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PO Box 117
221 00 Lund
+46 46-222 00 00

Business Model Experimentation for Circularity: Driving sustainability in a large international clothing retailer

Economics and Policy of Energy
and the Environment (EPEE)
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(accepted version)

Nancy M.P. Bocken[1 2, 3] †, Karen Miller[1], Ilka Weissbrod[4]
Maria Holgado[1], Steve Evans[1]

[1] *University of Cambridge, Department of Engineering, Institute for Manufacturing, 17 Charles Babbage Road, Cambridge CB3 0FS, United Kingdom.*

[2] *Lund University, IIIEE, Tegnérsplatsen 4, 223 50 Lund, Sweden.*

[3] *TU Delft, Industrial Design Engineering, Landbergstraat 15, 2628 CE Delft, The Netherlands.*

[4] *Imperial College London, Centre for Environmental Policy, Faculty of Natural Sciences, London SW7 1NA, United Kingdom*

† Email: nmpb2@cam.ac.uk

Abstract

Business model experimentation for sustainability is an intentional and systematic approach to identify, test and learn about value creation strategies that could be adopted by a business in response to current unsustainable trajectories. For businesses such as large clothing retailers the need to alter course is acute as pressure builds from economic, environmental and social angles. The circular economy concept provides a potential powerful lever for change. To date, however, scant research has been conducted on how circular business model experimentation is conducted.

We present an in-depth action research case study of a large international clothing retailer embarking on a journey of business model experimentation for circularity: the processes, methods, roles and the organisation in light of the need to address broad sustainability challenges in the business. It was found that experimentation activities oscillated between slow and loaded, and faster and un-weighted modes. While an intentional and stepwise process was sought, in reality it was largely emergent and highly iterative. Through this iterative process, new circular business models were generated that co-exist with current non-circular ones. Confidence in experimentation as a business capability also increased through this collaborative project.

This study provides insights into how to conduct lean startup type business model experimentation for circularity in a large organisation. For practitioners, the benefits of academic-industry collaboration, and the oscillating dynamics of business model experimentation are illuminated.

Key words: Lean startup; circular economy; business model experiment; sustainable business model; circular business model; clothing retailing.

1. Background: Business model experiments for sustainability in clothing retailing

Sustainability for clothing retailers has become a critical issue (Wiese et al, 2012; WRAP, 2012) as multiple factors from economic, environmental and social standpoints collide (Wilson, 2015). Highly consolidated markets increase economic pressures with downward forces on prices (Christopher et al., 2004; Miller, 2016). Simultaneously, concerns for the environment are growing (Fletcher, 2014); cotton, a widely used fibre for example demands substantial volumes of water (Chapagrain et al., 2006) and chemicals (Bourguet and Guillemaud, 2016). Energy is required not only in the fibre production phase but also for clothing manufacture and logistics (Luz, 2007). Socially orientated demands from stakeholders such as NGOs and customers over clothing production working conditions further increase the need for action (Allwood et al., 2006; Pedersen et al., 2016). Meanwhile clothing consumption and disposal patterns are driving demand (Niinimäki and Hassi, 2011), compounding the problems above. Clothing in the UK for instance is estimated by WRAP[1] (2012) to be kept on average for two years and three months before approximately 350,000 tonnes ends annually in landfill; there CO_2, methane and toxic leachates are generated (Muthu, 2015). This means that clothing disposal at landfill adds to the strain on natural resources whilst contributing to climate change and environmental pollution.

Circular Economy has become a major concept in academia, governments and business (Geissdoerfer et al., 2017) and in the clothing industry characterized by fast fashion and associated continuous streams of waste, it could serve as a powerful lever for change (Kant-Hvass, 2014; Fischer and Pascucci, 2017). Different interpretations of the circular economy concept all have in common that resource life-extending strategies play a “major role” (Blomsma and Brennan 2017, p. 605). We assert that strategies to extend the life of resources are essential to reduce the negative impacts of the clothing industry. Of equal importance for the umbrella concept of circular economy is organising the relationship between life-extending strategies (Blomsma and Brennan, 2017). At the same time, how this organization of life-extending strategies might translate into business model innovation is unclear (Bocken et al., 2016b). Rapid business model transformation by clothing retailers (Kant-Hvass, 2014) is however, imperative to mitigate negative clothing industry impacts. Boons and Lüdeke-Freund (2013) argue that new sustainable business models (SBMs) can contribute to resolving environmental and societal issues while contributing to business competitiveness. Simultaneously, others have argued that the concepts of circular economy and sustainability have the creation of both economic and environmental value in common, although the social dimension needs further exploration in circular economy discourse (Murray et al., 2017; Geissdoerfer et al., 2017).

