

CHAPTER 8

New Product Development Strategies for Societal Well-being: A Circular Economy Perspective

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1 Introduction

In the sustainability discourse, the concept of circular economy (CE) stands out as a shift from traditional production and consumption models. Traditional model follows a linear trajectory in which raw materials are extracted, products are manufactured, used, and then disposed of (Geissdoerfer et al., 2017). As Ellen MacArthur Foundation highlights, CE is a systemic perspective, focusing on material flows and aiming at creating closed loops (2013). Studies often focus on the environmental impacts of circularity, including waste reduction and resource conservation, with

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less emphasis put on how circular strategies can influence social outcomes. However, we argue that such a paradigm shift can also improve economic development, job creation, and societal well-being in addition to lessening the environmental impact of production systems through redesigning products and services (Esposito et al., 2018; Murray et al., 2017).

Compared to the economic and the environmental domain, the social domain of sustainability focuses on a wider range of aspects from social inclusion and labor practices to societal wellbeing (Cirella et al., 2020; Ly & Cope, 2023). According to the strong sustainability view, the social domain plays an interlinking role between the environmental domain and the economic domain. All economic activities have a certain degree of impact on societal well-being. In the scope of business practices, societal marketing deals with organizations' potential contributions to societal well-being (Carvalho & Mazzon, 2015; Kotler & Lee, 2008). Companies can have a direct impact on social sustainability through relationships with their employees and corporate social responsibility activities. Yet perhaps a larger impact could be achieved through the products and services they produce. In this manner, societal marketing can have a critical role to alight new product development (NPD) processes and social sustainability goals (Chandy et al., 2021; Grinstein et al., 2022).

In this study, through a literature review, we aim at investigating how NPD strategies aligned with CE strategies can contribute to social sustainability and societal welfare. We argue that integration of CE strategies into NPD processes with a societal wellbeing perspective, represents a significant opportunity for businesses, marketers, and designers to create products and services meeting consumer needs and contributing positively to society.

The chapter is organized in four sections. Following an initial introduction, the second section focuses on key CE strategies employed in NPD processes and their potential social impacts. To illustrate the link between NPD strategies and their societal implications, the third section utilizes the R-hierarchy framework. In the fourth section we focused on the implications of CE strategies for societal marketing to summarize key findings, provide recommendations for businesses, and identify further research opportunities in the intersection of CE, NPD, and social sustainability.

2 New Product Development and the Social Aspects of Circular Economy

Responding to market demands and meeting consumers' needs can be companies' primary objectives for developing new products in traditional economies but, in circular ones, businesses are forced to ensure these products contribute to use longevity, reusability, and waste minimization (Bocken et al., 2014). Aiming to make product development processes suitable to CE principles, strategies aim at designing products with a longer lifespan and enabling product longevity and repairability (Hysa et al., 2020). Product design practices that support product and social sustainability, such as using recycled materials, local production, and ethical sourcing can directly enhance labor practices, improve consumers' access to sustainable products, and contribute to community development (Lacy & Rutqvist, 2015). Therefore, integrating circularity into product development processes minimizes their environmental footprint, contributes to social equity, and promotes inclusive growth (Mansilla-Obando et al., 2022; Thongmak & Hoontrakul, 2024).

In our review, we identified NPD processes that need to be shaped by the main societal dimensions of CE in relation to key social actors. These dimensions are labor practices, human rights, society, and product responsibility (Padilla-Rivera et al., 2020), and the social actors consist of workers, organizations, consumers/customers, local communities, and society at large (Mies & Gold, 2021). Additionally, we identified key strategies and practices that may contribute to social, environmental, and economic sustainability within the CE framework when applied at various stages of the NPD process.

