

Experimentation capability for a circular economy: a practical guide

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The circular economy maximizes the value of products, components and materials over time, and minimizes absolute resource use, waste and emissions. The transition to a circular economy has become a driver for organizational change, to mitigate environmental degradation and provide superior customer value. Several consumer-facing multinationals have pledged to become circular. Yet it is unclear how this can be achieved. To get started, multinationals have experimented with new circular business models. They have provided products as a service, encouraged customers to care for their products to extend product lives and incentivized them to bring old products back for reuse, repair and refurbishment.

To speed up their innovation efforts, companies need to build experimentation capability. Iterative experimentation can help reduce the uncertainty about the faith of new business models. It serves to plan, design and execute relatively controlled situations. The purpose is to develop new knowledge and to understand what can and should be pursued, to drive continuous change and competitive advantage. But what this capability entails and how it can be built when innovating for a circular economy is not clear. Multinationals need to perform key institutional, strategic and operational actions that can help them build it. We identify and share these actions here, based on a study with three large multinationals, H&M, IKEA and Philips, that are leading the transition to a circular economy.

Experimentation capability

To innovate their business models, companies need to build the capability to experiment, test and commercialize radical ideas across research and development, manufacturing and marketing departments. This requires a strategic vision, a physical infrastructure for experimentation, cultural capital and directives that incentivize the use of experimentation methods (Wrigley *et al.*, 2020). It also requires a cultural shift, where people accept failure as a natural part of the process, executives let data trump opinions, everyone gets the possibility to run experiments and where people get ethical training on what kinds of experiments to run (Thomke, 2020).

Innovation for a circular economy requires widespread and interdependent changes in the architecture of a company's business model and the underlying activities. For example, when products are provided as a service, the financial model changes from a one-off sales transaction to recurring revenue, which requires adapted accounting procedures and financial instruments. And the activities around value creation change from linear supply and production to the need for reverse logistics to return the products and prepare them for reuse, refurbishment, remanufacturing or recycling (Lüdeke-Freund *et al.*, 2019). These new business models require experimentation to test their desirability, viability and feasibility before committing significant resources to implementation.

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We distinguish between three nested actions to build experimentation capability for a circular economy (Figure 1) (Bocken and Geradts, 2020). The first refers to institutions: the rules, norms and beliefs that nurture an experimentation culture. The second is strategy: core organizational objectives and the long-term direction that encourage experimentation. And the third is operations: the experimentation practices that contribute to the core organizational objectives. We detail these actions that build experimentation capability for a circular economy.

Method and research setting

We use qualitative research to analyse how multinationals build experimentation capability for a circular economy. Our focus is on multinationals that have ambitious circular economy targets, and that have experimented with consumer-facing circular service business models for at least a couple of years. We selected H&M, IKEA and Philips because of their pioneering efforts to innovate for a circular economy.

We approached key innovators from these organizations who experimented for a circular economy. After the first interviews, we used snowballing to have interviewees refer us to other informants who were involved in the process. We repeated this process until the interviewees only recommended names that we already interviewed. The interviews took place virtually, using video conferencing, between March 2020 and February 2021, and lasted on average 50 min. Table 1 shows the list of interviewees. Interviews discussed different types of circular business model experiments and pilots. The focus was on understanding what influences the ability to experiment with new circular business models.

Data were transcribed ad verbatim and then analysed and coded using the Gioia method (Gioia et al., 2013), where interview data are collated into first-order concepts and second-order

