

Stanford SOCIAL INNOVATION^{Review}

Feature

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Stanford Social Innovation Review
Spring 2022

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Stanford Social Innovation Review
www.ssir.org
Email: editor@ssir.org

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Illustration by Mengxin Li

Corporations can achieve greater environmental and financial performance by developing and implementing circular business model strategies.

The last eight years have been the warmest on record, and the pervasive effects of climate change on humanity have become glaringly evident. Confronted with mounting infectious diseases, droughts, and floods amid rising sea levels, nations around the world are launching plans to mitigate these harmful effects. In 2019, the European Commission introduced the Green Deal, a €1-trillion plan to turn Europe climate neutral by 2050. This package includes a Circular Economy Action Plan to make manufacturing and industrial production processes more sustainable, encourage environmentally conscientious consumption, and reduce waste by recycling and reusing resources for as long as possible. In the United States, the Biden administration reentered the Paris Agreement last year and has pledged to invest \$2 trillion in infrastructure and sustainable energy.

Leading corporations are also setting ambitious sustainability targets. The circular economy has inspired corporations to address environmental challenges in response to accelerating climate change. Moving away from the “take-make-dispose” linear economy—in which materials are extracted to make products that are discarded after limited use—the circular economy presents a new economic model of production and consumption where waste is eliminated, materials are recycled, and nature is regenerated. To accomplish this transformation, corporate leaders rely on four circular business strategies: using less material per product (narrowing resource loops), extending product life (slowing resource loops), reusing materials (closing resource loops), and reviving natural resources used in production processes (regenerating resource loops).¹ These strategies enable corporations to cut costs, enhance their reputation, and

spur new product and market development.² Many, however, have experienced a host of managerial challenges in their transition to a circular business model.³

Drawing on more than a decade of our experience researching sustainable and circular business model innovation and more than 200 interviews with managers of corporations leading on sustainability, we have found that corporations in the process of designing a circular business model face questions around market desirability, technical feasibility, and business viability. The search for and implementation of circular strategies are often hampered by traditional business practices—a challenge typical in social innovation work, as University of Michigan professor of sustainable enterprise Andrew Hoffman has observed.⁴ In this article, we observe how corporations that adopt these four strategies encounter different obstacles, including whether customers desire such innovations, whether firms can drive them, and whether innovations are profitable. To guide corporations in the adoption of a circular business model, we identify the managerial implications and best practices for each strategy.

Four Circular Strategies

Corporations have traditionally focused on implementing simple and cheap green practices—such as reducing paper use or using sensors that automatically turn off office lights—that result in direct cost savings. These incremental innovations are necessary but insufficient to significantly reduce companies’ environmental footprint. Politicians and activists are increasingly pressuring businesses to implement more substantive measures—such as



substituting unsustainable materials with greener alternatives, avoiding unsustainable consumption of everyday products, recycling products, or regenerating the natural environment used for materials and resources. To transition to the circular economy, corporations need to adopt a more holistic approach that includes the four circular business model strategies of narrowing, slowing, closing, and regenerating resource loops.

Narrowing resource loops | This strategy intends to make the production process more efficient by using fewer resources. For example, the “Clean Future” strategy of multinational consumer-goods company Unilever includes reducing and replacing fossil fuels with renewable resources for its home-care brands. CO₂ is recovered from production processes and reused, and nonrenewable fossil resources are replaced with natural sources—for instance, soda ash, a laundry powder ingredient, is made using CO₂-capture technology. Unilever estimates that this innovation can help reduce its carbon footprint by nearly 20 percent.

Narrowing resource loops also involves creating efficiencies in product design that are enabled by new digital and manufacturing processes. Japanese car manufacturer Toyota, for example, partnered with American engineering company 3D Systems to use additive manufacturing technologies to create lightweight parts more efficiently. This endeavor aligns with Toyota’s strategy to eliminate all carbon emissions during a vehicle’s entire life cycle by 2050. Thus far, the company has reduced its emissions by 49 percent in comparison to its 1990 level. Cars can also be made much more compact and built to run on hydrogen power to further reduce emissions. UK-based eco-car company Riversimple developed a hydrogen-powered fuel-cell electric vehicle that weighs about 1,300 pounds. The eco-car can travel 200 miles on a kilogram (a quarter pound) of hydrogen—a significantly greater distance than the Toyota Mirai, which travels 113 miles per kilogram of hydrogen but weighs three times as much.

