



ENTREPRENEURSHIP MANUAL FOR ZERO WASTE CIRCULAR ECONOMY

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INTRODUCTION

The unsustainable use of natural resources is fuelling multiple planetary crises: resource scarcity, pollution, climate change, and biodiversity loss. More than 100 billion tonnes of materials are consumed in our linear-based systems every year – a little less than the estimated weight of Mount Everest. Only 10 percent of these materials are cycled back into the global economy. Approximately half of all global greenhouse gas emissions occur during the extraction and use of natural resources, such as minerals, metals and biomass. Each year, 5 trillion single-use plastic bags are discarded after a single use, choking our oceans and landfills. The transition from a linear to a circular economy is more critical than ever to transform how we produce and consume and reduce our impact on the planet. An intentional and thoughtful transformation can also help to meet the sustainable development goals.

Imagine you walk into a coffee shop on a cold winter day and order a coffee. The next moment you are handed over your favourite drink, in a disposable cup. This all sounds normal, until you start asking yourself: “Do I really need the disposable cup? What is it made of? What happens to it after I finish the drink in 5 minutes?”.

For a long time, our economy has been built on a linear “take-make-dispose” model, one that has significant impacts on resource depletion, environmental degradation, human health as well as climate change. Responding to the planetary crisis, the concept of circular economy has emerged as an attractive alternative to the current linear model. As governments, businesses and individuals around the world begin to rethink the way we produce and consume, advances in technology will play a critical role in accelerating the transition towards a circular economy.

This manual introduces good practices and real-life examples of circular system models and highlights an integrated approach to achieve the overall economic, social and environmental sustainability of complex infrastructure systems. Realizing a circular economy will require a concerted effort among policymakers, scientists and researchers, and the business community to incentivize investment and bolster the adoption of circular technologies and business models at scale. [22]

In the context of post-pandemic stimulus, it is imperative for governments to consider policies aligned with circular principles in their recovery packages. These include:

- Adopting green fiscal measures to support circular business models by reducing taxes on reuse, repair, remanufacturing and recycling activities, and regenerative food production.
- Removing fiscal subsidies on fossil fuels and introducing market-based mechanisms to put a price on carbon externalities.
- Incorporating circularity criteria into sustainable public procurement schemes.
- Promoting integrated infrastructure planning for a circular economy.
- Fostering local value chains by supporting local businesses, particularly small and medium-sized enterprises (SMEs). [22]

CIRCULAR ECONOMY

What is circular economy?

Circular economy is an economic system aimed at retaining the value of products, materials and resources for as long as possible, thereby minimizing primary resource use, waste and emission (Oberle et al., IRP and UNEP 2019; Hass et al., 2020) [1-3].

As opposed to a linear, “take-make-dispose” model in which natural resources are extracted as raw materials for making products that are quickly thrown away after use, a circular economy seeks to close the loops of energy and material flows by employing strategies such as reuse, repair, refurbish, remanufacture and recycle. In short, a circular economy employs the industrial ecology law to promote resource efficiency and recycling rate in an economy (Zeng and Li 2021) [4].

The linear growth path, which depends on the extraction and consumption of finite resources, is inherently unsustainable. Circular economy redefines growth by decoupling economic activities from resource extraction and designing waste out of the system, thus reducing environmental degradation and improving society-wide well-being. The Ellen MacArthur Foundation, a global influence on, and advocate for circular economy, defines three guiding principles of a circular economy [5].

These are:

- Design out waste and pollution
 - Keep products and materials in use
 - Regenerate natural systems
- Key features and benefits of a circular economy, in comparison to a linear model, are outlined in Table 1.[22]

Table 1: Comparison of a linear and a circular economy

Global challenges	A linear economy...	A circular economy...
Natural resource shortage	is resource-centric, therefore growth is constrained by the finite resource.	decouples economic growth from resource extraction and over-consumption.
Climate change & biodiversity loss	relies heavily on natural resource extraction and processing, which contributes to about half of global Greenhouse Gas (GHG) emissions and more than 90% of biodiversity loss and water stress (IRP 2019).	takes a restorative and regenerative approach to the use of natural resources, thereby reducing environmental impacts, including carbon emissions.
Inequality & well-being	exacerbates global inequality by generating waste and pollution, the burden of which falls disproportionately on poor and vulnerable populations.	minimizes waste and reduces pollution at source by designing externalities out of the system. As we transition to a circular economy, innovative business models could result in a net total of six million new jobs by 2030, compared to a business-as-usual scenario, according to an estimate by the International Labour Organization (ILO) [6] .

Understanding circularity: the “9-R” framework

The framework of circular economy is structured over the whole life cycle of goods and services across wider social and economic perspectives. A useful framework to understand and approach circularity is the “9-R” concept, as illustrated in Figure 1.

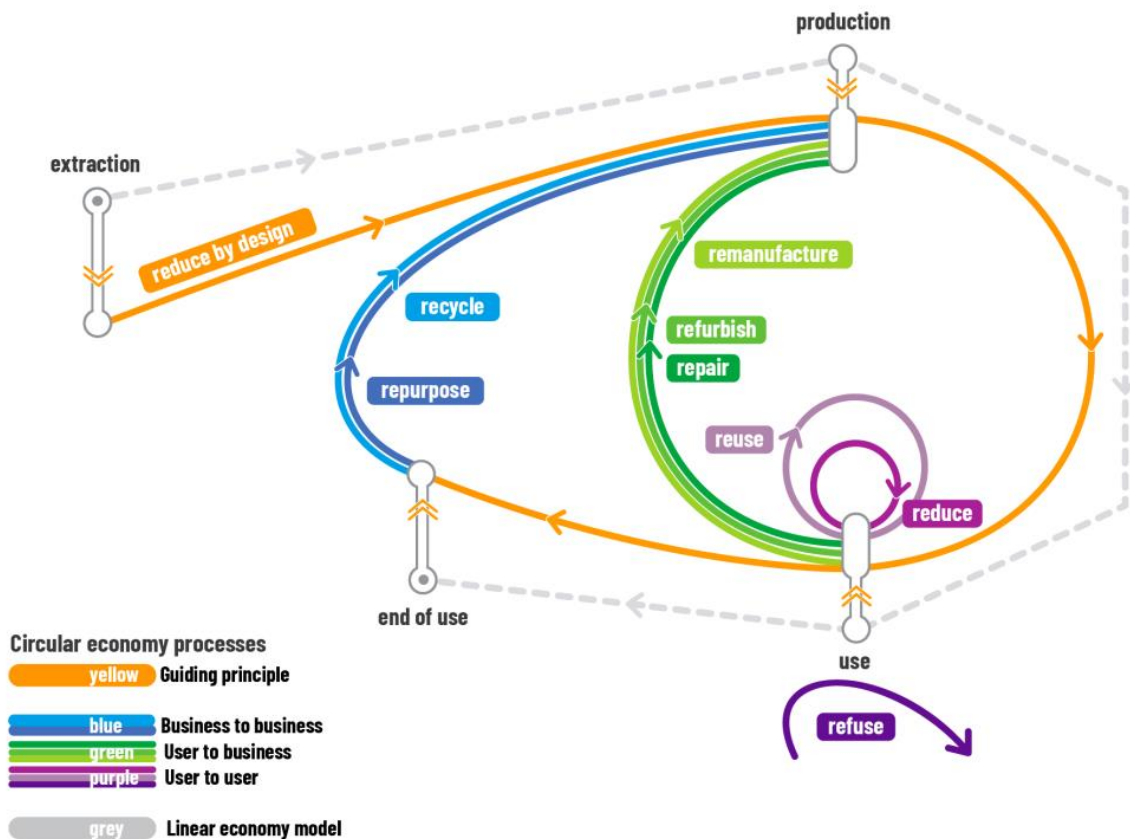


Figure 1: A Circularity approach Source: UNEP Circularity Platform [7]

The 9-R concept is built upon the following four “value retention loops”, from the most impactful to the least:

- From a whole system perspective: Reduce by Design

This is, reducing the amount of material used, particularly raw material, from the earliest stages of design of products and services. This should be applied as an overall guiding principle throughout value chains.