Several large retailers have adopted SBMs around extending the life of resources through the reuse and recycling of clothing but progress is slow (Kant-Hvass, 2014). Sustainable business model thinking is holistically

[1] A UK charity aiming to help organisations achieve greater resource efficiency

orientated around creating value beyond that exclusively for customers and shareholders (economic returns), to encompass multiple stakeholders with societal and environmental goals (Stubbs and Cocklin, 2008; Bocken et al., 2013).

The move towards new sustainable and circular approaches creates fresh opportunities for businesses but also risks (Hockerts and Wüstenhagen, 2010). Teece (2010) identifies that risk relates to venturing into unknown territories - but insists that innovating a novel model of organising and operating a business to create and capture value is essential. This logic is particularly pertinent in saturated markets (Sorescu et al., 2011; Velu and Stiles, 2013) such as clothing retailing (Pedersen et al., 2016).

Yet many firms experience various barriers (Sandberg and Aarikka-Stenroos, 2014) such as inertia or 'lock-in' to their modus operandi (Chesbrough, 2010) when attempting to radically innovate, and adopting experimentation in such conditions may be helpful (Chang et al., 2012). Inertia may result from obstacles such as a lack of resources and/or "restrictive mindset[s]" in corporate contexts (Sandberg and Aarikka-Stenroos, 2014, p.1299). Experimentation is defined by Chang et al. (2012; p.445) as a process "*to probe, experiment, test, and commercialize radical ideas and concepts*". Experimentation with business models can help organisations build confidence and an internal business case about new business models, which enable it to employ larger scale pilots and implement business model changes (Chesbrough, 2010; Osterwalder et al., 2014; Kraaijenhagen et al., 2016). However, it is unclear how business model experimentation for sustainability is undertaken in large complex organisations, although studies have started to explore how experimenting with new value propositions will impact the creation of new business models (e.g. Weissbrod and Bocken, 2017).

Business model experimentation is a deliberate approach to test key 'hypotheses' or assumptions about the potential future business (Chesbrough, 2010), through an iterative process as described in Osterwalder et al. (2014) and Ries (2011), although the latter focuses mostly on customer validation. Experimentation allows for exploration of new value opportunities (Andries et al., 2013), and evaluation of the 'fit' to specific scenarios (time, place, stakeholders) (Weissbrod and Bocken, 2017). However, how resource life-extending strategies might be manifest in new business models that create social and environmental value has not been explored to date. This is an important gap in the literature, especially in relation to the clothing industry.

In this paper, we describe an in-depth case study of business model experimentation in a large international clothing retailer to understand the process to achieve a radical circularity goal of diverting 50% of its clothing from disposal at landfill. The study was funded by the Innovate UK competition 'Supply Chain Innovation towards a Circular Economy' and focused on innovative approaches to bring Circular Economy into practice. Circular Economy was the key driver for achieving sustainability in this retailer case. The perspective of circular economy as a driver for sustainability is one of the dominant ones in literature (Geissdoerfer et al., 2017).

The study addresses the following question: *How can a large clothing retailer experiment with new business models to create greater levels of circularity?*

The paper is structured as follows: first, existing literature on sustainable business models and experimentation for circularity is reviewed. Thereafter the in-depth case method taken in this research is described. Next the process of business model experimentation for circularity is presented and discussed in relation to the literature. Finally the limitations of the study and future avenues for research are offered.