Slowing resource loops | This strategy targets overconsumption by extending a product’s life. Former eBay CEO John Donahoe maintained that the greenest products are often ones that already exist, in reference to the global market that eBay has created for used, refurbished, vintage, and new products. E-commerce platforms like eBay offer one example of how to slow resource loops. Businesses can also encourage consumers to reuse products. The Swedish furniture company IKEA’s buyback and resell service is designed to increase the duration of a furniture item’s use. The service offers vouchers for up to 50 percent of the original value for items in good condition.

Other examples include premium business models for long-life products and services, including lifetime warranties, repair services, and service contracts. The costs of durable, high-quality products are higher than average at the time of purchase but are cheaper over time because of their quality, which is guaranteed under warranty. For example, Dutch health-care and electronics company Philips sells lower-cost care through integral life-cycle management services that include options to keep medical equipment in use longer, such as upgrades and reconditioning and refurbishing of hardware.

Closing resource loops | The strategy of reusing material post-consumer usage is often called “post-consumer recycling.” The practices of plastic, paper, and glass recycling are already widespread.

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In Europe, for example, 66 percent of packaging waste is recycled. Companies also have incorporated recycling more widely in their operations. British car manufacturer Jaguar’s REALITY aluminum project upcycles waste from cans, bottle caps, and end-of-life vehicles into premium cars like the Land Rover, an effort that Jaguar estimates could cut its CO₂ emissions by 26 percent. Walmart has committed to 100 percent recyclable, reusable, or industrially compostable packaging by 2025. American electronics company Xerox has established a take-back program focusing on recycling its products to divert waste from landfills. Working with third-party recyclers, it diverted approximately 276,000 tons of electronics from landfills in 2018, avoiding producing 724,000 tons of CO₂.

Regenerating resource loops | This fourth business strategy focuses on improving the environment that a company exploits for its operations and commercial use. Large-scale, unsustainable practices in the food industry, such as monocropping (growing the same crop on the same land, year after year) and the widespread use of pesticides, have degraded soil around the world. In 2018, multinational food company Danone invested \$6 million in its soil health initiative to help meet its goal of strengthening agricultural resilience. Danone developed a regenerative agriculture framework together with the international NGO World Wildlife Fund for Nature to support its farmers’ regenerative practices. IKEA also employs a regeneration strategy, as the production of its furniture consumes vast amounts of raw materials like lumber, which contributes to deforestation. As a part of its approach, the company purchased nearly 136,000 acres of forest in five US states to protect it from commercial development. IKEA has vowed to become more “climate positive” by 2030 by continuing to acquire forestland to protect it from development, in addition to its emissions-reduction efforts.

Managing Loops

Strategic design science has long recognized the need to develop *desirable* products using business models that are *feasible* and financially *viable*. In designing their circular business models, corporations must therefore consider these three factors when looking to narrow, slow, close, and regenerate resource loops. First, they must assess whether the four circular business model strategies can appeal to their customers. Second, they need to determine whether these strategies are technically and operationally achievable. Finally, they must weigh whether these strategies make financial sense. Let us consider the three design elements for each circular strategy in turn.

Narrowing Resource Loops

Desirability | Achieving resource efficiencies through narrowing can leave product desirability unchanged when sustainability efforts remain unknown or invisible to customers. However, using fewer or different resources likely changes production costs, potentially

forcing businesses to adjust their prices. Narrowing may allow for price reductions, which increases product desirability. Alternatively, they may keep prices unchanged but increase product desirability by publicizing their sustainability improvements.

Raising prices generally requires knowledge about price elasticity and customer expectations. Even though consumer demand is inversely correlated to cost, demand may still increase despite rising prices when customers value the social purpose underlying the business's mission.⁵ If customers unfavorably associate sustainability with higher costs or lower quality, businesses may prefer to omit sustainability from branding.

Feasibility | Narrowing resource loops can be relatively easy to implement through internal research and design practices or in collaboration with external partners to alter production processes, work with recycled materials, or use resource-saving technologies. Structured approaches such as product life-cycle analyses may identify opportunities to reduce waste during the production process. Beverage company Coca-Cola's life-cycle analysis, for example, resulted in its introduction of PlantBottle packaging, which rapidly saved 30 percent of the petroleum traditionally used in the production process.