- From a user-to-user perspective: Refuse, Reduce and Re-use

This includes, for instance, consumers saying no to certain products and services, and users choosing to buy less and/or second-hand or using products for a longer time. Consumer behavioural changes at this level can usually be implemented at little or no cost, while sending a strong signal to the market and businesses at the upper value chain to make necessary changes towards a circular economy.

- From a user-to-business intermediary perspective: Repair, Refurbish and Remanufacture

This typically results in the extension of product lifetime, sometimes even a new (or as-new) service life for the product through comprehensive refurbishment or remanufacturing. Such Value Retention

Processes (VRPs) between the user-to-business interface can significantly save costs and lower environmental impacts.

- From business-to-business: Repurpose and Recycle

After a product reaches its End-of-life (EOL), manufacturers may adapt or reprocess the discarded goods, in whole or in part, for another function. Recycling therefore provides a valuable source of material. However, it requires effective collection systems, technologies and infrastructures that are often lacking in many countries.[22]

Towards circularity: where do we stand and what can we do?

Our world is only 8.6% circular, leaving a massive circularity gap [8, 9]. That means, for every 100 billion tonnes of materials we consume in our economy (a threshold that humankind has just crossed in 2020), only 8.6% is cycled back into the economy. However, if the circularity rate is doubled by 2032, we may not only close the gap of wasteful material consumption, but also return to a path towards a well below 2-degree world [10]. A circular economy also offers circular business opportunities that may yield up to US\$4.5 trillion in economic benefits by 2030 [8].

Global efforts to kick-start a circular economy are being rolled out at various levels. In 2019, at the Fourth Session of the United Nations Environment Assembly (UNEA 4), the world's Ministers of the Environment agreed to "advance sustainable consumption and production patterns, through circular economy and other sustainable economic models", and called for innovative solutions to achieve this vision.

The European Union has been a global champion for circular economy and put in place a comprehensive policy framework, including over 60 circularity strategies and roadmaps at regional, national and local levels [11]. The latest effort includes a new Circular Economy Action Plan aimed at accelerating the transformational change required by the European Green Deal.

Circular economy is also gaining traction amongst emerging economies as a viable tool for realizing sustainable growth. In 2009, China adopted its national Circular Economy Promotion Law and spearheaded a national ban on waste imports in 2018, which shed light on the scale and urgency of ending the global flows of waste in the global trade network. India recently formulated a National Resource Efficiency Policy aimed at doubling the recycling rate of key materials in five years and mainstreaming resource efficiency across all sectors and regions of the country.

A global consensus on ending single-use plastic waste is forging. Many countries and cities have announced legislations and rules to ban single-use plastics. Rwanda, for instance, is aiming to become the world's first plastic free nation; since 2008, it has introduced bans on plastic bags and packaging [12]. In 2017, Kenya announced a nationwide ban on single-use plastic bags, and on World Environment Day in 2020, further tightened the ban on any single-use plastics in the country's protected areas [13].

Businesses are following suite. The New Plastic Economy, as per the Ellen MacArthur Foundation, will challenge a linear “thrown-away-after-first-use” business model, which currently leaves US\$ 80-120 billion worth of plastic packaging material value out of the economy [14]. Through the New Plastic Global Commitment, more than 250 businesses across all stages of the plastic packaging value chain have pledged to eliminate plastic waste by 2025, representing more than 20% of all plastic packaging used globally [15].

More broadly speaking, by applying circular economy principles – that is, retaining the value of products and materials for as long as possible and eliminating waste – businesses will be able to reduce their dependence on finite resources, thereby saving cost, unlocking new circular opportunities to grow revenue and staying competitive. For instance, the size of a second-hand (resale) market is expected to grow from US\$28 billion in 2019 to US\$64 billion by 2024[16]. Another study suggests that by shifting the business model of internet routers from selling to renting out, manufacturers in Germany can reduce material loss by 80% and CO2 emissions by 45%, compared with the linear business model [17].

Companies that are most successful at creating circular value seek to incorporate circular business modes with their value drivers through their operations, products and services. Here are five business models for driving a circular economy (Figure 2). [22]

Circular Inputs	Use of renewable energy, bio-based or potentially completely recyclable materials
Sharing Platforms	Increased usage rates through collaborative models for usage, access, or ownership
Product as a Service	Offer of product use with retention of the product ownership at the producer to increase resource productivity
Product Use Extension	Prolongation of product use through repair, reprocessing, upgrading and resale
Resource Recovery	Recovery of usable resources or energy from waste or by-products

Figure 2: Five business modes for a circular economy Source: *The Circular Economy Handbook* [18]

CIRCULAR BUSINESS MODELS/GOOD PRACTICES

8 business cases for circular economy

Successful circular initiatives will reduce dependence on natural resources and will create value for companies and their stakeholders. Through interviews and surveys conducted across 2016 and 2017, WBCSD collected information on specific business cases that companies use for implementing circular projects.

Participants identified eight business cases for the circular economy that accelerate growth, enhance competitiveness and mitigate risk.

Accelerate growth	Enhance competitiveness	Mitigate risk
Gener8: create additional revenue from existing products and services	Captiv8: Enhance customer and employee relationships	Acclim8: Adapt business models and value chain relationships
Innov8: Spur innovation of new products and services	Differenti8: Distinguish from competition	Insul8: Mitigate linear risk exposure
Moder8: Reduce operating costs	Integr8: Align corporate strategy with mission	

Figure 3: 8 Business cases for the circular economy [19]

The survey showed that about 40% of companies implementing the circular economy referenced growth and competitiveness as key business cases, respectively. The final 20% of business drivers cited risk mitigation as the main business driver [19].

Gener8

Create additional income from the existing products and processes Companies can GENERATE revenue from existing products by taking a circular economy perspective on their products, services and operations Specifically, businesses have demonstrated positive contributions to their bottom line by remanufacturing, refurbishing and turning products into services.

