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Circular Business Model Experimentation: concept and approaches

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Abstract. *This paper aims to provide conceptual insight on ‘Circular business model experimentation’ by exploring the concept and potential approaches to pursue. The Circular Economy can be a successful driver for change by focusing efforts on economic and environmental issues while also addressing socio-economic challenges such as (un)employment. The business model of firms is viewed as a systematic driver for change in a company, bringing together the various elements of the way of doing business: the value proposition (what value is proposed and to whom); value creation and delivery (how this value is provided) and value capture (how money is made and other forms of value are captured). To develop and validate novel business models, experimentation is needed. While experimentation has been prominent in natural sciences, economics and transitions management literature, it has not yet mainstreamed as a potential business approach, despite the fact that it has been heralded as a key driver for competitiveness and sustainability success. This paper explores the concept of Circular Business Model Experimentation by addressing the following questions: What is Circular Business Model Experimentation? What approaches are available for business? Based on this, suggestions for future research and practice on circular business model experimentation are developed.*

1. Background

Pressure on resources and a growing world population are leading to increasing sustainability challenges for industry and society, which means that business-as-usual is not an option [1]. A vital shift is required in the purpose of business and every aspect of how business is conducted [1;2;3;4]. The Circular Economy has gained significant traction with policy makers, academics and business as a driver for sustainability transitions [5] tackling socio-economic and environmental issues simultaneously. In the transition to a circular economy, new circular business models will need to be developed to narrow, slow and close resource loops [6;7]. Companies such as Gispén (furniture) [8], Desso (carpets), and Philips Lighting (‘pay per lux’) are shifting from product-oriented to service oriented business

models [8, 9]. Such service contracts can increase product and material life times, because products retain ownership by the company and can be remanufactured and recycled easily. Various collaborative efforts have emerged, such as “Networks”, where Interface (carpets), the Zoological Society of London, and Aquafil source used nylon fishing nets and turn them into new carpets [10]. Value is created from a former ‘waste’.

Despite such examples, the Circular Economy has not yet reached its potential, as the uptake of radical circular business practices with companies is quite low [11]. As Frosch [12] (p. 803) noted: “[T]he time scale for cultural and system change is likely to be long (...) It takes a long time to shift a gigantic social system into a useful direction, and there will be no doubt many failed experiments along the way. Insistence on no failures is also insistence on no experiments. We must begin to try.” There seems to be a momentum: business leaders gathered at the World Economic Forum Annual 2018 Meeting and pledged to pursue new circular business models [13].

There is a clear need for circular business model experimentation, but there is little understanding on how to do this. Theory is lacking, with few contributions in academic literature on business experiments and even fewer focusing on such experiments for sustainability. Exceptions include Weissbrod and Bocken [14], Antikainen and Valkokari [15] and Bocken et al. [16;17], which include cases of circular business model innovations and experiments. Several books also focus on experiments like the work by Blank [18], Ries [19] and Osterwalder et al. [20] although not with a specific sustainability or circularity focus. We address this gap by providing conceptual insight on ‘circular business model experimentation’. The following questions are explored: *What is Circular Business Model Experimentation (CBME)? What approaches are available for business?*

2. Understanding circular business model experimentation

This section aims to gain an understanding of the concept of CBME by exploring how to define it (what?), why it is needed (why?), and how it can be done (how?).

2.1 What is circular business experimentation?

Business experimentation is about exploring the different possibilities that a business could create value from, or understand what works in which particular situations in a real-life business context [16; 17]. It is a method that aims to set up experiments and control and manipulate certain variables of the business model [18; 19; 21]. Whereas typically business experimentation is about testing customer propositions, or more broadly the value proposition [18; 19], sustainable and circular business experiments bring in a clear environmental and/ or societal element: what is the positive value created for wider society and the environment [14; 22; 23]. So, besides the customer proposition, an environmental and societal

value proposition needs to be formulated and tested [24; 25; 26]. This 'sustainable value proposition' refers to pledge, in absolute values, that a company provides about environmental or societal ambitions throughout its value chain [27]. In addition to testing value propositions, a business model experimentation can also be used to test other business model elements [28], which play a critical role in making a business model successful.