Narrowing the loop efforts may also focus on suppliers. Aluminum is among the most energy intensive and CO₂-emitting industries globally. Aluminum companies Alcoa and Rio Tinto established a joint venture to commercialize a new technology that significantly reduces emissions from the aluminum melting process—a project that multinational technology company Apple also invested in to both reduce its overall emissions and save on operational costs.

In other cases, narrowing may require product redesign. Laundry detergent brands from US-based corporation Procter & Gamble and its European competitor Unilever have been working on concentrating detergents so that they can be packaged in smaller bottles that require less material and are also effective at lower water temperatures, potentially reducing at-home energy use. The Franco-Dutch airline Air France-KLM has partnered with Delft University of Technology to give its planes a streamlined V-shape, saving 20 percent on fuel used on flights and reducing emissions.

Viability | Narrowing resource loops often saves costs, resources, and energy. For example, Unilever saved more than €873 million by improving energy efficiency across its factories. Alternatively, narrowing may prove profitable when efficiencies allow corporations to position their products at a premium. A study released in 2020 by multinational tech corporation IBM found that nearly 80 percent of its customers believe sustainability to be important and, of that 80 percent, more than 70 percent would pay an average premium of 35 percent more for sustainable products.

Unquantifiable benefits such as an enhanced reputation may also justify narrowing resource loops. When resource and emissions savings do not immediately save on cost, environmental leadership may be attractive to customers. This potential requires corporations to consider a broader set of performance metrics to evaluate the business case. For example, the American carpet manufacturer Interface stopped using unsustainable materials, which increased production costs and resulted in a short-term financial loss, because its executive board determined that it would likely benefit long-term from reputational gain if it used cleaner production processes.

Slowing Resource Loops

Desirability | When slowing resource loops focuses on extending a product's life, longevity becomes a product feature and customers may consider this factor in their purchasing choices.⁶ To increase overall product desirability, slowing resource loops often includes future-oriented services like warranties, repairs, and maintenance. For example, the products of international outdoor company Patagonia have a lifetime warranty that is facilitated by its repair service. This support matches the company's philosophy of "buy less, demand more" by providing customers with long-lasting, repairable products backed by high levels of service.

However, customer myopia and a craving for novelty may jeopardize the market desirability of this proposition. Customers may want the latest smartphone or newest clothing. Solutions to this kind of consumerism include delivering novelty through rental models, which provide product variety without ownership, or through re-commerce models. In 2019, Swedish retailer H&M trialed fashion rental, offering members up to three pieces from its Conscious Exclusive collection for about \$40 per month.

Importantly, service models may allow consumers to meet their demands in more effective and sustainable ways that do not require product ownership and help extend the product's life, such as rental services.⁷ The stroller company Bugaboo offers a stroller lease service called Bugaboo Flex that allows customers to upgrade their stroller as necessary and to return their stroller when it is no longer needed. Returned products are refurbished for reuse, which saves resources.

Feasibility | Slowing resource loops requires design for product longevity and ready repair or maintenance, such as through upgradable software and hardware components. Technological and operational challenges, including designing for ease of upgrades and maintenance and reverse logistics to take back products for repair, can be addressed by internal research and design teams or supply chain specialists or through external collaborations. In addition, service providers may be contracted for maintenance and repair services if they cannot be performed in-house. For example, Patagonia collaborates with the wiki-based platform iFixit's repair community to make repair guides and videos available online.

Alternatively, joint ventures and acquisitions may be considered to bring in expertise. H&M, for instance, bought a majority stake in the Swedish online secondhand shop Sellpy, which has allowed them to scale their used-clothing business as part of its target to become "100 percent circular." In 2018, Swiss luxury goods group Richemont acquired Watchfinder, a UK-based platform that buys, sells, and exchanges parts of pre-owned luxury watches. Watchfinder processes more than 20,000 watches a year through its accredited service center, which inspects, authenticates, and prepares items for resale. This acquisition has allowed Richemont to be active in the secondhand market and contribute to extended product life.