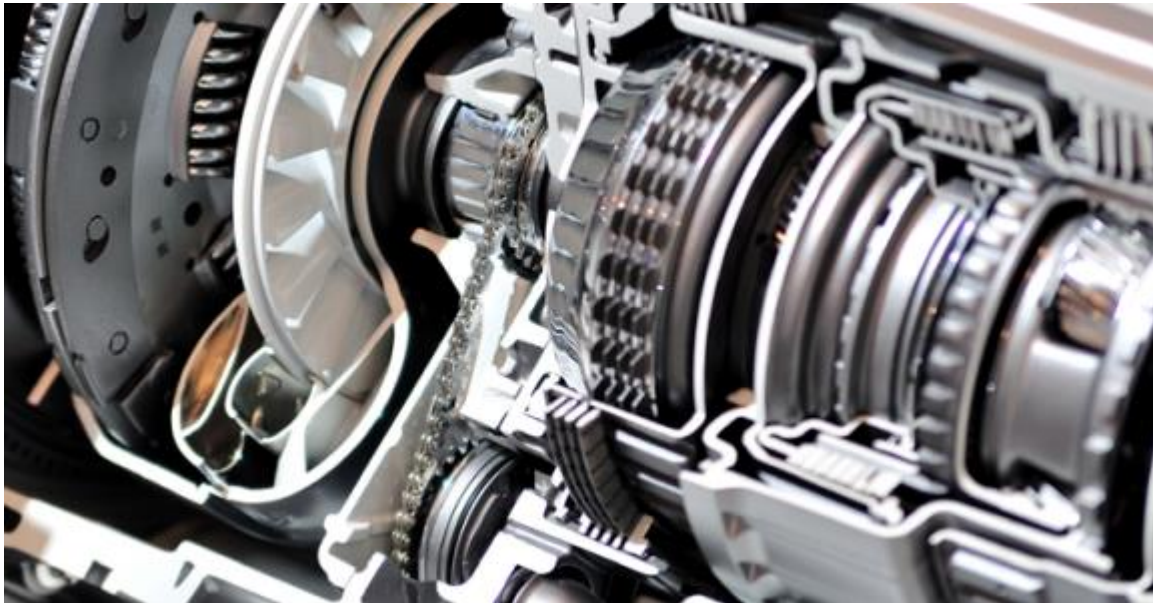
Canon also offers remanufactured multifunction devices as well as refurbished products. The company maximizes value from its manufactured capital by collecting used equipment from the market, remanufacturing it and re-selling it with the same high-quality guarantee as original products.

In reusing at least 80% of the materials, Canon also reduces product greenhouse gas emissions associated with raw materials, parts and manufacturing by more than 80% compared to a newly manufactured product. By capturing the components and materials directly, Canon offers customers a high-quality product with fewer environmental impacts at a competitive price. [19]



Source: [19]

Tata Motors Limited, a USD \$42 billion organization, is a leading automobile manufacturer practicing sustainability and the spirit of “giving back to society” as a core philosophy. One of the company’s highly successful circular economy initiatives is Tata Prolife, a pioneering after-market product support strategy for Tata Motors' customers. Use of Tata Motors Prolife aggregate ensures original equipment-like-performance of the vehicle even after the first life cycle. Tata Motors conducts its reconditioning at Prolife plants in Lucknow and Coimbatore. The ambition is to minimize the product life cycle cost, allowing the company to offer high quality products at a reduced price. Tata Motors’ Prolife business has a wide variety of reconditioned products, from engine long blocks, gear boxes, turbo chargers and air compressors to electrical components such as starter motors and alternators. Tata prolife business reconditions about 23,000 equivalent engines in a year. With such positive results, it is not surprising that Tata Motors’ Prolife is expanding into new facilities at Surat and Hyderabad, India. [19]



Source: [19]

Innov8

Spur innovation of new products and services. Business can INNOVATE new products and services, establishing complementary revenue streams or adopting new business models. Companies have capitalized on innovation opportunities to drive growth through joint ventures, re-evaluating product design or function and disruptive technologies.

SUEZ is the only international company whose activities are exclusively dedicated to solid waste and water management, and it therefore intends to be the leader in sustainable resource management to improve the environmental and economic performance of cities and industries.[23] SUEZ's strategy is based on two main pillars: Transform the Group's activities through innovative solutions that lead the way to circular economy, and open up to new markets across the globe and in new customers' segments.[24] In establishing new revenue streams and services, the company aims to double the volume of plastics recycled by 2020, increase the production of renewable energy from waste and water facilities by 10% and improve alternative water resources supplies.[25] SUEZ has partnered with two companies aiming to capture complementary business lines: innovative recycling solutions with TerraCycle and a new polymer recycling facility in partnership with Chemelot Ventures. Capitalizing on the power of collaboration, SUEZ anticipates its circular economy solutions will allow it to capture more market share and expand into unconventional markets for resource management companies. [19]



Source: [19]

Launched in 2012, **Lyft** is the first peer-to-peer ridesharing platform that unites humanity and technology. Based in San Francisco, California, the company recognized the underused capacity of personal vehicles on the road as an opportunity for direct transportation services at a fraction of the cost of taxis while providing income to drivers. Demonstrating successful implementation of the sharing economy through turning products into services for underused assets, Lyft had 162.5 million rides in 2016, three times the amount in 2015. Lyft launched Lyft Line in 2014, an additional service that uses a real-time on-demand ridesharing model to maximize every seat in the car. Building upon the original Lyft service model that established trust and reliability with consumers, Lyft Line creates more value for customers by offering fare reductions of up to 60% if they're willing to share their ride. [26] As the Lyft platform improves in efficiency, passengers, drivers, local business and communities all stand to benefit from on-demand carpooling. Lyft Line now operates in over 20 cities and gets smarter over time as it better understands how people move around. As the system learns more it can better optimize vehicle rides, Lyft aims to shift society's perception from "needing a car" to "needing a ride." Lyft recently raised another \$600 million USD at a valuation of \$7.5 billion USD as it has expanded operations to 131 additional cities in 2017 alone [19,27].



Source: [19]

Moder8

Reduce operating costs. Companies can MODERATE the resources they use to save money and generate financial gains. Resource reuse, remanufacturing, recycling, by-product exchange, circular procurement and selling services instead of products are some of the strategies companies have taken.

Renault has implemented circular strategies at all stages of the vehicle life cycle, including dematerialization through design as well as end-of-life vehicle collection and dismantling, reuse, remanufacture and recycling. In 2008, Renault entered a joint venture with SUEZ to acquire 100% of INDRA vehicle recycling services [28]. The objective of the partnership was to recover 95% of all end-of-life vehicles in France, addressing the European Community ELV Directive 2000/53. [29] INDRA's dismantling network processed 400,000 end of life vehicles in 2016. Renault supported INDRA's development to supply its own plant and foundries (plastics, aluminium, platinum or copper), as well as second hand part premium services for repair in its dealer network (offering more affordable solutions for repair to its customers). Simultaneously, Renault is increasing recycled content in its vehicles, achieving over 32% of new vehicles by weight in EU in 2016. [30] The large amount of recycled plastics reintroduced into the system saves between 10% and 15% of the cost virgin material. Thanks to INDRA and other company operations, like the Choisy-le-Roi gearbox and injection pumps remanufacturing plant, Renault's remanufacturing division is more than a €200M business. [31] This is still a small fraction of the European automobile remanufacturing market estimated at €8-10B. [32] Additionally, the company has €370M turnover of dismantling and material recycling. [19]