From a resource perspective, circular business models are about slowing, closing and narrowing resource loops (Figure 1): strategies to provide products that last and support product life extension (slowing); strategies to close material loops through recycling (closing); and strategies to use less material and energy per product (narrowing loops). The sustainable value proposition to be experimented with can focus on achieving these resource strategies [27]. CBME supports the development of new circular business models, by creating hypotheses about the business to be tested and testing these in a small-scale and limited resource way [14; 18; 19; 23; 29]. For example, they might test how a business model can support diversion of fashion waste to landfill, while fulfilling customer demands [23].

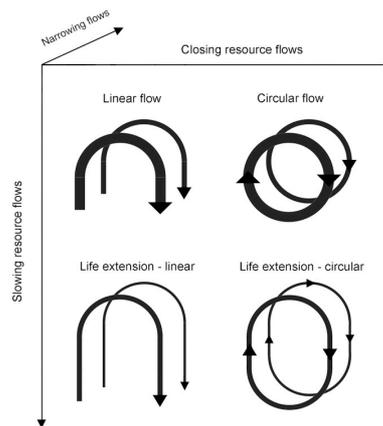


Figure 1. Circular Economy framework. Source: Bocken et al. [7, p. 309]

Although experiments cannot typically be controlled in a business environment, as businesses deal with real customers and immediate business pressures at the same time [23], careful planning plays a critical part in the experiment process ensuring that the experiment provides useful data on the critical parts of the business model. They are essentially small-scale and limited resource activities, taking place before starting larger scale pilots, and eventually scaled up businesses, to help challenge business as usual and encourage (collaborative) learning [17]. Experiments in business have a fast-paced learning cycle [20; 30] low resource requirements [19] and are rather iterative compared to pilots (Figure 2). They may include focus groups, 'paper versions' of business models and web landing pages (to test demand through the number of clicks) or A/B split tests for

advertisements (testing two versions of an advert) [31]. Although experiments allow businesses to test assumptions, it is unknown what happens when all assumptions come together when offering the actual product-service-system so they can be followed with a larger pilot [10].

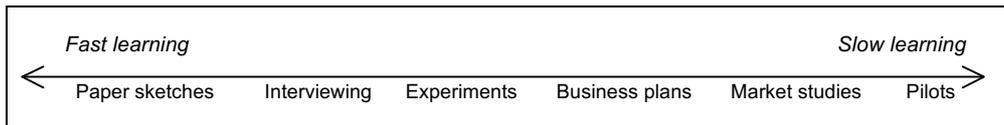


Figure 2. Experiments in the 'learning spectrum'. Based on [20].

In other words, experiments are the starting point of the transformation of a business model further and will need to be followed by larger scale pilot and roll out activities [20]. Another essential aspect is the evaluation of the circularity and sustainability of the business model [14; 23; 24; 27]. Ideally, CBME would simultaneously test business, customer as well as sustainability viability [14; 23; 24; 27]. Environmental and social value proposition design [27] in addition to testing customer traction [18, 19] would be an essential element in this process.

To conclude, CBME may be defined as *an approach to explore the different possibilities that a business could create value from and understand what works in a real-life business context to significantly reduce the natural resource needs of business while creating positive value for customers, wider society and the environment in a fast, low resource way.*

2.2 Why is circular business experimentation needed?

There is a clear need to start experimenting with novel solutions in order to start the transition to a sustainable future balancing needs of people (society), the planet (environment) and profit (our economic system) [14; 32]. Hence, an essential aspect of experimentation is the evaluation of the circularity and sustainability of the business model [14; 24; 25; 26] in addition to testing customer traction [18; 19]. It is not surprising that experimentation has a strong footing in transitions management [33; 34]. However, such experimentation is often large scale and takes place over a long period of time [17]. In economics and the natural sciences, experiments often take place in a 'lab environment', with the exception perhaps of the field of 'behavioural economics', including approaches such as nudging, where the 'best choice' is made easiest to the target audience and solutions are tested in practice [35]. While behavioural economic experiments appear popular in policy areas, business can also use an experimentation approach by rapidly trying new options in practice. This is in line with trends of organisations adopting 'agile' approaches using small flexible teams to develop customer solutions [36].