Employment Opportunities: Circular Design Strategies for Slowing Resource Loops

One of the important contributions of CE is its potential to create new jobs, decrease regional unemployment problems, and prevent the decrease in demand for some occupations (Padilla-Rivera et al., 2020). Several circular design strategies are particularly emphasized for slowing resource loops (Aguiar et al., 2022). The first one is the design for disassembly. The CE-centered product design process considers the reuse, recovery, or recycling of the parts of products at the end of the product lifecycle. Therefore, in CE, NPD strategies can aim to enable components and

parts to be reused, recycled, or recovered for energy by simplifying disassembly (Ostapska et al., 2024). The second one is the design for recycling. Efficient recycling needs appropriate product materials to be efficiently recovered and reprocessed when the product's lifespan ends. Enabling material separability and recyclability and using recyclable or recycled materials in NPD processes can be efficient practices for integrating the circular economy (Albaek et al., 2020).

Finally, other strategies (i.e., design for refurbishing and design for easy maintenance and repair) enable or simplify the repair and replacement of products' parts. In the NPD process, designers may aim to design products with standardized and modular components that simplify repairs. Additionally, providing detailed manuals that enable users' and repairers' maintenance and after-sale support for accessible spare parts improves further efficiency (Albaek et al., 2020).

All of these strategies can potentially decrease unemployment problems by generating local job opportunities for independent experts and skilled company workers with expertise in the maintenance and repair of products. Additionally, there will also be a need for skilled workers with expertise in recycling processes, such as disassembly, sorting, and material reclamation. Since maintenance and repair services are often provided near customers, such businesses are typically established locally, supporting local job creation, particularly in areas where manufacturing opportunities may be limited.

Patagonia, a well-known clothing brand, has NPD processes that enable repair practices for product longevity. The brand offers repairable garments with detailed manuals that consumers themselves can repair. Besides, the company also employs professional repairers in their Repair Center, located in Reno, Nevada, one of the most extensive apparel repair facilities in the U.S. (Patagonia, n.d.). The repair technicians are often skilled in sewing and have diverse backgrounds, including those with factory experience in other countries and self-taught sewers who learned on their home sewing machines. (Patagonia, n.d.).

Bugaboo is a Dutch brand enabling repair and modularity with NPD to ensure product longevity. The company offers innovative, high-quality strollers, and mobility solutions for families. To contribute to CE, the company operates authorized repair service centers for its products (Bugaboo, n.d. -a). Besides, its modular product design simplifies repair, increases model compatibility, and makes refurbishment and recycling easier. The 'Certified Refurbished' program ensures that every stroller is

thoroughly inspected and restored by technicians to make them clean and ready for subsequent use. Over 97% of returned or defective strollers are refurbished and given a second life for resale (Bugaboo, n.d. -b).

Inclusiveness and Accessibility: Strategies and Business Models for Equitable Design and Consumption

Along with increasing discrimination and vulnerability issues, inclusiveness has become a critical and integral aspect of NPD in recent years (Schroeder & Barrie, 2022). Inclusive design aims to offer products, services, and experiences that are accessible, effective, and emotionally positive for the widest range of people, regardless of their abilities, or circumstances (Patrick & Hollenbeck, 2021). In the early stages of product development, engaging with diverse users helps identify barriers and opportunities for inclusiveness. Inclusive design aims to create equal and fair opportunities that enhance the quality of life for the greatest number of people, considering both psychological and social factors (Lim et al., 2020).

In addition to the traditional market-oriented view that focuses on designing products and services to meet targeted users' needs, in CE, contributing diversity through increasing products and services' accessibility and affordability by broader and diverse groups of people has become a central tenet for NPD. In recent decades, sharing, collaborative, and access-based consumption practices and using peer-to-peer platforms have become more widespread in consumption life (Lofthouse & Prendeville, 2018), providing a suitable background for circular business models. By supporting these practices, businesses can make their sustainability-oriented products more accessible to diverse consumer segments, who usually cannot afford to own them.

One of the well-known examples is MUD Jeans. The company has created a subscription-based renting platform called "Lease A Jeans." Subscribers making monthly payments have options to keep their own jeans, exchange them with other jeans, or return their jeans to the company for recycling. During the subscription period, users can also benefit from free repair services. Therefore, users can reuse and recycle jeans to minimize waste, maintaining a closed-loop system (MUD Jeans, n.d.-a).