Source: [19]

Global resource constraints are driving a shift to value-based healthcare approaches that reduce cost, increase access to care and improve patient outcomes. At the same time, the rapid pace of technology development triggers the replacement of medical equipment with significant residual value. Therefore, **Philips** is transforming its business model, moving from selling equipment alone to providing solutions to hospitals and other care providers, sharing risk for results through long-term partnerships. Through this new approach, Philips can directly manage when to upgrade equipment, refurbish systems, reuse parts and recycle materials. This allows Philips to reduce the total lifecycle costs of equipment and extend their lifetimes. The model enables care providers to also reduce costs and access state-of-the-art technology at a more predictable cost. By moving away from a purely transactional sales approach, Philips has achieved 50-90% material reuse (depending on the product) through its refurbishing activities, including its reuse of 940 tons of refurbished medical imaging equipment in 2016. Currently 9% of Philip's total revenues (in 2016) is circular, with a goal to reach 15% in 2020. [19]



Source: [19]

Captiv8

Engage customers and employees. Companies can CAPTIVATE customers and employees by working towards a circular economy. Businesses may find that improving customer loyalty and recruiting better talent are outcomes of circular business models and objectives, enhancing their competitive advantage.

Michelin solutions, one of Michelin’s business units, offers a Fleet Tire Management solution called EFFITIRES™ in which customers pay a monthly fee for travelled kilometres (or miles) instead of tires. Today, more than 320,000 vehicles are under an EFFITIRES™ contract and Michelin expects to double the revenue of services and solutions by 2020. This alteration of the existing business model from product- to service-based offers turns customers into “long-term partners” and generates improvements to fleet efficiency, productivity and environmental impact. Because of this, Michelin solutions improves its value proposition to customers and consequently strengthens their loyalty. The solution maximizes tire usage and therefore its life expectancy, by ensuring tire use – in compliance with the law – to the last possible millimetre of rubber, then regrooved and rethreaded. Michelin established this new business line without compromising its core business of manufacturing and marketing tires. [19]



Source: [19]

Dow Chemical's packaging group has observed that programs aiming to close the loop have had a significant effect on their recruiting efforts. Based on listening sessions with new employees, Dow estimated that approximately 80% of new recruits viewed the company's commitment to sustainability as the number one reason for joining. These new recruits are often some of the most enthusiastic and innovative employees in helping Dow achieve its 2025 Sustainability Goals, one of which is to advance the circular economy through closed-loop solutions. This reflects results from a joint study between the Yale Center for Business and the Environment and WBCSD, which found that 84% of students prefer to work for a company with good environmental practices and 44% are willing to accept a lower salary to do so. [33] Companies who can demonstrate that employees can contribute to corporate sustainability programs that create positive change will have an advantage in securing top talent.

84% of students would choose to work for a company with good environmental practices

44% of students are willing to accept a lower salary to work for a company with better environmental practices.

19% would not accept a job at a company with bad environmental practices, regardless of how high the salary was [19].

Differenti8

Distinguish from competition. Companies are using circular approaches to DIFFERENTIATE themselves from their competition based on price, quality, durability or convenience. These strategies allow businesses to improve their competitive advantage by capturing more market share, expanding into new markets, securing niche markets or being the first mover.

TerraCycle has cemented a market niche as the company that can recycle anything. The company has found those opportunities in the most difficult to recycle products, including cigarette butts and chewing gum. Since 2012, TerraCycle has worked directly with municipalities and businesses to

implement Cigarette Waste Recycling Programs across 363 cities, diverting over 75 million tons of cigarette waste from landfill. [34] Collected cigarette butts, filters and packaging are manufactured into industrial products like plastic pallets while remaining residual tobacco and ash are composted. This program – and other programs for difficult to recycle products – are free to consumers as strategic brand partners cover the operating costs. In many of these programs, companies want to close the loop on their products and partner with TerraCycle to collect and repurpose the products and materials that curb side recycling programs do not. Their innovative business model and drive to solve the circular economy’s biggest challenges distinguishes them from other recycling and resource management companies. [19]



Source: [19]

Carpet is not easily recyclable due to challenges in deconstruction and material blends. As a result, around four billion pounds of carpet winds up in U.S. landfills every year, making up about 85% of discarded carpet and one of the largest contributors to landfill sites. [35] The second most common disposal method for carpets is incineration, which requires a high constant temperature and results in the release of toxins. **DSM** recognized the risk associated with the current carpet life cycle and identified how it could turn it into an economic opportunity. In partnership with Niaga, DSM redesigned carpet manufacturing and end-of-life characteristics. Their new design approach required them to (1) focus on purpose; (2) choose clean and pure materials; (3) simplify and (4) connect materials that allow for simple end-of-life processing. DSM-Niaga used its technology to create a 100% recyclable carpet product with no Volatile Organic Compounds (VOCs). DSM-Niaga Technology enables simple recycling through DSM engineered adhesive, which replaces energy-intensive latex in bonding the carpet fibre top to the backing. This product differentiates from others based on

characteristics that allow manufacturers to easily separate the carpet fibre and backing without compromising the quality of the original product. In contrast to today's carpets, Niaga® carpet does not consist of PVC, bitumen, latex and undisclosed fillers. Due to the simplified design, the carpet offers unexpected additional benefits: no water use, and 85% energy reduction during the lamination step in production, reduced product weight, easier installation and maintenance, as well as better fire safety and indoor air quality. DSM-Niaga sees the potential of this technology extending beyond carpets to other products like car mats and diaper. [19]



Source: [19]

Integr8

Align with corporate strategy or mission. Implementing the circular economy may INTEGRATE a company's strategy with its mission. In this scenario, the firm may find that their ethos provides an advantage over its competition.

In 2001, **Tata Steel** and **SAIL** established a joint venture called mjunction services limited, which has become the world's largest eMarketplace for steel and India's biggest B2B eCommerce company. [36] mjunction's mission is to create robust and sustainable supply chains by bringing more efficiency and transparency to stakeholders. Extending beyond typical ecommerce buy and sell services, mjunction also offers financing and consulting services to customers. However, it is the side business that helps customers sell their "non-core" products and by-products such as secondary steel, minerals, coal and coal chemicals, hazardous products and obsolete or idle assets. Arguably the biggest value offer to buyers and sellers is the price transparency on industrial by-products. mjunction has increased its business volumes from \$13.8M USD in 2002 to \$10.27B USD in 2016. [37] Additionally, mjunction sells hazardous wastes like batteries, e-waste, coal and chemicals. For the last five years, mjunction has facilitated the sales of approximately \$900M USD worth of hazardous materials. mjunction is helping many industries and organizations to find right buyers for these hazardous materials, and thereby providing the best solution for their by-products while contributing positively to the environment. [19,38]



Source: [19]

In December 2015, **Veolia** announced its 2017-2018 strategic plan to focus on continued growth and improvement in operational efficiency. The company cited the circular economy as a key driver for growth as a high added value offering for municipal customers and an industrial priority segment.[39] Veolia aims to recover 70% of all waste treated for its clients worldwide while increasing by-product recovery, water reuse and substitute fuel production from waste. Veolia also commits to sustainably managing natural resources through the circular economy by setting a 2020 objective of generating at least €3.8B in turnover related to the circular economy.[40] Veolia further exemplifies its commitment to circular economy in the creation of their Circular Economy Committee, led by a member of their Executive Committee. This Committee's charge is to share existing solutions across business units, analyse market opportunities, define Veolia's circular value proposition and support implementation. [19]



Source: [19]

Acclim8

Companies may use a circular economy perspective to ACCLIMATE their business models and value chain relationships, addressing economic changes Consumers, commodity prices and technology are everchanging, requiring businesses to constantly evaluate their relationships with their value chain and competition. Companies may acclimate through vertical integration, expanding into new consumer market segments or strategic partnerships. Companies can manage linear risk by incorporating flexibility and diversity into their strategic planning.