Figure 1 Three nested actions to build experimentation capability

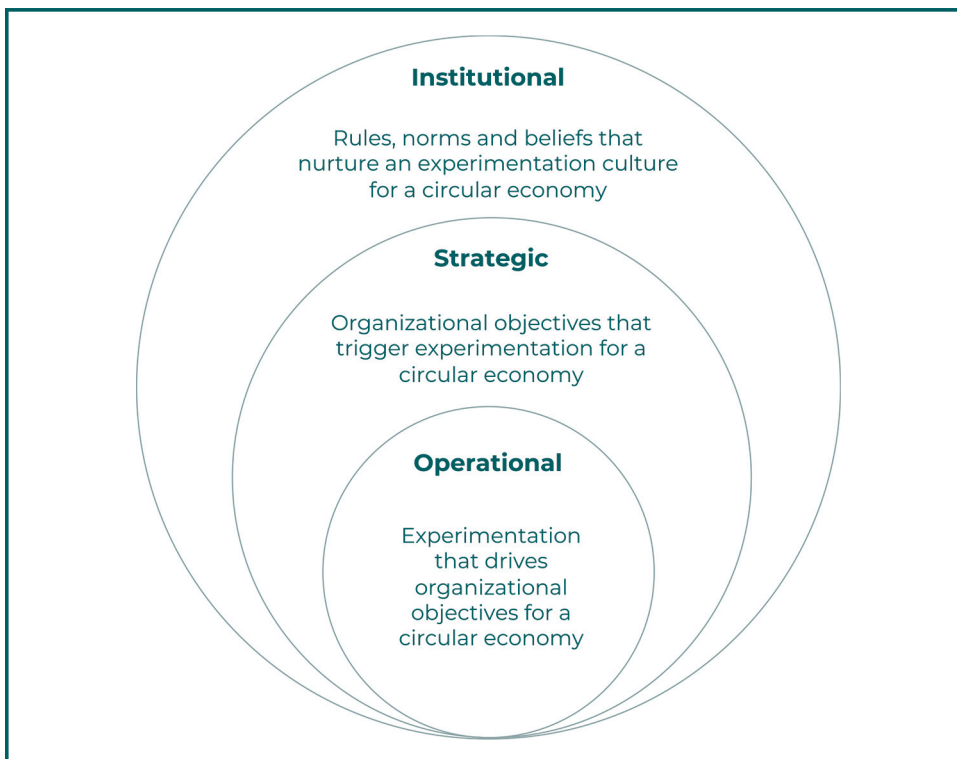


Table 1 Interviewees

<i>Companies</i>	<i>Interviewee role/focus</i>
<i>H&M Group (H&M)</i>	Sustainable business development Circular business development (2 interviews) Global sustainability, innovation and incubation (interview with two experts) Innovation and incubation Sustainability controller Project manager, global sustainability Sustainability project manager Business developer – circular business Circular business innovation lab
<i>IKEA</i>	Global business leader circular economy (1); head of circular business development (2); communication manager circular economy (3) (interview with three experts) Circular supply chain project leader Circular business designer Circular product design and assessment lead Circular business designer Sustainability developer
<i>Royal Philips (Philips)</i>	Program manager circular economy Senior designer, circular economy Start-up venturing lead Design business partner Service designer Venture leader Legal business partner, supporting new business model innovations Subscription accelerator leader and group sustainability – Innovation and strategy (interview with two experts) Senior director sustainability

themes which again lead to aggregate dimensions. In our case, the first-order concepts were operations, which were collated to strategy, which were again collated into institutions. The coding structure thus represents the nested nature of different actions that build experimentation capability. The authors iteratively alternated independent coding followed by joint discussion to develop the final list of actions. The results were shared back with the interviewees to resolve any misinterpretations.

Experimentation capability for a circular economy

Table 1 shows the institutional, strategical and operational management actions to build experimentation capability for a circular economy. We describe these in more detail below.

Acknowledge the need for radical change to achieve sustainability

The first institutional starting point to build experimentation capability is to acknowledge the need for radical change towards sustainability. This is about changing norms and values of how to do business to nurture a culture of experimentation for a circular economy. Within H&M, for example, top management has realized that “the environment is changing [and that] they can’t do business as usual” (sustainability project manager, H&M) and that people in the organization “cannot do work in an extractive manner anymore” (sustainability controller, H&M). As a result, the interviewees have revisited what H&M stands for as an organization and what its values and purpose are. This questioning of the fundamental purpose, norms and values of the organization made “sustainability as big as “global” and “digital” (sustainability controller, H&M).

A publicly announced and ambitious vision for a circular economy is an important step to nurture a culture for experimentation. One interviewee recognized the boldness of the goals set by top management and the pressure from having committed these goals to the public (sustainable

business development, H&M). Another innovator confirmed that the circular economy vision and goals are key to achieving the carbon emissions targets (sustainability developer, IKEA).

The three companies defined the following visions and goals. H&M wants to become 100% circular: by 2030, it aims to use only recycled or sustainably sourced materials, and by 2040, it aims at a “climate positive value chain” that regenerates the carbon cycle. IKEA aims at “100% circular by 2030”, with all products being designed using circular product design principles. Philips has the goal to improve the lives of 2 billion by 2025, and 2.5 billion by 2030, with a focus on underserved communities. Environmentally, by 2025, Philips wants to generate 25% of its revenue from circular products, services and solutions, and to send zero waste to landfill.

An ambitious vision requires top-level management support. Without this support, the innovators lack the organizational back-up and resources to pursue the necessary changes (Circular business designer, IKEA). This includes the need to assign clear roles and responsibilities and provide a clear mandate and budget for experimentation. An interviewee from Philips describes that “when chief executive officer Frans van Houten mentioned his initiative as an example, they really got the ball rolling” (venture leader, Philips). This shows that top-level managers, in addition to making budget and resources available, need to be authentic, stand behind and actively proclaim the needed transition in the way they lead the organizations.