Promoting Sustainability Awareness and Knowledge: Design Strategies for Behavior Change, Labeling, and Certifications

The success of a CE is vastly related to the consumers that align with its goals (Daae et al., 2018), which makes it vital to develop products that encourage desired behaviors. Design for Sustainable Behavior (DfSB) focuses on using design interventions to guide consumer behavior during a product's use phase for more sustainable actions (Wilson et al., 2016). It applies behavioral theory and behavior-changing strategies to drive the development of products, services, and systems that encourage more sustainable use (Lilley & Wilson, 2017).

DfSB cases often focus on using less (energy, water, food) and increasing product efficiency (Daae et al., 2018), through highlighting resource usage by making it visible and comprehensible, providing real-time reminders of resource consumption, motivating users through rewards or penalties, and embedding affordances and constraints to guide behavior (Bhamra et al., 2011). It is argued that DfSB is one of the strategies to increase consumer understanding of sustainable products and promote more sustainable behaviors, which can lead to a greater collective awareness of social and environmental issues.

Vitsoe is a furniture company established in 1959 that produces long-living, adaptable, and environmentally conscious products that defy obsolescence. The company promotes sustainable lifestyles by enabling consumers to live better with fewer through its business practices and philosophy, offering honest pricing without seasonal sales (Vitsoe, n.d.). Vitsoe deliberately trains its sales team to focus on under-selling rather than over-selling, emphasizing that customers can add more later if needed, while also ensuring that staff do not receive sales commissions (Bocken & Short, 2016). Encouraging consumers to buy once and use for a lifetime could be a direct challenge to the wastefulness of consumerist culture. It inspires consumers to think beyond the immediate benefits of a product and consider its long-term impact on the environment, economy, and society (Vitsoe, n.d.).

Product labeling, including the use of eco-labels, can significantly enhance consumer awareness about sustainability (Testa et al., 2015). Product labeling schemes, especially third-party certified labels, provide credible information about a product's green credentials, reducing the effort required for consumers to evaluate sustainability. Such information is often communicated through product packages, advertisements and

websites. Eco-labels guide consumers toward environmentally friendly choices by highlighting attributes like reusability, reparability, and recyclability, making them an effective tool for promoting sustainable behavior (Meis-Harris et al., 2021). For instance, Kyocera printers and copiers designed for reduced resource consumption and recycling have been certified with the Blue Angel ecolabel, which is recognized as the world's first ecolabel and has been awarded to over 1600 companies (Blue Angel, n.d.). Similarly, some Bang & Olufsen speakers are certified with the "Cradle to Cradle" standard, which is a globally recognized standard ensuring safe, circular, and responsible products that enable a healthy, equitable, and sustainable future (Cradle to Cradle Platform, n.d.). Certifications not only raise awareness for customers but also motivate companies to continuously improve in areas ranging from employee care to the launch of circular services (Bugaboo, n.d. -b).

Encouraging a Sense of Belonging to a Community: Design for Longevity

Design for longevity is an approach that influences replacement decisions through product design, which includes strategies such as designing for reliability and robustness; design for repair and maintenance; design for upgradability; design for product attachment; and design for variability (van Nes & Cramer, 2005). We argue that product life extension contributes to a sense of belonging by encouraging local repairs and maintaining products in local communities.

People socialize around repair activities, such as repair cafés, which might strengthen local cultures and a sense of belonging, thereby boosting well-being (Svensson-Höglund et al., 2022). Repair Cafés are community spaces where volunteers assist people who bring transportable items like appliances, electronics, bicycles, and toys to be fixed for free (Madon, 2022). Unlike commercial repair, community repair emphasizes fostering a sense of community by addressing consumerism, promoting sustainability, encouraging collective learning, and sharing (Van der Velden, 2021). Thus, repair cafés might have a crucial role to foster a sense of belonging in a community, both for the repairer and visitor (Meißner, 2021). Whereas enhanced durability extends product lifetimes and increases the likelihood of repair, many products are neither durable enough for long-term use nor repairable enough to address breakdowns (Van der Velden, 2021).