The world leader in rolled aluminium products, **Novelis** collaborates with customers to provide infinitely recyclable products for the transportation, packaging, electronics and architectural sectors. Novelis incorporated an average of 53% recycled content across their portfolio in 2016 (up from 30% in 2009) [41]. Their journey towards massively increasing the recycled content in their products took a big step in 2014 with the opening of their €200M aluminium recycling centre in Germany, the largest and most advanced in the world. The facility has a capacity to recycle up to 400,000 metric tons of aluminium scrap annually, potentially saving 3.7 million metric tons in CO2 emissions. [42,43] Because of the high-energy intensity of aluminium production, Novelis views this vertical integration as a strategy to decouple their economic productivity and energy consumption. In addition to securing future feedstocks, this new value chain relationship also saves money and greenhouse gas emissions. In addition to contributing to their recycled content goal, a key driver for opening a recycling plant was to give them the ability to produce their own aluminium and hedge supply chain risks like commodity price volatility.[44] Novelis even considers their customers to be suppliers because they can give back scraps. [19]



Source: [19]

Copersucar S.A., Brazil's largest trader and exporter of sugar and ethanol, bringing together field and industry with integrated logistics throughout its entire business chain, operating excellence and sustainable value creation. Copersucar's partner mills reuse 100% of their by-products and generate enough electricity for self-sufficiency during the harvest season. The sugarcane industry is highly effective in reusing by-products - with over 150 alternative uses available by some estimates. A few reuse examples include using cane tops in animal feed, filter muds and vinasse for amending fertilizers and molasses for ethanol production. In line with the strategic plan to strengthen its integrated logistics structure, EcoEnergy promoted investments of around USD \$50M in the period 2015/2016, more than double of the previous year. Recognizing the societal challenge of reducing greenhouse gas emissions from fossil fuels and the economic opportunity that their by-products presented, Copersucar invested 100% equity stake in Eco-Energy Global Biofuels LLC. Through the acquisition of Eco-Energy, Copersucar became the largest global platform for biofuels. Together, the two companies marketed 13.5 billion litres of ethanol in the 2015-2016 Crop-Year, equivalent to 11.5% of the entire global supply. Copersucar traded over 5 billion litres and exported 0.6 billion of that. Over that same period Eco-Energy handled 8.5 billion liters and held 16% of US market share. This evolution in Copersucar's strategy and its partner mills used its by-products to create financial returns through the exploration of new, higher value markets. [19]



Source: [19]

Insul8

Companies can INSULATE themselves against linear risks by purchasing circular supplies, recovering resources at end of life or partnering with the public sector. As issues like resource scarcity, pollution and commodity price volatility become increasingly material to business, leadership has an opportunity to address these challenges through the circular economy.

Due to the declines in Italian energy demand and decentralization of energy generation, **ENEL** is decommissioning 23 of its old thermal power plants. Decommissioning old industrial assets in the energy sector is conventionally a waste management challenge. Each decommissioned facility requires reclamation and demolition activities that comply with stringent, local regulations. In support for its commitment to sustainable business and the circular economy, Enel established Futur-E, a public-private program that uses public tenders and idea competitions to identify long-term, sustainable, redevelopment solutions for the old plants. One of the first projects finalized within Futur-E was the transformation of the former fuel oil power plant in Augusta, Sicily to a 900-kW biomass gasification plant fuelled from local biomass. Approved by an actively engaged community, the redevelopment will also include a phyto-remediation technology research centre powered, heated and cooled by onsite renewable energy. Lastly, the Augusta project will divert all ashes generated from landfill by sending them to construction material manufacturers. [19,45]



Source: [19]

Stora Enso is one of the largest consumers of recycled paper in Europe, purchasing recycled paper for 26% of all fibre used in its mills. In fact, three of the company's mills across Belgium, Germany and China use recycled paper for 100% of fibre inputs. Stora Enso recognizes the economic and environmental benefits of recycled paper as it improves material efficiency and contributes to corporate sustainability goals. Sourcing recycled paper requires cost-effective collection, sorting and deinking. De-inking is a wash to remove ink from the paper, resulting in white paper pulp. Stora Enso's Langerbrugge Mill in Belgium produces over 500,000 tons of paper from recycled fibres per year. Beyond contributing to material efficiency, using recycled paper provides benefits like satisfying consumer preferences, diversifying fibre supply and differentiation from the competition. Stora Enso further demonstrates its commitment to preserving natural resources and sustainable forest management by using 97% of the generated residuals and waste. For instance, production residuals

and waste have gone into agriculture, brick manufacturing, road construction and bioenergy production. [19,46]



Source: [19]

Conclusion - All industries face planetary resource limits.

As the global population increases and the middle class continues to grow, competition for those resources will intensify. Business must recognize the risks. The circular economy can help companies address these risks and identify opportunities. Examples in this report demonstrate how companies have implemented circular measures to drive growth, enhance competitiveness and mitigate risks. When considering the return on investment or cost-benefit of potential circular projects, start with these eight business cases as you build the argument for getting the necessary buy-in and implementing circularity. [19]

Call to action:

Integrate life-cycle thinking - Successful businesses of the future will maximize the economic value of every unit of resource used. They will incorporate a circular mindset into the design of their products and services, and they will not fail to consider end of life consequences before it's too late. The earlier companies integrate circular thinking and processes into the product or service, the greater the opportunity to create the most value.

Collaborate: Collaboration is also essential for achieving a circular economy, both externally and internally. Internally, individuals and teams must work across departments and geographies to identify opportunities, implement and scale across the organization. Externally, companies must work with value chain partners, stakeholders and sectors with complementary goals and objectives. Whether in the form of a joint venture, merger, customer relationship or a general partnership, collaboration has been and will continue to be a pivotal characteristic of successful circular programs.

