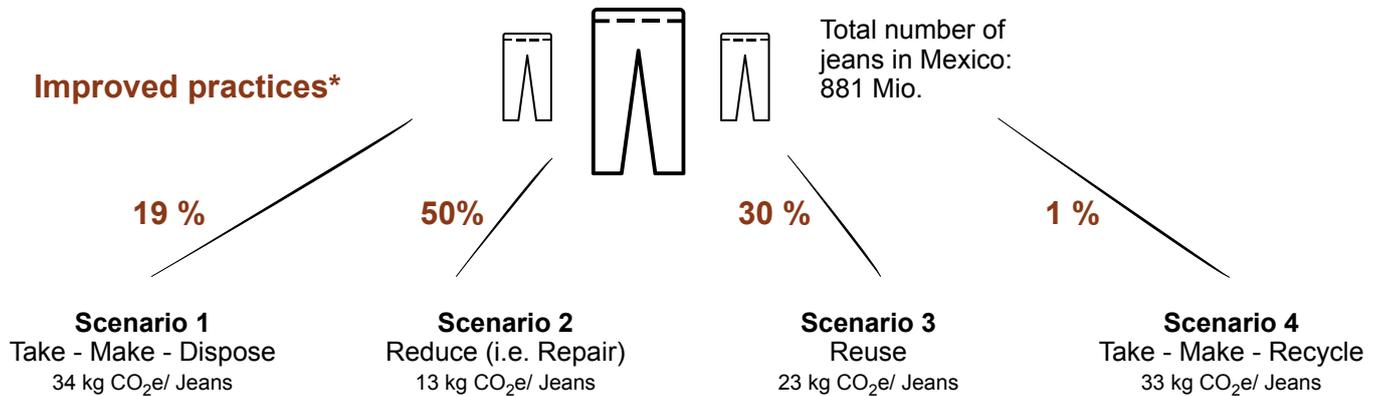


Figure 11 compares how much GHG emissions are associated with each scenario under current practices and compares these with the potential emissions with improved practices of usage time extension. Under current practices of use and end-of-life-scenarios, the **GHG emissions for the Mexican jeans stock totals about 22.7 million tons of CO₂e**. If the proportion of repaired jeans for longer use (scenario 2) or reused through second-hand purchasing (scenario 3) were increased as assumed above, **4.9 million tons of CO₂e could be saved**.*