Not only customers but also companies benefit from the sense of belonging to a community sharing commitments to circularity. B Corp Certification is a designation awarded by B Lab, a nonprofit organization, to companies that meet high standards of social and environmental performance, accountability, and transparency (B Lab, n.d.). Certified B Corporations often display the B Corp logo on their websites, products, or packaging. MUD Jeans states in their website that being a B Corp means belonging to a like-minded community. They prioritize collaborating with other B Corps, as they share the same vision (MUD Jeans, n.d.-b).

Enhancing Health, Safety, Quality of Life: Ethical Sourcing and Production, Elimination of Hazardous Substances

The concept of CE emphasizes eliminating waste and pollution by avoiding hazardous materials and substances that could harm people or the environment (Ellen MacArthur Foundation, 2013). During the NPD process, choosing materials that are non-toxic and safe for human contact (for instance, toys made of BPA-free plastics, electronics without toxic heavy metals, textiles free from harmful dyes) enhances customer health and safety. Research into alternative, renewable materials align with circular principles. Material innovations, such as plant-based bioplastics, reduce reliance on harmful synthetic materials, ensuring products are safe for customer use and disposal. Additionally, considering the end-of-life phase, for instance designing packaging that decomposes safely or electronics that can be disassembled without exposing users to toxic substances, also promotes customer safety.

Reusing materials can pose risks if workers are exposed to hazardous substances or unsafe conditions during recycling processes. By ensuring ethical standards from raw material extraction to the final product, sustainable NPD prioritizes non-toxic, renewable, and easily recyclable materials, not only for customers but also for workers' exposure to hazardous substances during manufacturing and disposal. Thus, ethical sourcing may also enhance safe labor standards, elevating occupational health, and safety in global supply chains.

IKEA prioritizes customer safety by adhering to strict chemical and material standards. The company ensures that all products meet rigorous legal requirements, avoid harmful chemicals, and strive for sustainable alternatives. For example, IKEA has prohibited the use of materials

containing chemicals known to cause cancer, mutations, or reproductive toxicity in their products. Not only customer health and safety but also environmental safety are considered by the company. The company banned the use of chemicals like chlorine bleaching agents in production in order to eliminate the negative impact on the environment (IKEA, n.d.).

3 Investigating Societal Impact with an R-Hierarchy Lens

As a widely acknowledged framework in CE literature, the waste hierarchy organizes circular strategies based on their sustainability potential and impact on resource efficiency. The strategies involved in the hierarchy are often referred to as a ladder, where each "R" signifies an action (Refuse, Rethink, Reduce, Reuse, Repair, Refurbish, Remanufacture, Repurpose, Recycle, and Recover) prioritized by their capacity to preserve resources and mitigate environmental harm (Kirchherr et al., 2017; Nilsen, 2020; Potting et al., 2017). As seen in Fig. 1, higher-tier actions result in shorter resource loops while lower-tier strategies offer limited prevention of waste generation and longer resource loops (Geissdoerfer et al., 2017). The following sections explore each R-strategy in detail, with an emphasis on their integration into NPD and their implications for societal and social well-being.

Designing Shorter Loops at Conceptualization Phase: Refuse, Rethink, and Reduce

The refuse strategy advocates rejecting unnecessary components, compounds, products, or services, emphasizing minimal resource use at the conceptualization phase in NPD processes (Bocken et al., 2016). Thus, products must undergo an assessment to evaluate the direct or indirect environmental impacts of all the materials used in their production. The elimination of harmful materials or their replacement with more sustainable alternatives can lead to substantial changes in product design. These changes may even result in modifications to the product's functionality or form.