Know your flows - One of the most valuable exercises a company can do as it begins to think about the circular economy is to map its resource flows - including materials, water, energy and money. In doing so, companies can establish benchmarks to measure progress, while understanding linear risk and identifying circular opportunities.[19]

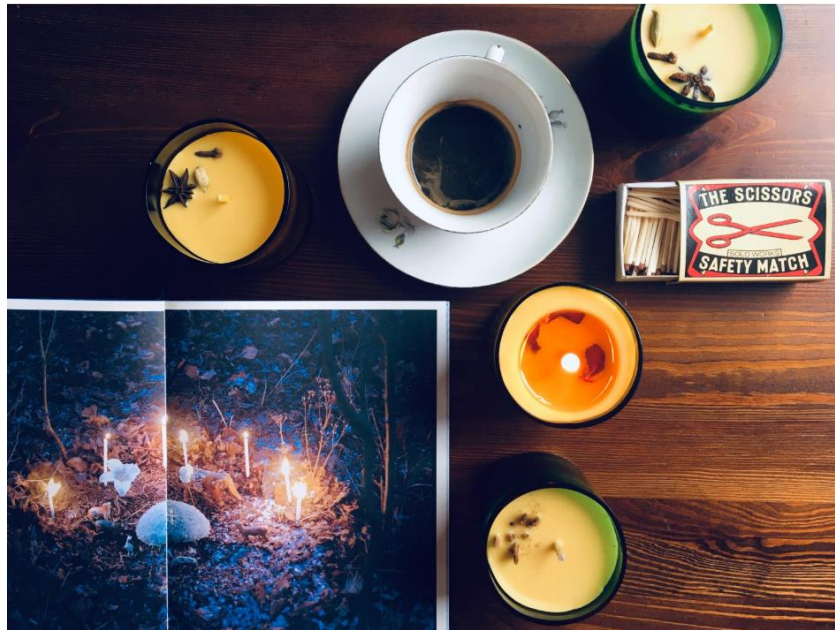
Best Practice from Slovakia – Second breath

Wine bottles caught Second Breath. Upcycling is the creative transformation of waste materials into new products that have artistic or environmental value.



Source: [20]

Zuzana Kopanicová pours candles from beeswax and virgin coconut oil into wine bottles that caught the Second Breath. This all-natural product is made from 100% beeswax and virgin coconut oil in a 1:1 ratio. Compared to ordinary paraffin candles, beeswax burns significantly longer. The radiation of a flame can be compared to the energy of sunlight. You will appreciate it especially in the cold seasons. It cleans the air, absorbs small bacteria, pollen, dust or allergenic substances. It has positive effects on allergies and asthma symptoms. The beautiful scent of beeswax induces harmonious well-being. [20]



Source: [20]

The fragile competition of wine bottles was transformed into a vase. We increased the value of waste with a new function. The wine has been drunk and its modified packaging continues to serve as an exceptional vase. [20]



Source: [20]

Each glass has a different bottom and glass thickness. The rim is carefully sanded to make them drink well. The glasses are from different wine bottles, which usually end their journey in a container with glass. [20]



Source: [20]

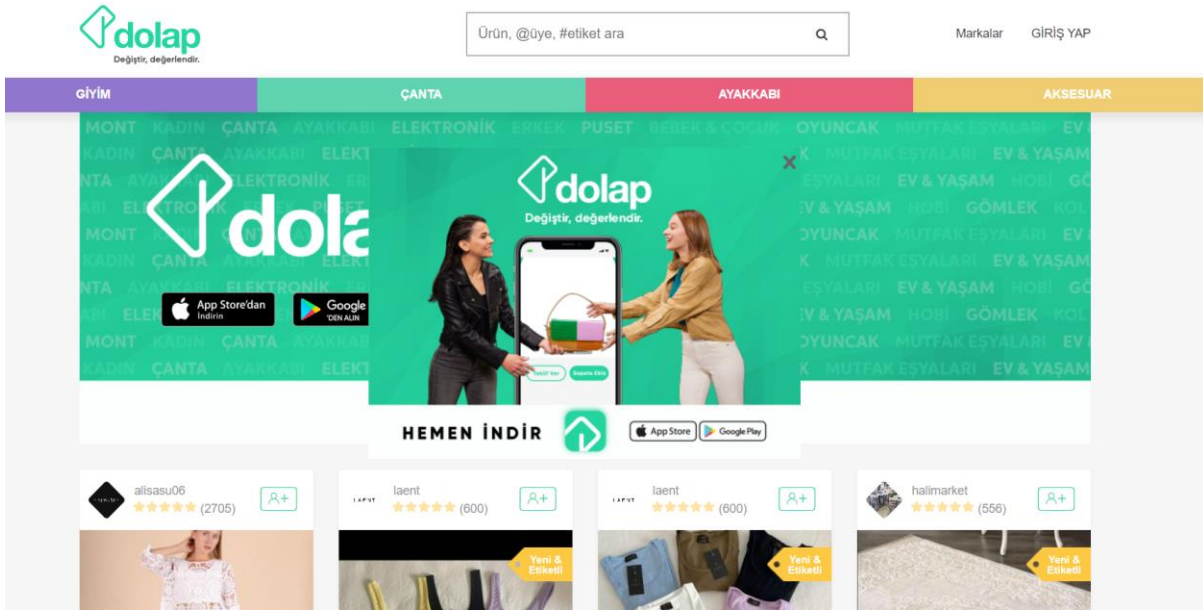
When making glasses, we had a lot of bottle necks left over. Therefore, a new connected candlestick was created by connecting two necks with a cork stopper. [20]



Source: [20]

Best Practice from Turkiye – Dolap (Wardrobe)

Dolap is Turkey's leading second-hand platform that enables second-hand shopping with Trendyol assurance. Millions of users sell their unused or no longer needed products on this platform at the most affordable prices.



<https://dolap.com/>

How Dolap works?

Dolap is an application where you can shop at affordable prices and sell your unused items. Dolap, where you can buy products in many categories such as babies, children, clothing, bags, accessories, shoes, pregnant, is also an application offered by Trendyol. In this application, where you can donate to associations, NGOs and children with SMA, you can also shop from the closets of famous names.

As a result of the search, the listing of the products is made according to a certain algorithm. This algorithm, which was developed to enable users to reach quality products more easily, scores products according to different factors, and the products are listed according to these scores.

Accordingly, products with high scores are listed above. Among the calculation factors of the algorithm are the viewing, comment and appreciation history of the product and the success criteria of its seller.

In other words, products that have received more comments, likes and reviews by other users, and sellers who have been successful in their past sales (the seller's on-time cargo delivery, order not canceling, and positive reviews) ensure that the products of the sellers are higher in the ranking.

What products do I find in the Dolap?

Millions of products from their owners in hundreds of categories, especially women's and men's clothing, decoration, mother-baby, home electronics, shoes, bags, accessories are on sale at Dolap.

How do I shop from the Dolap?