Circular business models aim to reduce resource use. Dematerialisation may refer to an absolute decrease in materials input per unit of service or an absolute dematerialization of the whole economy (i.e., decrease in total material use by a

country) [37; 38]. Dematerialization can be seen as relative to the volume of economic activity - e.g., referring to the materials use or carbon footprint /value-added or materials or energy use/ sales price [37]. However, to avoid further disastrous effects resulting from anthropogenic climate change, absolute reductions in carbon emissions are needed [39]. As summarized by Heiskanen and Jalas [36] from literature, the environmental benefits envisaged by different authors from shift from a product-oriented to a service-oriented business models can result in the following four benefits:

1. *Lower manufacturing volumes* (e.g. through business models supporting greater intensity of use or premium pricing; [1]).
2. *Less impact during the use phase of the product* (because of the manufacturer's incentive for product-life-cycle economic savings when being responsible for life cycle impacts; [4; 40]).
3. *Lower stocks of products* (through optimizing demand)
4. *Higher rate and quality of utilisation of end-of-life products* (because companies retain ownership of the product; e.g. [8]).

Experimentations can help draw out how these impacts might actually work out in practice from a business and environmental perspective. Outdoor company Patagonia for example experimented with a zero-growth model, but this led to motivational issues with employees [41]. However, it continues to experiment with different strategies (e.g. "Don't buy this jacket advert; donating Black Friday revenues to environmental groups; [1]). Automotive startup Riversimple is experimenting with degrowth notions, challenging existing business models [42].

2.3 How to do circular business model experimentation: key elements

Adopting a circular business model (CBM) requires a reorganisation of systems – who to work with and how value is 'distributed' and the changing role of organisations in networks.

2.3.1 Purpose followed by testing the building blocks of the business model

Sustainable business model experimentation often starts off with reiterating the business purpose, which in contrast to just 'making money', also includes clear societal and environmental goals [43]. In circular business models, the focus is specifically on resources as the environmental goal [5]. CBME could follow the different building blocks of business models: value proposition; value creation and delivery, and value capture [44; 7]. A value proposition experiment may focus on testing the viability of the product/ service offering for the customer or larger stakeholder group as the partners, environment and society, which all play an essential role in CBM. A value delivery experiment focuses on customer relationships, customer segments and channels. Value creation and value capture experiments are about more operational aspects such as stakeholders to work with, key activities and cost and revenue streams to be tested [28].

2.3.2 Changing systems, shifting boundaries and new partnerships

Circular business models have the potential to influence individual behaviour (micro-level) through business practices (meso-level) that may also challenge the wider institutional context (macro-level) [45]. They will need to be innovated in parallel with value chains, product and service designs, and new processes and technologies, as these areas are strongly interlinked [46; 47; 7]. The business model also has the potential to bring together multiple considerations about the way in which business is done [48]. Stubbs and Cocklin [43] assert that sustainable business model innovation occurs at a systems level, affecting a whole system of stakeholders and optimising value creation across those. Boons and Bocken [49] and Wirtz and Daiser [45] add that the institutional context in which innovation takes place is essential. In the worst case, business model innovation, albeit well intended, may keep in place existing infrastructures and systems outweighing potential environmental benefits [49; 50]. While complex, CBME requires the consideration and testing of viability at a systemic level, e.g.: will it help reduce the dependency on fossil fuels? Will it lead to absolute reductions in resource use? Will it lead to more efficient use of existing products?