Once a vision and goals are in place, it is important to identify the people who are passionate about the circular economy and who will lead the needed change in the operations. To be able to experiment, these leaders set up key performance indicators for experimentation, with a focus on the desirability, feasibility, viability and sustainability of new business models. H&M’s business model experiment in partnership with the “Renewal Workshop” is an example, a new offering that cleans and repairs returned damaged fashion items so that they can be resold to customers. These fashion items were previously sold to a third-party recycler if not fit for reuse. The viability for H&M is defined as the profitability of reselling used items, the feasibility is guaranteed by the Renewal Workshop and the desirability is tested in a dedicated campaign in physical stores where customers can buy the recovered items at reduced prices. And the sustainability is based on data about the material composition of the items and calculated material and energy savings. This shows that key performance indicators are important to build experimentation capability, as they evaluate experiments and pilots.

Overcoming the linear economy legacy

The linear economy legacy refers to the “historical lock-in” (senior designer circular economy, Philips) of the linear take-make-waste organizational structures and routines, and the “struggle to integrate the new within existing systems” (business developer, circular business, H&M). Part of this legacy is a dependency on quick sales and little responsibility for the product beyond the sales horizon, except limited legal warranties.

The linear economy legacy can be overcome by building new organizational capabilities, structures and routines because “the process and tools and finance are not aligned” (design business partner, Philips). A new business model like subscription might first be set up outside the existing billing systems until it is ready to scale up. The ability to experiment with new circular business models requires “a lot of internal changes” (project manager, global sustainability, H&M). Procurement and logistics need to adapt to try out reverse logistics, because the organizations are “just not used to sending things the reverse way” (circular business designer, IKEA). Experimentation capability also requires awareness and knowledge of the circular economy, sustainability and experimentation methods across the organization. To obtain this knowledge, the innovators “read all the books and take the courses to be able to test and learn” (circular business designer, IKEA). This is needed until “most of the co-workers have an understanding of the ambition, a basic understanding of what circular means and how that might translate into their roles today” (circular business designer, IKEA).

This also requires intra- and inter-organizational collaboration because circularity goes beyond business divisions and organizational boundaries. The main impacts of the business are typically in the value chain or in how customers use and dispose of the products. Employees need to collaborate cross-functionally to design the experiments and external partners who support them with adapted operations, such as reverse logistics, repair and recycling. The goal is then to replicate a successful model (such as subscription) across multiple contexts, but with the necessary adjustments to fit local legislation and restrictions. It may be the case that “the proposition has to be (slightly) adjusted” (group sustainability, Philips). When scaling up, local teams thus “give it their very own twist” (venture leader, Philips). The core experimentation team may consist of “14 or 16 rebellious people, but then, to do all of this, it requires the whole organization to be part of it” (circular business designer, IKEA), including logistics, commercial and financial departments. That is why “many partners are needed” (global sustainability, H&M) to co-create new solutions together with procurers in different locations. This way, an organization can gain insights into how products travel through the use phase and “what kind of behavior is driving consumption of new and re-use of old” (global business leader circular economy, IKEA).

Scanning for relevant legislation

Scanning for legislation is important to build experimentation capability for a circular economy. Legislation for a circular economy has been strong in Europe, in the form of “the EU Green Deal and the circular economy action plan” (sustainability developer, IKEA). Multinationals scan for new legislation to understand the legal feasibility of new business models that present questions of ownership and liability around used products and products that are provided as a service.

On a strategic level, organizations need to analyse the legislation in different countries to understand where certain business models focussed on repair, spare parts or product take back can be implemented. The legal analysts then build frameworks for new business models to support experimentation. This is no easy task. Within the EU, for example, the law differs by country, for instance in terms of who owns a product once it has been written off or when it is brought back. Also, claims that can be made about products are difficult to assess where the rules on what can be termed “refurbished”, for example, differ per country.

Understanding the legal landscape around circular business models supports people in operations, as they experiment with these new models. Based on the legal requirements, experiments focus on the needed product properties. For example, IKEA must do flame tests on sofas in China. But when a sofa is refurbished, it is not clear if it has to be tested again for flammability. Every product that comes back is different and has a different use phase. This makes it difficult to test the required properties again. To find a workaround, the innovators decided to test samples for flammability.