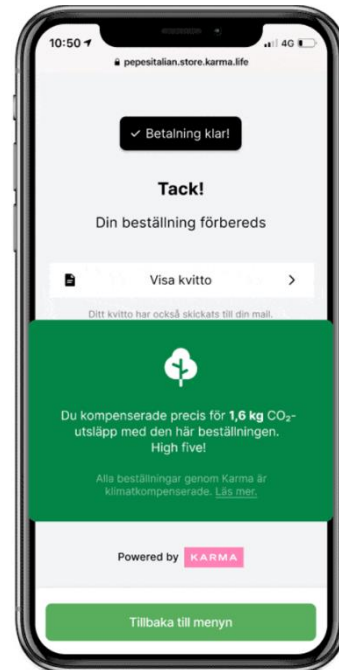
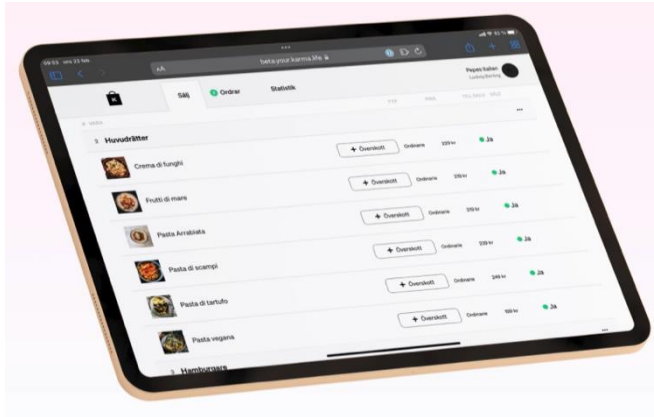
- You can access the Dolap platform from the App Store or Play Store by clicking on all the fields containing the phrase "Dolap" or "Buy, Sell, Earn" that will appear in the rendyol mobile application.
- You can use category, brand, size, price and color filters to reach the product options you are looking for faster.
- By adding the products you like to your favorites, you can be notified when the price of the product drops, and you can go back and add the product to your cart whenever you want.
- When you complete your purchase, your order is automatically notified to the Locker seller and your payment is held in the pool.
- You can follow the status of your order on the "My Account" page, on the "I've Purchased from Dolap" tab.
- The cabinet seller delivers your product to the cargo. You can confirm your order within 1 business day after receiving the cargo.
- If you do not confirm your order, your order will automatically be approved after 1 business day and the seller will receive the payment.[47]

Best Practice from Sweden – Karma

Karma is a Swedish start-up that was founded in Stockholm, Sweden, in November 2016. The main mission of the company is to reduce food waste – and ultimately ensure that food is never wasted – and lead the shift towards a more sustainable society. This is promoted through their app, which connects surplus food from restaurants, cafes, and grocery stores to consumers for a lower price.

How does it work?

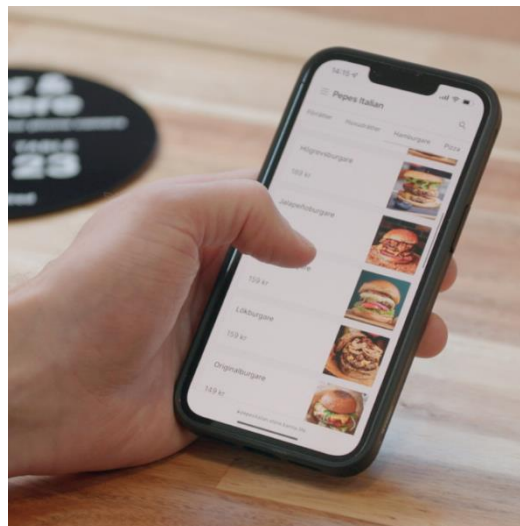
In the app, consumers can check the digital menu of the restaurant, who directly operate and put the available items up as desired. This means that the consumer can decide exactly food item they want to purchase, pay directly through the app, and pick their purchased item within the timeframe provided by the restaurant. As a result, consumers can profit from having access to restaurant food at a lower price, business can receive an additional revenue stream from items that would otherwise be wasted, and waste from food is reduced. Finally, all orders purchased through Karma are automatically climate compensated.



Source: <https://www.karma.life/#this-is-karma>

Outreach

Karma has reached 150 Swedish cities, working with 7000+ retailers, and attracting 1 million app users. Since 2018, Karma has also been available London and later in Paris.



Source: <https://www.karma.life/>

Issue Addressed (Source: <https://circulareconomy.europa.eu/platform/en/good-practices/karma-connects-surplus-food-consumers-lower-price>)

A third of all food produced is thrown away annually, resulting in 1.3 billion tonnes of waste worldwide. The food industry takes a major toll on the environment, from the staggering number of resources required in production and distribution, to the CO₂ emissions from waste in landfills.

- Food waste has increased 50 % since 1990
- Yearly CO₂ emissions from food waste is equivalent of 3 million cars
- Food waste equals \$1 trillion in losses, annually



Source: https://commons.wikimedia.org/wiki/File:GI_Market_food_waste.jpg

Main results (Source: [ibid](#))

- 750 tonnes of food rescued
- 2 million meals saved
- 1000 tonnes of CO₂ saved
- 7000+ businesses use Karma
- Present in 3 EU countries

Best Practice from Spain – Recircular (Getxo, Bizkaia)

Recircular is a Spanish platform that offers the opportunity to exchange resources, connect businesses, and help valorise their products. Patricia Astrain is the found and director of “Recircular”, and after many years within the industrial domain, she has decided to leverage her

knowledge in creating a start-up that focuses on the sustainability and social side of the industrial setting. The team is working on various projects, and one of them focuses on offering consultancies to companies to implement a circular model while identifying waste recovery opportunities. So far, their projects have covered leather reuse, feminine hygiene products, shampoo waste, textile and wood leftover and beverage byproducts. In collaboration with Basque Ecodesign Hub, they have developed a methodology that can assess the lifecycle of the business and integration of waste while reducing emissions, water consumption and lowering energy input. The platform offers available resources that otherwise would turn into unmanaged waste. Through each purchase, the team will help the customer with an LCA and Impact Measurement to improve or upcycle their purchase. [48]

Best Practice from Spain – Cocoro - Advanced lingerie for periods

(Barcelona)

Cocoro is a Spanish enterprise that focuses on reducing menstrual single-use products by providing an alternative solution to women, namely redesigned knickers. Their properties for absorbing the menstrual cycle can hold up to 2 years by upholding the given cleaning instructions, and after this, they can be used as regular underwear. The founders of this innovative business are Eva Polio, Laida Memba, Clara Guasch and Cristina Torres. The current team has over 14 members, and they are constantly collaborating with other agencies. The concept formed shaped after a crowdfunding campaign in 2016. The knickers are 100% hand-made, environmentally friendly, cruelty-free and have the OEKO-TEX Confidence in Textiles Standard 100. Cocoro gives women options, and by making informed decisions, women will be more likely to invest in panties that can be used for a more extended period of time, either for a menstrual cycle or everyday wear. The concept of underwear has been upcycled through layering innovation, and the purchasing of these panties will reduce the number of disposable tampons, which are either incinerated or end up in landfills. [49]

CHECKLIST TO SUPPORT SME'S

SMEs (small and medium-sized enterprises) are increasingly aware of benefits which are related to Circular Economy (CiE) like closing material loops. However, implementing aspects of CiE is a very complex task. Depending on the current business model, a complete rethinking and redesigning on how doing business or only a gradual shift is needed. SMEs are often not very familiar with the term and concept of CiE. So far, terms like “green economy” or “resource efficiency” are more common. However, the concept of CiE goes beyond and is crucial to implement real changes. As the initial status and the know-how of SMEs as well as their questions regarding CiE are very diverse, a general checklist to support SMEs on their way towards a CiE is a challenge. Nevertheless, many SMEs need easy-to-understand information about how to take the first steps towards a CiE. The goal of this “checklist” with questions and fact sheets is to support SMEs [21]

- to increase their know-how on circular thinking
- to identify their status quo regarding CiE
- to ask themselves the right questions
- to get an extensive list of supporting tools.