For instance, Broadbit is a battery company that refuses environmentally harmful metallic salts, which are widely used in conventional batteries, and prefers sodium chloride (NaCl), also known as table salt

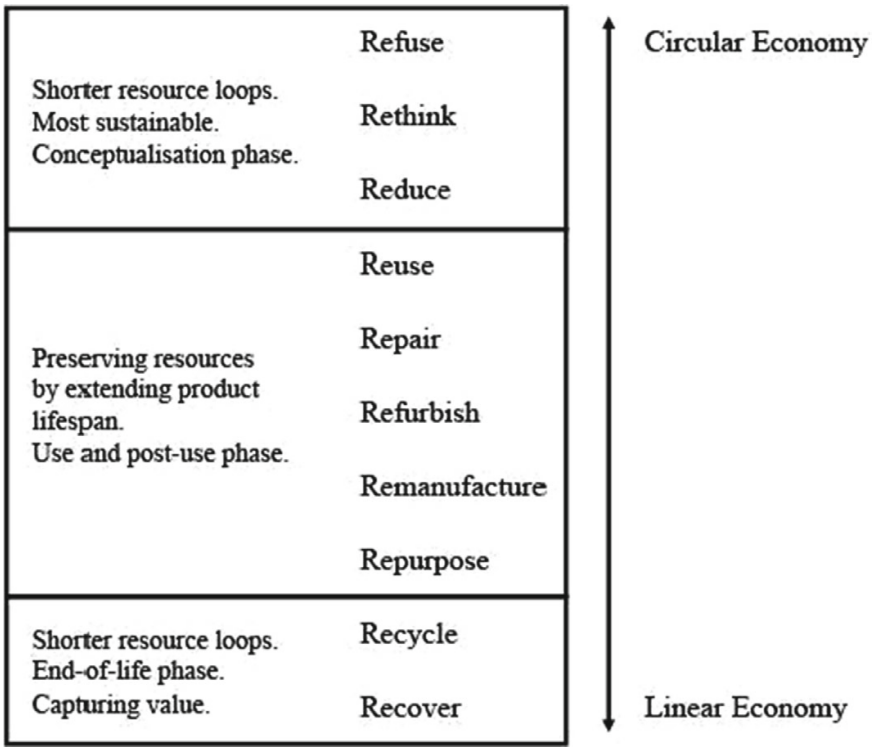


Fig. 1 R-Hierarchy. Reproduced from Kirchherr et al., (2017, p. 224) under the terms of the Creative Commons Attribution License (CC BY 4.0)

(Hamsan et al., 2023). The company claims that with this strategy, their products offer longer lifetimes, reduced costs, and improved environmental performance (Broadbit, 2023). In addition to reducing metal mining, improved environmental health would be beneficial for the quality of life and well-being of society. Some companies intentionally eliminate the use of certain compounds, such as palm oil, which is known for causing extensive farming practices and destruction of forests, while increasing health risks for people. Similarly, refusing single-use plastics and communicating this decision not only reduces environmental impact but also fosters public awareness on the issue and may trigger a behavior change (Borg et al., 2022). In this case, the refuse strategy yields benefits both for the environment and public health, while fostering awareness.

The rethink strategy stresses radically reimagining how products and services can meet user needs with fewer resources or innovative approaches in order to cause lower environmental and social impact

(Kirchherr et al., 2017). In this sense, compared to other concepts of R-hierarchy, rethink is a vague and broad strategy that is hard to illustrate with solid suggestions for implementation in NPD. Incorporating rethink into NPD often results in transformative business models. For instance, the adoption of product-service systems, where the functions traditionally fulfilled by physical products are instead provided through more intangible solutions, such as services, may also drive significant improvements in sustainability (Bocken et al., 2016; Mont, 2002).

Philips' lighting-as-a-service model rethinks ownership by providing illumination rather than selling light bulbs (Singh et al., 2022). In this business model, which is later branded as Signify, customers only pay annual fees for the light they use, making it easy for them not to deal with technology upgrades and burn-out bulb replacements. This approach causes a reduction in energy costs and environmental impact by eliminating the customer's initial capital investment in switching to energy-efficient LED lighting, and increases the reuse and recycling of lighting products and their components by the company (Kramer et al., 2019). As discussed earlier, in some cases product-service systems (PSS) and sharing models increase accessibility and inclusivity by offering scalable solutions tailored to diverse user demographics.