2. Literature on sustainable business models, experimentation and circularity

2.1 Circular business models and experiments

A business model according to Velu and Stiles (2013) encapsulates "the architecture and logic of a business"; or more simply how a business is operated and organised to create and deliver a product/service (value) proposition, attract payment for this value and secure profits from the payment (Richardson, 2008; Osterwalder and Pigneur, 2010; Teece, 2010). Sustainable business models include a broader approach to value and can act as powerful levers to create change not only for a business, but also at a systemic level within the business' ecosystem (Boons and Lüdeke-Freund, 2013; Boons et al., 2013). Boons and Lüdeke-Freund (2013) emphasise more holistic activities are performed by the focal firm as well as partners, suppliers and customers in order to actualise the innovation in the market. Moreover, "environment" and "society" (i.e., environmental and societal concerns) are viewed as key stakeholders for sustainable business model innovation (Stubbs & Cocklin, 2008). Retailers more specifically have the ability to act as 'orchestrators' due to their ecosystem positioning (Sorescu et al. 2011). This position offers retailers significant potential in relation to driving the Circular Economy (Ellen McArthur Foundation, 2012).

According to Chesbrough (2010) businesses need to experiment with their business models to remain relevant in changing industries (McGrath, 2010), primarily because business model change is associated with a high degree of customer and market uncertainty (Andries et al., 2013). Sorescu et al. (2011) argue that experimentation must be a perpetual process in retailing due to intense rivalry. Amazon originally a book retailer that has avariciously expanded (Mazoor, 2010) into clothing, for example, conducts small-scale experiments e.g., with third party sellers, terminating weak options and fervently pursuing favourable ones (McGrath, 2010). If successful, experiments allow businesses to optimise opportunities, leading to the transformation or disruption of existing markets (Christensen, 1997; Magretta, 2002), as Amazon demonstrate (McGrath, 2010).

In this paper, the focus is on experimentation to develop sustainable business models (Stubbs & Cocklin, 2008; Bocken et al., 2014) and *circular* business models as a subset (Geissdoerfer et al., 2017). Circular business models deliver a superior value proposition to the customer while delivering clear societal and environmental benefits (Boons and Lüdeke-Freund, 2013) and

are specifically focused on slowing resource loops (slow consumption and extended product life), closing loops (recycling, post multiple uses) and narrowing loops (efficiency) (Braungart et al., 2008; Stahel, 1994; Kraaijenhagen et al., 2016; Bocken et al., 2016b). In this study, we take a large clothing retailer perspective and how it can experiment to slow, close and narrow resource loops. Business models are often depicted according to a value proposition (product service offering for customer but also wider society and environment), value creation and delivery (how value is created and delivered) and value captured (how money and other forms of value are captured) (Richardson, 2008; Bocken et al., 2014). Similarly, Urbinati et al. (2017) in the context of Circular Economy evaluate the adoption of circularity along two dimensions: the customer value proposition and interface (implementation of the circularity concept in proposing value to customers) and the value network (ways of interacting with suppliers, stakeholders and reorganizing own internal activities). Post-retail responsibility of fashion has been discussed in literature (Kant Hvas, 2014), but not yet across multiple circular economy dimensions. This research investigates experiments at multiple levels within circularity from slowing to closing and narrowing loops (Bocken et al., 2016b).

2.2 Business model experimentation tools and approaches

Business model experimentation for circularity as a process has not been described to date in academic literature. Therefore we focus on adjacent stepwise or structured processes and effectual approaches, and the types of tools used.

Examples of stepwise approaches include the six stages in entrepreneurial literature by Aulet (2013), the three key steps by Ries (2011) and the four steps by Blank (2003) for startups. Osterwalder et al. (2015) offer a ten-question approach to develop value propositions. These approaches, developed for entrepreneurs and startups, have several commonalities, such as focusing on the customer, building solutions and learning rapidly. Figure 1 describes a simplified example of a stepwise iterative approach. The first phase starts with generating a list of business model ideas and their associated barriers and opportunities. Brainstorming techniques help initiate these ideas (Fritscher and Pigneur, 2009), which provide the material for the fermentation of the initial value proposition that is core to any business model (Teece, 2010; Zott et al., 2011), and the focus for experimentation.