To understand these challenges up front, legal analysts report on the legal landscape surrounding new business models and they help prioritise experiments with the lowest legal barriers. As one innovator put it: “It is really cool that our legal expert proactively comes with useful tools and methods” (start-up venturing lead, Philips) to facilitate knowledge sharing about legal conditions in different countries. Innovators can then explore “the more scalable solution” (circular business designer, IKEA). Providing spare parts as part of a product offering for easy repair, as an example, is also supported by legislation in several countries, while refurbishment is not (circular supply chain project leader, IKEA).

Sensing changing marketing preferences

Another key to build experimentation capability is sensing changing market preferences, which has two main components. First, consumer awareness of sustainability issues has transformed over the past years, due to viral images of sea plastic and estimates that the sea could contain more plastic than fish by 2050 if no strong global action is taken (MacArthur, 2017). The innovators we interviewed have sensed “increased interest and demand” for sustainable

offerings (sustainability controller, H&M) and noticed that “there is now ambition from the big companies, from the politicians, and there’s interest and willingness to change” (sustainability developer, IKEA). The second component is that customers expect more and better service from products, which leads the innovators to explore how they can build “longer term relationships with the consumer and services” (subscription accelerator leader, Philips).

On a strategic level, this changing customer demand supports the ability of teams to experiment with new circular business models. The teams found out that customers are willing to pay a bit more for sustainable offerings and they react positively to sustainability claims. This resulted in different value propositions that included messages about sustainability, support to help the customers care for their products, and a customer-centric mindset that identifies customer pain points. Seasonal clothing, or clothing that is worn seldomly, as an example, is suitable for experimentation with a rental business model. It addresses both a pain point (no need to own it, cheaper to rent) with a sustainability benefit (higher usage rate, less overall clothing needed).

Changing market preferences also include the rising service expectations of customers. The interviewees repeatedly stated that their innovation efforts are about service and the overall experience. This is because, in the emerging service economy, expectations of customers have changed and competitive advantage comes with a superior service and customer experience, driving the ability of innovators to experiment with circular service business models. Experiments among the interviewees include “beauty-as-a-service” (Philips), “fashion-as-a-service” (H&M) and “furniture-as-a-service” (IKEA). Emerging service models require more attention to customer relationship management and the need to leverage existing service capabilities on an operational level. The interviewees realized “that across many markets the customers want to do the right thing, but they don’t have the tools, the time, the money, the energy to always do it” (circular business designer, IKEA). The challenge during experimentation is to better understand these pain points while providing more sustainable offerings.

Driving the digital transformation

Experimentation capability is closely connected to digital transformation because many experiments happen on the internet. Digital transformation provides the means to address new customer preferences, to drive better customer relationship management and to enable novel ways of experimenting with business models, also in the context of the circular economy and “product-as-a-service” models.

On a strategic level, companies develop their own digital infrastructure for experimentation. This includes online A/B split tests, which test two versions of an advertisement via social media. One innovator tested the offering of a refurbished subscription next to a normal offering and found that 40% of visitors opted for the cheaper refurbished product (service designer, Philips). This confirmed the desirability of circular offerings. To conduct these experiments, the innovators require digital capabilities and access to the required customer data to design targeted experiments.

While building this capability, the innovators stress legal and ethical aspects. Multinational corporations and brands can be wary of digital experimentation. This requires extra checks on the ethical aspects of online messaging, as mentioned by a legal business partner at Philips. For instance, the innovators questioned how ethical it is to launch a landing page with a new product offering that gives the option to lease a product instead of buying it while this service does not yet exist. They stress the need to protect the brand and only offer what they can and will deliver. Another example relates to the need to be identifiable as a company when conducting A/B split tests of different value propositions. Getting these ethical questions right is an important part of experimentation capability.

On an operational level, this requires compliance with data privacy laws and training for ethical customer testing. Innovators need to reflect on the ethics of value proposition testing. The legal departments can act as an ethical compass for teams that conduct experiments online.

Conclusion

This study investigates actions to build experimentation capability for the corporate transition to a circular economy. While much prior work focuses on what needs to be done and why (e.g. to increase competitiveness), research on how to organize the required changes remains scarce (Baldassarre *et al.*, 2020). This study adds to the emerging work on “how to do” circular-oriented innovation (Weissbrod and Bocken, 2017; Zollo *et al.*, 2013).