Compared to the dramatic changes offered by refuse and rethink, the reduce strategy aims to minimize resource input and waste generation during product life cycles (Kirchherr et al., 2017). In NPD, this can involve material substitution, lightweight design, energy-efficient manufacturing processes, or designing products that use less energy and complementary products during the use phase. For instance, designing bottles in a way that reduces the amount of plastic raw material used in production for each product would not only decrease the material use and extraction but also cause less fuel consumption during the transportation of goods to market and waste to recycle facilities.

Socially, the reduce strategy aligns with affordability by lowering use-phase costs for end-users. Notable examples include the development of energy-efficient appliances that consume fewer resources throughout their lifespan, water-saving washing machines consuming less detergent targeting low-income consumers. Companies like Unilever have introduced concentrated detergent formulas that reduce packaging and water usage, making products more accessible to low-income consumers, which may eventually improve their quality of life (Evans et al., 2020).

Extending Product Lifespan in Use Phase: Reuse, Repair, Refurbish, Remanufacture, and Repurpose

Offering relatively longer resource loops compared to the previous three strategies, the reuse emphasizes extending the life of products by encouraging repeated utilization in their original form (Ghisellini et al., 2016; Kirchherr et al., 2017; Potting et al., 2017). NPD can facilitate reuse through designing durable, repairable, and aesthetically timeless products while enabling business models like renting or leasing to enable product reuse.

In Europe, packaging constitutes approximately 40% of plastics and 50% of paper consumption (Coelho et al., 2020) and designing reusable alternatives to single-use packages, for instance reusable shopping bags and refillable packaging systems, would reduce resource use for packaging. Contrary to packaging and many other single-use products, the majority of the goods have lifespan allowing them for multiple use scenarios. While the level of multiple use changes according to the durability, cost and use case of the product, commercial initiatives develop strategies to keep products in cycle. For instance, furniture, as a product category having relatively longer lifespan, has potentials for manufacturer buy-back and resell programs. This approach provides cheaper second-hand alternatives to consumers and also decreases furniture waste (Kruckenberg et al., 2023). In addition to manufacturer companies, in some cases, initiatives provide lacking logistics and technology as a resell channel. Thus, smaller companies are facilitated to access the secondary market with minimal investment.

In addition to a reduced amount of waste, the reuse strategy can promote consumer awareness of sustainable practices, fosters behavior change. Moreover, in second-hand markets, items often cost significantly less than the original goods, which could improve affordability and thus contribute to social inclusion.

As highlighted in the previous sections, the repair strategy includes restoring functional states of the faulty products and preventing premature disposal (Bocken et al., 2016). Socially, enhancing repairability as a strategy can (i) contribute to skill development and job opportunities in the repair sector, (ii) improve collaboration and social networks in communities (van der Velden, 2021), and (iii) foster a value co-creation process by enhancing consumers' DIY repair capabilities (Bayraktaroğlu & İdemen, 2024).

Refurbishment aims at restoring products to like-new conditions for resale or extended use (Kirchherr et al., 2017). In NPD, this strategy encourages the integration of refurbishment loops into supply chains, as seen in companies like Apple's certified refurbished devices. Socially, refurbishing goods supports affordability by providing high-quality products at reduced costs. This is particularly beneficial in low-income regions where access to new products is rather limited. Enabling refurbishment opportunities for some products is crucial, including electronics, since informal waste processing often causes environmental and health problems (Gutberlet & Uddin, 2017). Yet, refurbishment might not be appealing for the consumers as they might mistrust depending on the product category. Better understanding consumer attitude toward refurbished products, offering quality assurance mechanisms might reduce the negative stigma around refurbished goods.

The remanufacture strategy highlights utilizing components of used products to develop new ones performing similarly to the original. Companies should stress design and use of standardized components and reverse logistic flows in NPD processes to yield better from the remanufacture strategy (Wang et al., 2017). In an industrial ecosystem, reverse logistic systems especially if manufacturing facilities are geographically distributed, companies might benefit from establishing remanufacturing hubs which fosters regional economic development and employment.