Experiments are then designed to test the viability of seedling business models and should focus on one key learning (e.g. customer interest), so that other learning (e.g. operational feasibility) is supplementary (Blank, 2013). This single-learning focus is recommended as there is a tendency for the experiment to migrate unwittingly from ‘lean’ to a full-scale pilot (Ries, 2011). The experiment should be analysed and outcomes ‘measured’. Data are collated and synthesised to learn and potentially ‘pivot’ towards new business models (Ries, 2011). Chesbrough (2010) and Blank (2013) identify that this process may be iterative with multiple rounds of experimentation.

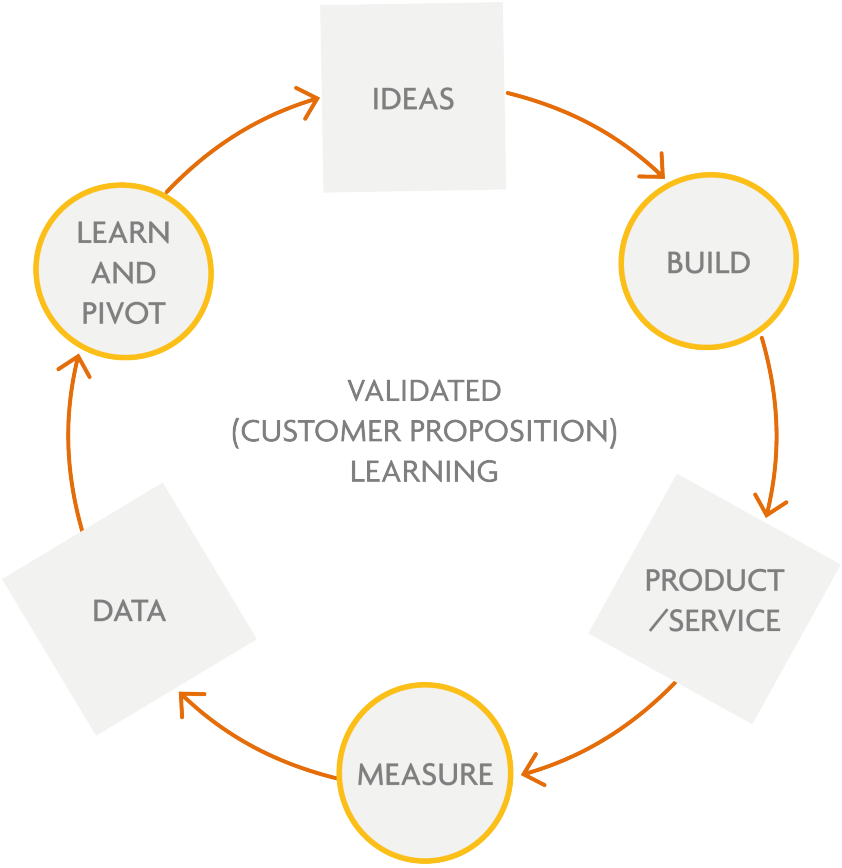

Figure 1. Lean startup approach, Weissbrod and Bocken (2017); adapted from Ries (2011) and Blank (2013)..

Effectuation (Sarasvathy, 2001; Read et al., 2008; Keskin et al., 2013) is an alternative to the structured approaches depicted above, and it is 'resource-based', and makes full use of the limited resources and information available (Read et al., 2008; Sarasvathy, 2001). Effectuation is characterised by five key principles: the bird-in-hand principle (use what is available); affordable loss (deciding what losses are acceptable to you as an entrepreneur); crazy-quilt principle (stakeholders shaping the enterprise); lemonade principle (exploiting opportunities in challenging circumstances) and the pilot-in-the-plane (human agency as the driver of opportunity) (Sarasvathy, 2009). Effectual logic thus uses any and all means at hand, irrespective of whether these turn out to be valuable (Read et al., 2009). Whereas those without entrepreneurial expertise rely primarily on predictive techniques and causation, experienced entrepreneurs typically use an effectual or non-predictive logic to innovation (Read et al., 2009).