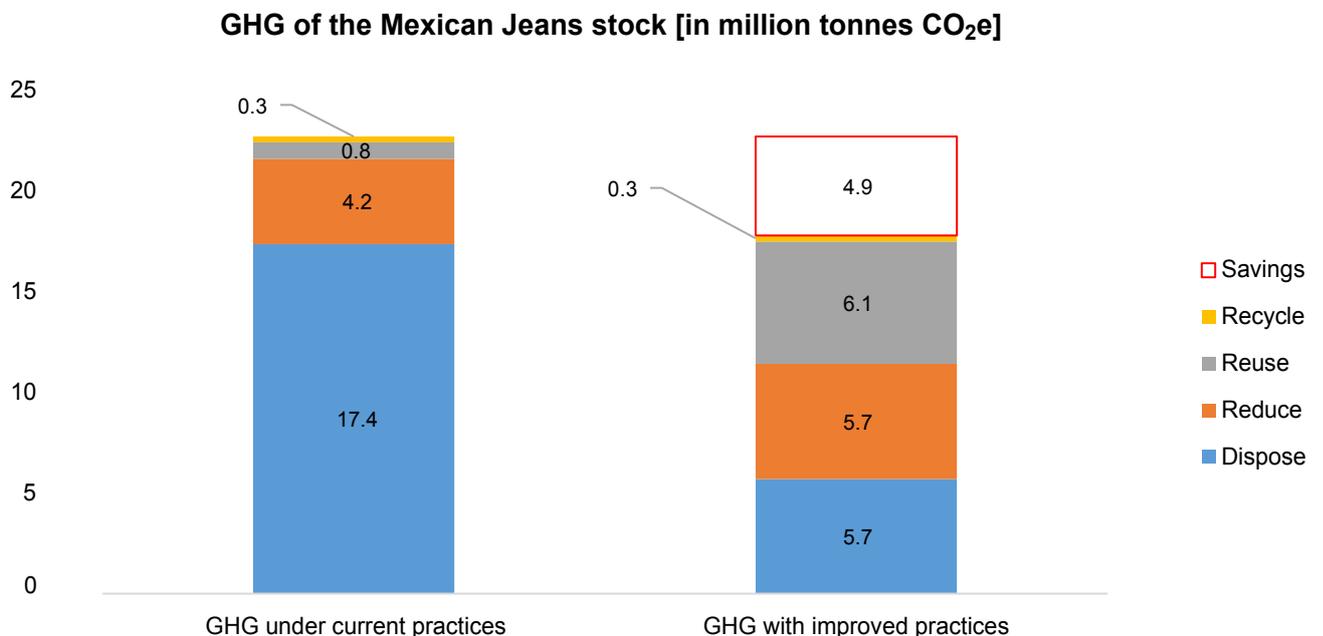


Fig. 11: GHG under current practices and with improved practices of jeans usage

*open online survey diffused through social media and e-mail conducted online from July to August 2021. It should be noted that the assumptions about the current share of jeans in each scenario were made based on a survey of 50 Mexicans and are indicative assumptions for the purpose of the estimation of the greenhouse gas saving potentials.

Order of magnitude of savings

Significance of the numbers based on a comparison...

In the previous calculations, it was found that extending the usage time of smartphones could save around 1.3 million tons of CO₂e, while wearing jeans longer would save even about 4.9 million tons. But is that a significant amount now? To get a sense of the magnitude, the GHG emissions saved are compared with the average per capita emissions of a Mexican.



3.74 tons CO₂e per person⁶



4.9 million tons CO₂e saved

corresponds to the annual per capita emissions of:

1,310,160 Mexicans



1.3 million tons CO₂e saved

corresponds to the annual per capita emissions of:



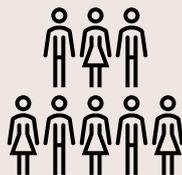
347,593 Mexicans



How many per capita emissions does the savings equal?

Extending the usage time of smartphones and jeans could save GHG emissions on the order of the combined annual per capita emissions

of about 1.6 million Mexicans.



Endnotes

1. Apple (2020): Product Environmental Report iPhone 12. Available online at: https://www.apple.com/environment/pdf/products/iphone/iphone_12_PER_Oct2020.pdf, checked on 8/28/2021
2. INECC. (2021). Estimación de costos y beneficios asociados a la implementación de acciones de mitigación para el cumplimiento de los objetivos de reducción de emisiones comprometidos en el Acuerdo de París. Instituto Nacional de Ecología y Cambio Climático (INECC), México.
3. Gröger, J. et. Al (2021): Produkte länger nutzen: Mit zirkulären Ansätzen die Umwelt entlasten. *Wissen. Wandel. Berlin. Report Nr. 8*. Available online at: <https://ecomet.berlin/ergebnis/produkte-laenger-nutzen-mit-zirkulaeren-ansaetzen-die-umwelt-entlasten>, checked on 8/31/2021
4. Levänen, J., Uusitalo, V., Härri, A., Kareinen, E. and Linnanen, L. (2021) 'Innovative recycling or extended use? Comparing the global warming potential of different ownership and end-of-life scenarios for textiles', *Environmental Research Letters*, vol. 16, no. 5, p. 54069.
5. Botta, V. (2021) *Durable, repairable and mainstream How ecodesign can make our textiles circular*. Available online at <https://ecostandard.org/wp-content/uploads/2021/04/ECOS-REPORT-HOW-ECODESIGN-CAN-MAKE-OUR-TEXTILES-CIRCULAR.pdf>, checked on 7/6/2021
6. The World Bank: Data - CO2 emissions (metric tons per capita) - Mexico | Data (2021). Available online at <https://data.worldbank.org/indicator/EN.ATM.CO2E.PC?locations=MX>, checked on 9/13/2021