Companies will thus take control of the fate of products after sales to reuse products and materials [46]. Materials and products will be repurposed and reused and customers can become suppliers. This may require additional contracting to recover and source used materials and prevent materials from being landfilled [10] and new forms of service, ranging from (reverse) logistics to maintenance, repair and refurbishment and remanufacturing services [51]. While companies can absorb some of these functions themselves, there is a potential role for coordinating parties to facilitate the governance of circular value networks [52]. In some cases, the business model will facilitate the 'automatic return flow' of materials and products. For example, in a leasing model, companies retain ownership of products [40]. Leising et al. [53] describe 'material passports' and 'material banks' as ways to facilitate material and product returns. In other cases, when products are sold to the end-customer, the customer may need to be incentivised to return products to the customer through take-back schemes, vouchers, free pick-ups etc. Different models will need to be experimented together with partners to develop business models jointly and distribute value across stakeholders [10; 31; 53].

In essence, business model innovation is about shifting organisational boundaries and positions along the value chain, potentially absorbing new functions, or moving functions to other actors [54]. "The entire transformation towards a circular economy sets challenges for established companies (...). [I]t might even destroy the usefulness of their existing capabilities, networks, and business models" ([24], p. 6). This type of innovation is necessary for long-term competitiveness and sustainability [14; 29] and the opportunity is to create 'win-win' situations through considering how to increase the 'value pie' and increase the customer value delivered [10]. By developing visions about the future circular business model together with others, joint business models can be created and optimised [53] rather than value being extracted from others. Leising et al. [53] for example

describe the processes of joint visioning and business model innovation to create some of the first 'circular buildings' in the Netherlands that optimise long product life and material recovery at the end.

3. CBME approaches identified in literature and practice

CBME is a fairly new topic in literature. Some approaches are more structured mimicking experimentation in science using hypothesis testing (e.g. Lean startup [19]), yet others are more intuitive (e.g. effectuation; [55; 56]). Moreover, some approaches are closely linked to the design world and others to business literature. The four approaches from the existing literature could provide inspiration for developing CBME: effectuation; structured lean startup type of approaches; design thinking, and approaches grounded in business modelling/ business model design.

3.1 Effectuation

Effectuation is a 'resource-based' innovation approach, which makes full use of the limited resources and information available [55]. It is rather intuitive and based on focusing and 'using what is available'. Effectuation has five key principles: the bird-in-hand principle (use what is available); affordable loss (deciding what losses are acceptable); crazy-quilt principle (stakeholders shaping the enterprise); lemonade principle (exploiting opportunities in difficult circumstances) and the pilot-in-the-plane (human agency as the driver of opportunity) [56 in 23]. Chesbrough [29] recommends an effectual approach towards business model experimentation, because of the emphasis of 'action over analysis' and the opportunity to build on latent opportunities ([29] p. 362).

3.2 Lean startup type of techniques

The lean startup approach is a structured business modelling approach to test assumptions about a future business [19]. It is customer-centric and fast-paced. Figure 3 shows the lean startup approach, which is iterative, including the generation of business model ideas, building simple prototypes (e.g. paper versions or mock websites), collecting data, learning and pivoting, and repeating this learning cycle.

Along with this approach, 'experiment cards' may be developed [17; 20; 24]. These would facilitate the data collection of the experiment and decision making by formulating hypotheses about the future business and judgment criteria for validating the hypothesis. Although the approach appears fairly structured, the actual implementation may still be 'messy' and decision-making after experiments is not always straightforward [17; 23]. In addition to collecting quantitative data, qualitative data can also be collected with the method, which facilitates a more explorative way to approach novel phenomena.

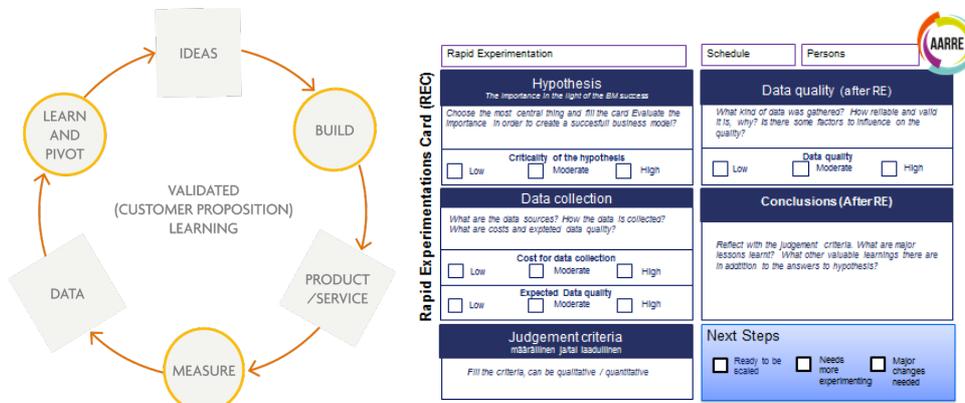


Figure 3. Lean startup notion (left; [14, p. 2666] + Experiment card (right; [57], p 9-10)