Chesbrough (2010; p. 361) strongly recommends that companies adopt an effectual approach towards business model experimentation, and notes that there is a "strong bias in effectuation for action over analysis … [where] there is insufficient data… firms do not study the market - they enact it". Additionally, while experiments might fail, useful new data is generated which may highlight previously latent opportunities (Chesbrough (2010; p. 362). Moreover, research based on six case studies, found that running multiple business model experiments simultaneously increases the likelihood of long-term business survival (Andries et al., 2013).

While it is evident that there are differences between more and less structured approaches, key authors recognise the need for activity within limited time and other resources; in particular, established businesses require a sense of urgency in initiating experiments (Amit and Zott, 2001; Chesbrough, 2010; Weissbrod and Bocken, 2017). Chang et al. (2012) found that the organizational experimentation capability is the most important capability to pursue radical innovation and to overcome organisational inertia. However, the experimentation methods described have mainly been developed for startups and Blank (2003) argues that startups are not smaller versions of large companies. Large firms might for example use lean startup methods to pursue experimentation in relation to sustainability goals (Weissbrod and Bocken, 2017). In Ries' (2011) Lean Startup experimentation technique a hypothesis is tested with the 'minimum viable product', i.e. a prototype that enables experimenters to derive maximal learning (from users) with minimal effort.

Various tools for mapping out business models are also positioned as useful in guiding teams experimenting with nascent propositions (Chesborough, 2010). Yet to date few models have been developed specifically for sustainable business model development (Bocken et al. 2013; Weissbrod and Bocken, 2017) and in particular the redesign of 'brick and mortar' businesses for sustainability as opposed to internet-based startups (the focus in Ries, 2011). One widely used tool the Business Model Canvas (Osterwalder et al., 2010; 2014) has however been adapted for sustainability purposes, for example by Joyce and Paquin (2016) through The Triple Layer Business Model Canvas, and Upward and Jones (2016) through The Flourishing Canvas; both versions seek to embed sustainability within business model considerations. Additionally, the value mapping tool may help catalyse innovative efforts towards sustainability through detailed consideration of value exchanges between stakeholders (Short et al., 2012; Bocken et al., 2013). Critically however, Chesborough (2010, p.360) asserts that "*tools such as mapping cannot by themselves promote experimentation and innovation with those models*". Established methods such as interviews, focus groups and 'physical' experiments directly testing the customer experience (Ries, 2011) may be helpful for experimentation.

Overall, while many tools, methods and approaches could support business model innovation for sustainability and circularity, to date there is little evidence on those actually used in practice and the ways in which these are applied in particular by large businesses. Moreover, the process of business model experimentation in practice for achieving greater levels of circularity in established firms has not yet been adequately investigated.

2.3 Barriers, enablers and opportunities to business model experimentation in large firms

Business model experimentation can help overcome bureaucratic hurdles and other barriers while transitioning towards more sustainable solutions (Andries et al., 2013; Hilden et al., 2016). Laukannen and Patala (2014) summarize three overarching barriers to sustainable business model innovation in established firms: regulatory (e.g. lack of legal drivers) (2) market and

financial (risk, awareness, know-how), and (3) behavioural and social (attitudes and values, leadership, customer acceptance) barriers. In the related field of sustainable product innovation, Hallstedt et al. (2013) identified: organisation (e.g. senior management support), processes (e.g. knowledge and experiences, social aspects, sustainability perspective), roles (responsibility for implementation), and tools (e.g. a systematic way of knowledge sharing and assessment tools). Organisational factors are recognised in earlier literature - Bos-Brouwers (2010) for instance identifies management (top management separated from customers and shop floor, emphasis on cost-cutting rather than long-term investments); the lack of tolerance for entrepreneurial thinkers; and the inflexibility of the organisation as barriers.

Amit and Zott (2001) also observe the conflicts with the established configurations of firm assets – for example, Velu and Stiles (2013) use the term 'cannablisation', to describe how managers view and might resist experiments that threaten their on-going activities within the company. A more fundamental issue highlighted by Chesbrough (2010) is the uncertainty about what the right new business model might be (for the current market and customers), which is the reason why experimentation is essential. Moreover, established organizations must address leadership challenges to ensure governance of business model experimentation, so that experiments lead on to action within the organization (Chesbrough, 2010; Kraaijenhagen et al., 2016).