Questions for thoughts

By answering the following questions, an SME can get a first indication on their status and on which topics the company might address to take steps towards a more circular SME. The following 50 questions are assigned to five categories. In the case the questions are not applicable for your SME, please skip them. The term “products” is used within these questions, but it should cover (when applicable) products as well as services.[21]

Product design and labelling

1. Did you know that 80% of the environmental impacts of a product is decided in the design stage?
2. Do you address the aspect of a modular design of the product?
3. Are other concepts like dismantling for recycling, dismantling for reuse, upgradability or reparability considered?
4. How does your SME consider the material selection within the design phase?
5. Are the selected materials recyclable / biodegradable / from renewable or secondary sources? And how is the reduction of material usage addressed?
6. Do you also consider ecological aspects with regards to packaging (primary and secondary packaging)?
7. Did your SME conduct a LCA (Life Cycle Assessment) study or did you ever check if LCA studies on your product or your service exist?
8. Are you aware of the biggest detrimental environmental and social impacts of your product? In which life cycle phases do they occur and how can they be reduced?
9. Are you familiar with relevant product certification schemes and have you ever thought about passing e.g., a C2C (cradle-to-cradle) certification?
10. Do you use any type of “social or environmental claim” for your product or service? If so, is it credible? [21]

Manufacturing and supply chain

1. Which materials are used during your production processes? Does your SME ensure that these materials are used “as long as possible”?
2. How dependent is your SME on imported raw materials? Could the usage of secondary or renewable raw materials be an improvement?
3. Could “production on demand” be an option?
4. Can your energy / material / water cycles within your production processes be optimized? Did you ever analyze related potential cost savings?
5. Have you ever considered switching to renewable energy sources / suppliers?
6. Which harmful substances are used in your production processes? And how could they be replaced?
7. Which types of waste does your SME produce? And how can this amount be reduced?
8. Can the by-products / (pre-consumer) waste generated during the production be utilized by you or another company (closed loop vs. open loop)? And how could this recovery of secondary raw materials be optimized?
9. Is a zero-waste target in your production processes possible (“from waste to resource management”)?
10. Are you familiar with the production processes of your suppliers?
11. In which countries do your suppliers produce and under which social and environmental conditions?
12. When thinking of your sourcing, manufacturing and distribution, which aspects could be more “circular”? [21]

Product properties and usage and end of life

1. How do you ensure an extension of the life time of your product and of your product’s components?
2. Does your product have an extended warranty?
3. How is the reparability of the product addressed? Can it be repaired only by you as producer or also by the user or a service provider?

4. Can your product be upgraded or does it provide multiple use/reuse?
5. Does your SME provide a product take-back system?
6. Is a remanufacturing / refurbishment of your product or parts of it possible?
7. Do you know the main reasons why users dispose of your product (e.g., certain parts are broken, out of fashion)?
8. Do you know what happens with your product after its usage in its End-of-Life? Is there any type of “utilization” (reuse / recycling / energetic recovery)? And how can this post-consumer waste be reduced or reutilized?
9. Do you provide information to consumers on the best disposal way of your product (e.g., sending it back to you, bring it to a recycling centre)?
10. Which other information do you provide to consumers about your product (e.g., ingredients, CO2 footprint)?
11. Does your product use energy during its use phase? If so, can this be reduced? [21]

New business models and economic benefits

1. Could your SME offer “product access” (rather than ownership)?
2. Could concepts like leasing or renting of products be of interest for your business?
3. Could performance-based models (e.g., printing: pay per print) be of interest?
4. Could a sharing platform (with e.g., transaction fees) where products are co-used or exchanged be a business model for your SME?
5. What could be your economic benefits from CiE?
6. How can you distinguish yourself from competitors with the implementation of CiE principles / business models?
7. Do you know best-practices in your industrial sector for inspiration? Did you ever look at companies from outside of your own country for inspiration? [21]

Organisational and behavioural aspects

1. Does your SME have a vision and / or a mission related to sustainability or CiE?
2. Does your company have CO2 reduction and / or any other environmental or social goals?
3. Do you write a CSR (Corporate Social Responsibility) report or any other non-financial report (e.g., based on GRI (Global Reporting Initiative) standards)?
4. How transparent is your current state of operation?

5. How is the hierarchy “reduce, reuse, recycling” anchored within your company’s behaviour (e.g., regarding topics like printing, event management, purchasing of office equipment)?
6. Is the CEO of your SME interested in a transition towards more circularity?
7. Has your SME ever thought of the “added value to society and the environment” of your product (motto “doing something good” instead of doing “less bad”)?
8. How can your SME spur innovation for products which are more in line with CiE?
9. Who could be relevant partners (e.g., ministries, suppliers, consulting firms, business support organizations, etc.) to support your SME?
10. When thinking of the whole value chain, which are the key stakeholders for a shift towards CiE (e.g., material suppliers, purchasers, end-consumers)?[21]

LEARNING CIRCULAR ECONOMY

Exercise examples

- (1) Describe how a linear economic model operates.
- (2) Compare and contrast the linear and circular economic models in relation to their impacts on resource extraction, consumption and waste generation.
- (3) Using examples, explain how a circular economic model may be more sustainable than a linear economic model.
- (4) The UNEP 9-R circularity framework outlines nine value retention loops. Pick one and discuss how it allows value to be retained (extended, recovered).
- (5) Using examples, explain why some value retention processes are more impactful than others.
 - a) Based on the framework introduced in the CIRCULAR ECONOMY section, identify the possible challenges in the transition to a circular economy.
 - b) How can technology and innovation help address these challenges and create new opportunities for circular business? Discuss using examples:
 - Circular inputs, Renewable energy, material innovation
 - The efficiency of resource use, Sharing economy
 - Product as a service Long-term relationship with consumers as better services based on valuable data reflecting user’s behaviour and preferences
 - Efficient maintaining of products or assets, Efficient repairing plan, easy access to repairing services

- Resource recovery, promote engagement in the recycle process of a produce since the producer knows best their products and easiest for the producer to track and bring back the material into a value chain [22]

Useful learning materials

Watch a 3-minute video: Explaining the circular economy and how society can re-think progress

<https://www.youtube.com/watch?v=zCRKvDyyHml&t=99s>

UNEP Circularity Platform

<https://buildingcircularity.org/>

The Circular Economy in Detail, Ellen MacArthur Foundation

<https://www.ellenmacarthurfoundation.org/explore/the-circular-economy-in-detail>

The benefits of a circular economy for effective climate action and society, Potocnik and Okatz. GGKP 2021

<https://www.greengrowthknowledge.org/blog/benefits-circular-economy-effective-climate-action-and-society>

The circular economy: A paradigm shift for global solutions, Albaladejo et. al., Industrial Analytics Platform, UNIDO 2021

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