In some cases, remanufacturing disposed products to retain original performance might not be possible or cost effective. Yet, companies might yield material value through utilizing components by transforming them into completely new purposes. Repurposing categorically requires more energy and material for complex transformation processes. According to Branca et al. (2020) this strategy often requires further design and development processes, based on the availability of waste materials and components from different companies. Efficiency of material cycles to keep value by repurposing often depends on the complexity of the product. Products having simpler forms and detachable components are often more prone to retain value through the repurpose strategy. Repurposing shipping containers into affordable housing units is an effective example for this case. According to El Messeidy (2018), this strategy can be used in urban areas to address housing shortages or housing solutions in emergencies.

Socially, the repurpose strategy addresses critical needs of underserved populations such as housing shortages and waste management

in resource-scarce settings. Furthermore, stakeholders of an industrial ecosystem working together to find new ways to utilize waste materials and energy available in the ecosystem, will foster sustainable product and process innovations reducing environmental impact, while increasing cooperation, mutual learning and collaboration among the ecosystem's stakeholders. However, challenges such as regulatory obstacles and limited material compatibility can limit scalability of such cooperation.

Capturing Value at the End-of-Life Phase: Recycle and Recover

Recycle focuses on processing waste materials into new products, reducing reliance on virgin resources. As mentioned in the earlier section, promoting the recycling ecosystem may increase job opportunities in recycling industries. Additionally, fostering recycling strategies in NPD can also contribute to environmental health by reducing waste, which eventually contributes to societal well-being. Adidas' use of ocean plastic in footwear production highlights how an environmentally problematic waste material can be used in a higher value product (Mendenhall & Lopez, 2020). However, its energy-intensive processes and potential for downcycling which require material quality degradation, pose challenges for achieving broader sustainability goals. Ensuring fair labor conditions in informal recycling sectors and investing in advanced recycling technologies can improve its societal outcomes.

Recover refers to extracting energy or materials from waste, typically through incineration or chemical processes (Ghisellini et al., 2016). In NPD, this strategy might require developing post use disintegration scenarios of the product and its components. In some cases, leftover materials of the manufacturing phase might be used for energy generation for the company. Recover is the least preferable strategy and causes the longer resource loops compared to other strategies mentioned in this section. In some cases, this approach reduces landfill dependency, supports waste valorization, reduces greenhouse gas emissions, and may provide cleaner fuel options—an alternative energy source—for communities, especially in areas lacking infrastructure.

Perhaps the most effective application of the recovery strategy is the composting of organic waste, which can recover energy through anaerobic digestion. In this way, food waste can be used for electricity, heat generation, and nutrition for farming.

The Social Impacts of NPD Strategies within the Circular Economy Framework

As discussed in this chapter and summarized in Table 1, the connection between human well-being and ecosystem health implies that economic activities and decisions taken in the NPD not only depend on but also substantially impact societal well-being.

NPD strategies such as effectively communicating product and service labeling and certifications related to sustainability, enabling reuse, and repurposing scenarios during the use and end-of-life phases of the product lifecycle, and consciously refusing the use of certain materials and components in the conceptualization phase might improve public awareness and knowledge about sustainability and the CE.

Similarly, lowering the cost of products or services through the R strategies (Rethink, Reduce, Reuse, Refurbish, Repurpose, Recover) or developing access-based business models and PSSs might allow a wider range of consumers to benefit from these products and services. Ultimately, these strategies have the potential to enhance social inclusion.