6

Recommendations

Based on the previous results, this section presents recommendations for Mexico's regulatory framework in order to extend the usage time and lifespans of products. The categories for policy instruments presented in Chapter 2 will be compared with the current Mexican legislation. In addition, suggestions will be made on how the current legal framework should be strengthened in order to effectively promote extended usage times and product lifespans. Furthermore, it will be shown how the recommendations can strengthen the business models that have been presented in Chapter 3. For each recommendation, an example is given of countries that are already implementing the respective measure. All these examples can be found in detail in Chapter 2 under "Policy Instruments - Good Practices"

Recommendations

Recommendations for Mexican legal framework to enhance usage time & lifespan of products

Influence on business models



Legal guarantees

Under Mexican consumer protection law, there is a sixty-day guarantee on goods and services. This short period does not have an incentivizing effect on the production of durable goods. Consequently, it is recommended that the guarantee period be aligned with the expected lifespan of the products. The guarantee law should also regulate that repairs should have priority over replacements. Furthermore, it should be stipulated that independent but qualified repairers should be involved in repair services.

A guarantee period based on the expected lifespan of products can promote the business model "Design Strategies" in particular. But also repair business may benefit from it, as the customer has a right to repair service during the guarantee period.



Example of implementation

Finland and the Netherlands based the length of the legal guarantee on the expected lifespan. See p. 17



Manufactures warranty

Although the law requires a minimum of 60 days, in practice cell phones and other electronic devices often are offered with a commercial warranty of one-year. It is recommendable to oblige manufactures to make mandatory statements on the length of the commercial warranty. This would be a supplement to the legal guarantees.

The additional warranty could promote repair business, in case independent repairers are involved in repair services.



Example of implementation

In the EU, the Ecodesign Directive (Directive 2009/125/EC) stipulates that refrigerating appliances with a direct sales function should declare information related to a guarantee which might facilitate repairs, where defects occur. This information includes the duration of the warranty. See p. 17



Ecodesign criteria

The Mexican government can issue standards that establish criteria for the environmental and technological efficiency of the materials used to make products. There is already a standard that considers ecodesign specifications: "NMX-SAA-14062-IMNC-2010, Gestión ambiental - Integración de aspectos ambientales en el diseño y desarrollo de productos." However, compliance with such standards is voluntary. Making ecodesign criteria mandatory, such as design for repair or design for durability, would directly contribute to an extension of product lifespans and could regulate the market by phasing out products that do not meet the criteria.

Binding eco design criteria can promote the business model "Design Strategies" in particular. The "Repair and Remanufacture" business model also benefits from the requirement for repair-friendly design.



Example of implementation

European Ecodesign Directive defines mandatory sustainability criteria on certain product groups. See p. 17

Recommendations for Mexican legal framework to enhance usage time & lifespan of products

Influence on business models



Regulations against planned obsolescence

Currently, there is no legal regulation on how to deal with planned obsolescence. In the case of smartphones it is to say, that the vast majority of cell phones in Mexico are imported and those produced in the country are only assembled. Hence, a regulation prohibiting programmed obsolescence would not have any practical application. Nevertheless, a bill for such a regulation is already in works. However, regulation of planned obsolescence in the form of criminal sanctions is viewed critically by many experts, as it is extremely difficult to prove that the market participant intentionally shortens the lifespan of its product with the aim of increasing the replacement rates of the same. Accordingly, such a law would primarily have a symbolic effect.¹

Symbolic effect to discourage bad design practices

Example of implementation

The France - Consumption Code (Article 19 L111-4) punishes planned obsolescence with a prison sentence or a fine of 300,000 euros.

See p. 17



Duty to provide spare parts

An obligation to keep spare parts on hand is stipulated in the Mexican consumer protection law. The period during which this obligation applies is the guarantee period, which, in any case, is limited to 60 days. However, the Ministry of Economy (Secretaría de Economía, y Procuraduría) may require that a longer period be granted for the supply of parts and spare parts, taking into account the durability for certain products. It is not further defined for which products this applies and how much longer the obligation to keep spare parts in stock exists in this case. A clearer definition of this obligation would therefore be recommended, with terms based on the expected product lifespan. Furthermore, non-discriminatory access to spare parts should also be guaranteed for independent repairers.

The stocking and provision of spare parts has a particularly positive effect on the business model "Repair and Remanufacture".