Slowing resource loops may require corporations to maintain ownership of their products when providing rental services. Besides legal challenges, corporations might need to revise their business model to address repercussions for internal systems, processes, and capabilities.⁸ Small-scale experimentation enables corporations to test new propositions and discover the implications of circular business model innovations.⁹

For example, Philips's former lighting division, Signify, partnered with Thomas Rau of RAU Architects to launch multiple pilots for selling "light as a service" to companies. Light-emitting diode lights (LEDs) are more expensive than fluorescent lights but are much more energy efficient and longer lasting. A service contract would prevent high upfront cost while providing energy savings. When switching to selling light as a service, the corporation had to determine how to set up service contracts and adjust its resource planning system. Because the service helps companies lower their electricity bills, the proposition turned into a financial service targeted at financial managers instead of facility managers. Signify maintained ownership of the lighting equipment and armatures, and sales managers were retrained accordingly. And, because accumulating assets on the balance sheet may draw investors' ire, Philips collaborated with multiple banks via "Philips Lighting Capital," an internal financial competence center that acted as a consultant to develop the financing arrangements and avoid issues, such as having too much equipment listed on the balance sheet.¹⁰

Viability | For corporations to benefit from slowing resource loops, a premium price charged for longevity may reduce the negative effects of cannibalizing their replacement market. In other words, the higher upfront price would offset the missed revenue from a reduced number of repeat purchases per customer. Some Nordic clothing brands, such as Filippa K and Nudie Jeans, charge a higher price for their premium durable products. They also capture the value of product longevity by accepting clothing returns from customers and reselling these pre-owned items.

While slowing can promote future sales, service models can generate a continuous income stream. Service models also lock in customers and enable vertical integration in the value chain to increase profit. British car and aviation engine manufacturer Rolls-Royce's "power by the hour" is an airplane engine and parts replacement service offered on a fixed-cost-per-hour basis. This long-term service contract aligns the interests of the manufacturer and the owner, who only pays for high-performing engines. About half the material is of sufficient quality to be remanufactured into new parts, so the product's lifetime can be extended. This has proven to be a highly profitable strategy: Rolls-Royce's service program is estimated to account for 70 percent of its revenues.

Closing Resource Loops

Desirability | Closing these loops involves reusing materials through recycling, as typically facilitated by take-back or recovery models, which allow customers to return used products to the company for recycling or reuse. Dutch clothing brand MUD Jeans, for example, uses a take-back model, offering a return option to encourage recycling. Customers receive a €10 discount on their next jeans purchase when returning an old pair.

Recovery models retrieve already discarded or wasted material to use for new products. This can result in lower prices by reusing valuable resources or in reputational advantages by addressing an environmental issue that enables companies to charge a premium. The Net-Works collaboration of Interface, nylon manufacturer Aquafil, and the Zoological Society of London turns ocean plastics, such as recovered nylon fishing nets, into new carpet. Net-Works

engages directly with local communities on this effort, connecting with fishing communities in the Philippines and Cameroon to prevent fishing nets from being discarded in the ocean. Interface intentionally designs its carpet to have ocean-like patterns in order to make this sustainability effort both visible and attractive to consumers.

Feasibility | Closing resource loops requires technical skill to recycle products, logistical innovations to retrieve materials, or fundamental changes in the value chain around the ways businesses collaborate with customers and suppliers to retrieve and reprocess products and materials. In Jaguar's case, seeking to reduce the cost and energy intensity of aluminum recycling led them to make an agreement with aluminum supplier Novelis to ensure that high quality and pure aluminum remainders from the Land Rover's production processes were collected separately for recycling. This scrap segregation requires significant effort, production planning, and stakeholder buy-in to align partners on the same goals and avoid issues that would affect product quality.

Recycling also poses physical and practical limitations. Materials cannot be endlessly recycled because they can suffer from contamination during the collection process and degrade after multiple recycling cycles. Moreover, collection is not always efficient. Take-back models also rely on customers returning old products, which may be encouraged by incentives like free removal or discounts on new products. Recycling may also be accomplished through community involvement. For example, Coca-Cola has collaborated with the nonprofits Keep America Beautiful and The Recycling Partnership in association with the Closed Loop Infrastructure Fund to donate more than one million recycling bins over the past decade and provide recycling education to residents in more than 1,400 communities worldwide. This partnership has diverted more than 800 million pounds of recyclables from landfills.

To support closing resource loops, legislation can make recycling more widespread and push firms in the right direction. After Japan implemented a home appliance recycling law in 2001, Japanese electronics manufacturer Panasonic began focusing on efforts to increase recycling, including customer education about how to best recycle. Closing the loop may also require significant changes in a corporation's business model, driving a need for internal reorganization and collaboration with external partners.

Viability | Closing the loop can help corporations both directly save costs and enjoy future benefits when recycling resources that will only become scarcer and more valuable over time. Philips, for example, has had longstanding concerns about the availability and cost of aluminum, so it continues to expand its service models that allow for the recycling of raw materials. In 2011, the aluminum producer Novelis announced a goal to use 80 percent scrap in its factories by 2020. In 2018, it used 60 percent recycled material, for a savings of an estimated \$900 per ton of aluminum because of rising aluminum prices.