Based on in-depth interviews with key innovators from leading multinationals, we identified institutional, strategic and operational actions that build experimentation capability for a circular economy (Table 2). Based on this, Table 3 contains guiding questions that can help managers develop experimentation capability for a circular economy. The questions guide innovation managers in multinationals in driving circular economy to the core of how

Table 2 Management actions to build experimentation capability for a circular economy

<i>Institutions</i>	<i>Strategy</i>	<i>Operations</i>
<i>Acknowledge the need for radical change to achieve sustainability</i>	Develop an organizational vision and goals for a circular economy	Engage passionate and dedicated people focussed on circular economy Define KPIs and conduct environmental impact analysis across the product portfolio
	Provide top-level management support for the transition	Define roles and responsibilities focussed on circular economy innovation Provide a mandate, budget and incentives for experimentation
<i>Overcome the linear economy legacy</i>	Develop new organizational capabilities, structures, and routines	Develop new internal structures and routines Build on own capabilities such as procurement, refurbishing, and (reverse) logistics to allow for circular flows Raise awareness and knowledge of circular economy, sustainability, and experimentation methods across the organization
	Build intra- and inter-organizational collaborations	Form cross-disciplinary internal teams focussed on experimentation Source complementary capabilities from partners (e.g., logistics, repair, local or digital infrastructure)
<i>Scan for relevant legislation</i>	Analyse environmental legislation in different countries	Prioritise products and services most affected by environmental legislation Prioritise experiments with lowest legal barriers
	Build legal frameworks for new business models	Inform teams about legal issues with new business models Focus on new markets and offerings
<i>Sense changing market preferences</i>	Explore customer demand for more sustainable offerings	Communicate customer and sustainability benefits Adopt a customer-centric mindset while designing new business models
	Attend to new service expectations of customers	Pay more attention to customer relationship management Leverage existing capabilities
<i>Drive digital transformation</i>	Create a digital infrastructure for experimentation	Build digital capabilities for online testing Get access to data to be able to experiment Comply with data privacy laws
	Review ethical and legal aspects of digital experimentation	Train for ethical customer testing of new business models

Table 3 Managerial questions to build circular business experimentation capability

<i>Institutions</i>	<i>Strategy</i>	<i>Operations</i>
<i>How can we contribute to solving societal and environmental issues? With whom can we collaborate to achieve this goal?</i>	What is our vision for the future of the organization and how can we use the circular economy paradigm to guide this?	How can we recruit employees with the right skillset and mentality? What training can we develop for existing staff members in different functions? What key performance indicators can we adopt? How can we analyse our environmental impact across the product portfolio?
	How can we engage top management in the circular economy transition? What new skills and incentives are needed?	How can we build circular economy into roles and responsibilities? Who is tasked with experimentation and who will support? What budgets (IT, R&D, marketing, operations) can we allocate to experimentation? Who has the mandate? What incentives can we apply?
<i>How can we overcome the linear economy paradigm through our business vision and mission?</i>	What new routines, capabilities or organizational structures are needed?	What new structures (e.g., IT team collaborating with marketing and sustainability on experiments) are needed? What skill gaps need to be filled? What own capabilities (e.g., repair, reverse logistics) can we build on to allow for circular flows of products and materials? How can we create awareness and knowledge of circular economy, sustainability and experimentation methods?
	Whom do we bring together internally? Whom should we collaborate with outside the organisation to bring in new capabilities?	What new team and cross-functional-team settings will be needed to start experimentation? Who will be responsible? What complementary capabilities do we need from partners (e.g., logistics, repair, local or digital infrastructure)?
<i>What (upcoming) legislations stimulate our circular economy transition?</i>	What environmental legislation enables or hinders us to innovate in different countries?	What products and services are most affected by environmental legislation? Which experiments have the lowest legal barriers?
	What legal structures or frameworks are needed for new business models?	What legal issues (e.g. financing or product related) are constraining new business models? How can we build workarounds or opportunities? What new markets and offerings can be offered in areas with the least constraints or best legal starting point (e.g. pro-repair or anti-planned-obsolescence laws)?
<i>How are market preferences for circular economy and sustainability changing?</i>	Which type of customers do we target for our sustainable offerings? What new markets can we address?	How can we communicate customer and sustainability benefits simultaneously? How can we adopt a customer-centric mindset while designing new business models?
	What new service expectations of customers can be met through our circular offering?	How can we develop better customer relationship management through new circular service business models? What existing capabilities (operations, service) can amplify our offering?
<i>How can we drive the “twin-transition” of digital and circular economy?</i>	How can we create a digital infrastructure for experimentation?	What new digital capabilities do we need for online testing? What data do we need to access, and can we access to be able to experiment?
	What ethical and legal aspects of digital experimentation need to be incorporated?	How can we comply with data privacy and access laws? What staff training can we provide for ethical customer testing of new business models?

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Business models,
Experimentation,
Multinationals,
Sustainability,
Circular economy

business is done. Future studies can focus on a larger set of sectors and types of companies and investigate pressing topics such as the negative environmental rebound effect (Das *et al.*, 2022) in circular business model experiments.

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