3.3 Design thinking

Design thinking has been suggested as an approach for sustainable business modelling ([5; 58]. “Design thinking is a method for developing innovative solutions for complex problems, by deliberately incorporating the concerns, interests, and values of humans into the design process” [5, p. 1220]. Similar to the Lean startup, a customer (and stakeholder) oriented focus is key. Baldassarre et al. [58] for example described the sequence of ‘talking, thinking and testing’ to develop sustainable value propositions by taking a user and broader stakeholder oriented approach. Iterating value propositions with an extended range of stakeholders may create larger acceptance, commitment and support for sustainable innovations ([5 in 58]).

3.4 Circular business experiments cycles

Finally, the business model literature itself [43; 59]. provides a good source of inspiration for CBME. The Circular Business Model Experiment Cycle (Figure 4) was developed based on business model literature to support the development of circular business models. Starting with defining the business purpose [43] and followed by a value proposition experiment, followed by more operational experiments (e.g. value creation and delivery) the cycle suggests an order of experimentation based on literature. Each stage includes deliberate learning and ‘sustainability checks’ (e.g. using sustainable value proposition design checklists: [27] to validate whether the business model experiments are steering the business in the right direction.

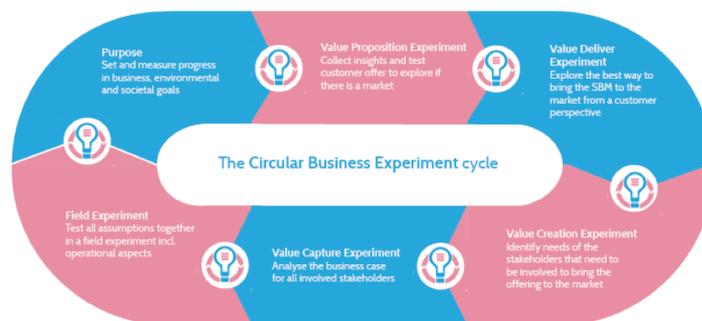


Figure 4. Circular Business Experiment Cycle. Source: [17].

5. Discussion and conclusions

Although literature recognises the need to experiment with multiple business models for long term competitiveness [29; 60] and to address society's grand challenges through business [14; 61], Circular Business Model Experimentation is an underexplored area. This paper aims to contribute to the nascent literature on CBME [14; 24; 61] by utilising existing literature on sustainable and circular business models and - innovation, as well as experimentations as a tool to test and validate business models. In this paper, CMBE was defined as an approach to explore and validate the different possibilities that a business could create value from and understand what works in a real-life business context to significantly reduce the natural resource needs of business while creating positive value for customers, wider society and the environment in a fast, low resource way. Four existing approaches related to CBME were identified: Effectuation; lean startup type of approaches; design thinking, and approaches grounded in business modelling. While the lean startup approach and circular business experiment cycle create a structured guide for business, the other approaches are more unstructured. As a conceptual paper, this work only scratches the surface of an important and emerging research field. Therefore, more action-oriented interdisciplinary research is needed to facilitate companies in their transition towards circular business models. Important future research questions centre around the following:

- How can CBME simultaneously test business, customer and sustainability viability? How can CBME lead to solutions that create absolute reductions in resource use?
- How can circular business models be experimented with jointly, and value be distributed across stakeholders? How can businesses and research organisations collaborate in the CBME process?
- How can the CBME process be managed? How can an internal CBME capability be developed?
- How can circular business model experiments be scaled up to transform businesses?

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