Example of implementation

Brazil - Law 8078/1990 obliges manufacturers and importers to ensure the supply of spare parts until the manufacturing or importation of the product ceases.

See p. 17



Duty to provide software updates

There is currently no such commitment. In order to counteract functional obsolescence, or more specifically software-induced obsolescence, such an obligation should be enacted.

The obligation to provide software updates would have a positive impact on the business model "Repair and Remanufacture" of smartphones and on the provision within PaaS models (for example Fairphone p. 23).



Example of implementation

European Union - Digital Content Directive (Directive 2019 / 770) and Sales of Goods Directive (Directive 2019/771) oblige that the trader of digital contents or digital services shall ensure that the consumer is informed of and supplied with updates, including security updates, that are necessary to keep the digital content or digital service in conformity.

See p. 18

Recommendations for Mexican legal framework to enhance usage time & lifespan of products

Influence on business models



Right to repair

A right to repair exists only during the 60-day guarantee period and is not comparable to the Right to Repair as enforced in the USA. In order to have a positive impact on the longevity of products, the existing right should therefore be extended both in terms of time and at the actor level. This means that independent repairers should have the right to access maintenance and repair information, as well as spare parts, repair tools and diagnostic software, all at a reasonable price.

The Right to Repair strengthens independent repairers and thus promotes the "Repair and Remanufacture" business model.



Example of implementation

USA - Motor Vehicles Owners Right to Repair Act requires automobile manufacturers to provide repair tools and information to independent repairers. See p. 18



Economic instruments

Economic instruments such as tax reductions, tax credits or subsidies to promote repairable, second-hand and durable products or consumption practices that allow products to last longer, do not yet exist. Financial support for reuse, repair, sharing, leasing and renting of textiles or smartphones could reduce costs, depending on the type of support, for companies on the supply side or for consumers on the demand side and thus increase the attractiveness of such business models and consumption practices.

Economic incentives, such as tax reduction, tax credits or subsidies for businesses, providing reuse, sharing, leasing and renting of textiles or smartphones would increase their competitiveness as they would be able to lower the prices of their products and services.²



Example of implementation

Sweden - VAT-reduction for second-hand & repair businesses and tax break for consumer using repairs See p. 18



Information on repairability or durability

A binding requirement to declare repairability and durability, e.g. as in the case of the French repair index, does not exist in Mexico. However, labeling products with this kind of information can influence consumers to prefer durable and repairable products over short-lived and poorly repairable products. Thus, the latter would lose attractiveness and producers would have an incentive to consider durability and repairability in product design. It is therefore recommended that information on repairability and durability be made mandatory for manufacturers and sellers in the form of standardized and uniform product labeling.

Declaring repair and durability properties directly on the product can promote the business model "Design Strategies". The repair market can be strengthened as consumers are made aware of repairability at the point of purchase.



Example of implementation

France - Environmental Code Article 16 L 541-9-2 introduces the "repairability index" See p. 19

Recommendations for Mexican legal framework to enhance usage time & lifespan of products

Influence on business models



Consumer education

There are already various programs and actions in the field of sustainability education that target different population groups and address topics such as sustainable consumption, taking into account the product life cycle. However, it is recommended that alternative consumption practices such as Sufficiency and the associated business models (PaaS, Second-Hand, Repair & Remanufacture and Sufficiency & Design) be more emphasized and promoted among the population. Furthermore, an understanding of the connection between the circular economy and climate protection should also be established among policy makers. The aim here is, that circular economy principles are integrated into the definition of Mexicans international climate goals.

Increasing awareness of the impact of shortened usage times and product lifespans can promote alternative consumption practices. All four of the business models listed here could benefit from this.



Example of implementation

Germany - National Program f. Sustainable Consumption lists a set of measures to promote sustainable production and consumption in Germany.

See p. 19



Green public procurement

The Mexican law regulating public procurement (Law of acquisitions, leasing and services of the public sector (LAAPS)) provides, among other things, for the establishment of procurement, leasing and services committees that define sustainability criteria for procurement. The reduction of greenhouse gases is explicitly mentioned. It is therefore recommended that criteria for reparability, reusability and durability be included as a sustainability criterion.