Alternatively, closing loops may allow corporations to charge a price premium, incur cost savings, or financially benefit from an improved reputation. To illustrate the last, in 2015, 83 percent of Interface's sales team indicated that Net-Works helped them strengthen their relationship with customers, which resulted in an additional \$23.5 million more in products sold that year.

Closing the loop can also lead to continued purchases when take-back services include a voucher for future discounts, such as in the case of MUD Jeans.

Regenerating Resource Loops

Desirability | Regeneration aims to improve the environment and society, and many see value in such stewardship by corporations. Regeneration may be particularly important in a business-to-business setting where companies benefit from doing business with green partners that have shared goals. It may also help corporations create goodwill among customers, communities, and NGOs. Companies like Coca-Cola have been heavily criticized for aggravating water scarcity with their business operations. In response, Coca-Cola launched a 2030 water security strategy to improve water availability, quality, ecosystems, access, and governance to ameliorate water scarcity for communities around the world.

Feasibility | The regenerative strategy requires a new form of capability and level of responsibility. The problems require collaboration with partners who share the same goals and can contribute complementary expertise and skills. For example, the Swiss food conglomerate Nestlé is collaborating with The Xerces Society nonprofit on its bee pollination initiative to improve bee habitats as well as secure its future supply of ingredients.

Moreover, this strategy must be integrated into a company's operations to regenerate the resources used in its production processes. For example, Unilever's Knorr brand co-invests \$1.2 million with suppliers and partners annually through its Knorr Partnership Fund, which finances sustainable agriculture projects, such as planting flower fields and building bee shelters to protect pollinators. Unilever also partnered with Spanish tomato farmers and the Spanish Ornithological Society to improve the habitats of 158 endangered bird species. This is a win-win strategy because birds eat the insects that damage tomato crops—tomatoes are a main ingredient of Knorr products. So, supporting a thriving bird population also benefits crop growth, which benefits consumers and consumer goods producers.

Viability | "There is no business to be done on a dead planet," environmentalist David Brower said. Brower's quote is featured at the entrance of Patagonia's headquarters, as a beacon of its commitment to doing business sustainably. Patagonia Provisions, the business's food division, was established so that the company could become a solution to the broken global food system. Patagonia chose salmon conservation as its first initiative—salmon play a vital role in natural ecosystems, but populations have significantly declined due to overfishing. The company estimates that through collaborations with conservationists and local governments, tens of thousands more salmon now exist in US waters.

Less broadly, collaborative regeneration practices may create new revenue streams. Sugar manufacturer British Sugar is working with its supply farmers to protect and improve soil health. It helped establish the British Beet Research Organisation, a nonprofit that shares expertise on sustainable farming practices. Through this collaboration, the company improved soil usage and sugar beet yields while also developing a new business idea for growing tomatoes from latent CO₂ produced by production

processes, which generated new revenue in an industry suffering from declining subsidies.¹¹ British Sugar is now among the biggest tomato growers in the United Kingdom.

The Road to Circularity

The circular economy challenges businesses to reinvent their business models. But how can successful circular business models be developed and deployed? Awareness of the four strategies' management implications and their solutions can offer managers guidance on how to change their linear business models, unlocking the potential for realizing both societal impact and new business opportunities. While some strategies may be easier to implement than others, corporations must combine all four strategies to fully transform their business models.

IKEA, for example, has improved its production processes and reduced its environmental footprint by switching to renewables to narrow the resource loop. It launched a furniture rental initiative to slow the loop. It collects used furniture for reuse and recycling, contributing to slowing as well as closing the loop. And it is involved in regeneration, buying land that would otherwise be commercially developed to plant forests that are carefully managed through partnerships with NGOs and governments.

By considering all four circular strategies simultaneously, businesses can develop new products and business models that are more desirable to customers. This holistic effort has the potential to reduce cost by saving on resources. It can also lead to innovative offerings with higher margins and secure a future supply network, at the same time realizing a significantly lower environmental footprint and having a positive environmental impact. Indeed, many highly successful companies have started embedding circular business model strategies into their business operations to realize these associated benefits. Even though the road to circularity is not a linear one, it is certain that the future requires companies to go down this path. ■

Notes

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