Certain NPD strategies within the framework of CE could also contribute to creating job opportunities and fostering local development by fostering repair, remanufacturing, and recycling sectors. In addition to job creation, increasing the repair and repurposing scenarios during NPD processes can help develop a sense of belonging and community

Table 1 Social implications of NPD strategies within the framework of CE

Social impacts	*NPD strategies within the CE framework*
Public awareness and knowledge about sustainability and CE	Product and service labeling, certification, refuse, reuse, repurpose
Social inclusion	Access based BMs, PSS, rethink, reduce, reuse, refurbish, repurpose, recover
Employment and local development	Design for longevity, repair, remanufacture, recycle, refurbish
Community, sense of belonging, mutual learning	Repair, repurpose
Health, safety, and quality of life	Elimination of hazardous materials and components, ethical sourcing and production, refuse, recover

among consumers. Additionally, to gain higher benefits from repurposing, a mutual learning process between companies within the same industrial ecosystem might be a beneficial approach.

Among all, perhaps the most direct social impact in the domain of health, safety, and life quality can be achieved through eliminating harmful materials and considering ethical sourcing. These strategies can drastically improve the social impact of value proposition, while encouraging businesses to develop sustainability-oriented alliances along the supply chain.

4 Societal Marketing Implications and Conclusion

Adopting CE principles in NPD strategies creates market opportunities while requiring companies to rethink societal marketing. New organizational models must consider the circular and holistic interrelationships between production and consumption that not only need to respond to customer expectations but also promote societal well-being (Geissdoerfer et al., 2017).

In these circular systems, marketing practices are expected to support customers in understanding the importance of sustainability and embracing sustainable consumption behaviors. In product development decisions, product benefits like extending product lifespan, reusability, repairability, or modularity have regained their importance because of their role in alleviating resource depletion. Recent studies and real-world practices also support the idea that new business models can encourage and empower users to show more sustainable behaviors. For instance, sharing platforms can transform consumers' ownership-based product consumption habits to access-based circular consumption practices. Repair systems also have the potential to raise consumer awareness and push them to prefer economically and environmentally responsible and sustainable choices.

Besides aiming to enable sustainable features of their products, companies can form circular communities with the partnership of local actors including local associations and organizations, local businesses, social media forums, online, and offline social groups. These communities can transform product consumption practices into more sustainable and responsible directions. The previously explained partnership between Patagonia and iFixit is one of the successful examples of the development

of repair communities through the integration of local cafes and forums to sustainable repair solutions.

These types of practices are in line with the environmental aspects of CE's. Besides, they also strengthen the social aspects through community development practices such as social activities and workshops, where consumers exchange knowledge and skills with others and support sustainable living.

Consumers are interested in the design processes of products, and their evaluations of these products are influenced by the information they obtain about these processes (Da Silva et al., 2015). Emphasizing how the product is designed for repairability (e.g., giving information about the modularity of the product with easily replaceable components) and highlighting the repair-friendliness of the design compared to competitors could be another strategy within this framework. Additionally, companies use certifications related to sustainability in their marketing zs (e.g., by placing the certification logo on their website or product packaging). However, studies show that eco-labels are often misunderstood and perceived as confusing and unreliable due to poor design, including insufficient information, lack of clarity, or ineffective imagery, which hinders consumers' ability to understand them, ultimately limiting their capacity to make environmentally responsible purchasing decisions (Taufique et al., 2019). Thus, to use eco-labeling as an effective behavior change tool (Meis-Harris et al., 2021), companies should provide information on their accomplishments to gather a certificate rather than simply displaying their logo to consumers who may not know enough about it.

Equity and inclusivity considerations have become central to societal marketing strategies in CE. Therefore, along with other responsibilities, marketing strategies that adopt CE principles are responsible for (1) developing products that are accessible to diverse consumer segments and (2) making existing products accessible to more vulnerable consumer groups rather than only targeting privileged consumer segments (Murray et al., 2017).

In conclusion, the transition toward CE principles needs fundamental reconstruction of product development strategies and practices. In their NPD processes, organizations must move beyond targeting specific consumer segments and meeting their needs. They need to embrace more systemic, holistic, and collaborative marketing practices (Bocken et al., 2016) considering the circular relationships between production

and consumption. We argue that these implications help companies to adapt their NPD strategies to CE principles, support consumers to show sustainable behaviors and construct long-term relationships between consumers and their products and contributing broader economic, societal, and environmental goals.

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