The influence on the business models depends strongly on the defined criteria. If reparability, durability and reusability are taken into account, the business models "Design Strategies", "Repair and Re-manufacture" and "Second-Hand" can benefit. PaaS models can be strengthened if, for example, office electronics are leased rather than purchased.



Example of implementation

Germany - Circular Economy Law (Closed Substance Cycle Waste Management Act KrWG) and Climate Change Act (KSG) establishes criteria that promote durable, repairable and reusable products in public procurement.

See p. 20

Recommendations for Mexican legal framework to enhance usage time & lifespan of products

Influence on business models



Extended producer responsibility (EPR)

Cell phones, as well as clothing, trimmings and cotton rags that are discarded at the end of their usage time are special management waste that must present a management plan. Provided that the waste is produced by a single generator in a quantity greater than 10. However this EPR scheme only regulates the end-of-life phase. Upstream processes that facilitate the transition to a circular economy, such as design for durability, repairability and reusability are not considered. Sustainability experts call for an EPR system that primarily promotes durability, reuse, and repair in accordance with the waste hierarchy - rather than focusing solely on the end-of-life phase. This could be implemented, for example, by specifying the manufacture and design of products through criteria such as durability, reusability and repairability.⁴ Another option is the introduction of an EPR eco-modulation fee, that varies according to how well certain criteria are met in terms of environmental product performance. In the latter, products fulfilling these criteria are charged at a lower rate to incentivize ecodesign.⁵

An EPR scheme that promotes durability, reuse, and repair and sets requirements for the design phase in addition to the end-of-life phase can strengthen the business models “Design Strategies”, “Second-Hand” and “Repair and Remanufacture” .



Example of implementation

European Union - Directive on waste electrical and electronic equipment (WEEE) (Directive 2012/19/EU) introduces producer responsibility with the aim to ensure that electrical and electronic equipment is designed and produced in such a way that its repair, possible upgrading, reuse, disassembly and recycling are fully considered and facilitated.

See p. 20

Endnotes

1. Keimeyer, F., Brönneke, T., Gildeggen, R., Gsell, M., Prakash, S., & Schmitt, R. (2020). Weiterentwicklung von Strategien gegen Obsoleszenz einschließlich rechtlicher Instrumente. *Umweltbundesamt*

2. Watson, D., Gylling, A. C., & Thörn, P. (2017). Business models extending active lifetime of garments: supporting policy instruments. *Mistra Future Fashion report*.

3. Secretaría de la Función Pública (2017): Contrataciones Públicas Sustentables. Acciones y estrategias para mejorar las contrataciones públicas. Available online at: <https://www.gob.mx/sfp/acciones-y-programas/contrataciones-publicas-sustentables>, checked on 9/7/2021

4. BDE (2020): Notwendigkeit einer „Erweiterten Herstellerverantwortung für Textilien“. Available online at: <https://textile-zukunft.de/wp-content/uploads/2014/10/Herstellerverantwortung-f%C3%BCr-Textilien-gemeinsame-Stellungnahme-10.12.2020.pdf>, checked on 9/5/2021

5. Botta, V. (2021) *Durable, repairable and mainstream How ecodesign can make our textiles circular*. Available online at <https://ecostandard.org/wp-content/uploads/2021/04/ECOS-REPORT-HOW-ECODESIGN-CAN-MAKE-OUR-TEXTILES-CIRCULAR.pdf>, checked on 7/6/2021

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Appendix

Outlook

Outlook

This section addresses the inconsistencies in the data and assumptions on which the results of this study are based and list the questions that remain open for further research projects.

Open questions that could not or not sufficiently be answered:

- The Consumer survey was based on data from a survey that included only a participant number of 52 Mexicans. However, the data was assumed to be for the entire population. The survey should therefore be repeated with a larger number of participants, or the data replaced with those from more valid sources. The projection of GHG savings had a variety of sources, not just consumer survey.
- Little data could be found that describe the Mexican business models and their relevance in the Mexican market. In some places, therefore, reference was again made to the survey. The same uncertainties as mentioned above apply.
- The analysis of the Mexican legal framework is probably incomplete and should be reviewed by experts. Accordingly, the recommendations could also change.
- An analysis of how the recommendations could be implemented, e.g. which laws could serve as a basis, was not part of the study and is pending.