Few studies investigate circular business model experimentation and transformation by large corporations with exceptions. Kant-Hvass (2014) studied emergent (i.e., not yet widespread) circular business models by large clothing companies and identified the following opportunities: building loyalty and identifying new customer segments, capturing the second hand value (from products), strengthening brand image and increasing competitive advantage. The barriers relate to limited 'best practice' and experience with reverse logistics and redistribution; stock related uncertainty (e.g., will second hand sell?) and a lack of consumer awareness (Kant-Hvass, 2014). Furthermore, new collaborative arrangements and contracts are needed in circular business models (Fischer and Pascucci, 2017: Kraaijenhagen et al., 2016). Schaltegger et al. (2016) describe how mature companies are following innovative routes to business model experimentation for sustainability. H&M via its venture capital fund H&M CO:LAB for instance, is investing in start-ups, e.g. Sellpy an online used clothing sales service model (Turula, 2016), to enhance knowledge of circularity. The fit with startups is therefore an interesting opportunity for established business to explore.

2.4 Research gap

Researchers view experimentation as a promising driver for business model innovation (Amit and Zott, 2001; Chesbrough, 2010; Weissbrod and Bocken, 2017). The magnitude of commercial and impact opportunities pursued through an entrepreneurial approach have a high degree of uncertainty before they are completed (Knight, 1921). Experimentation has been highlighted as a suitable way to address uncertainty (Andries et al., 2013). However, as of yet,

there are few in-depth cases or studies highlighting how experimentation made be applied to sustainable or circular business models in large established organisations with some exceptions (e.g., Weissbrod and Bocken, 2017). Nevertheless, there are promising tools and methods from the 'conventional' business model literature to build on. Ries (2011) and Blank (2013) develop customer-focused stepwise approaches for business model development, whereas Osterwalder et al. (2014) and others (Bocken et al., 2013; Osterwalder et al., 2014; Joyce and Paquin, 2016; Upward and Jones, 2015) describe tools and methods that can be used by any size of business to experiment with the value proposition, some with a strong focus on sustainability.

More work is required to describe how large firms can embark on such an experimentation journey, as the process sets challenges for established companies (Antikainen and Valkokari, 2016). In the startup literature, the importance of teams and dynamics for the success of new startups has been highlighted (Franke et al., 2008). Hallsted et al. (2014), in the field of sustainable innovation, identify organization, processes, roles and tools as key success factors. The need to develop an experimentation capability as a large business pursuing sustainability has been described (Weissbrod and Bocken, 2017). However, few scholars have focused on the actual business model innovation processes for sustainability through a collaborative approach. Collaboration has been recognised as essential in a future circular economy (Fischer and Pascucci, 2017). For instance, collaborative ties between procurers and suppliers can help strengthen the circularity of business models, through improving resource utilisation and reducing waste generation (Witjes and Lozano, 2016). Circular economy experiments may strenghten existing ties or force the development of new collaborative ties early on in the innovation process (Kraaijenhagen et al., 2016). Furthermore, no such research has been conducted in the clothing retail industry.

In the next section the methodology used to investigate the following research question is described: *How can a large clothing retailer experiment with new business models to create greater levels of circularity?*

3. Research approach: participatory action research case study

This paper presents a key part of a twenty-seven month collaborative research project part funded by Innovate UK (that commenced in August 2014), between University of Cambridge and a long established international clothing retailer. The primary aim for the retailer was to eliminate clothing waste being disposed in landfill. using a circularity oriented approach. However, the (mature) view in the project was that prevention by reducing clothing consumption (slowing loops) would be one of the key circular strategies in the project, in addition to closing (e.g. recycling) and narrowing loops. A secondary objective was to learn about its transformation to a sustainable business and build confidence in business model experimentation for circularity. The underlying premise was based upon the notion that typical lean startup techniques (Ries, 2011; Blank, 2013) could also support large businesses in their endeavours to move to a sustainable business model through experimentation (Weissbrod and Bocken, 2017).

The ‘action research case study’ method (McManners, 2016) combines the focus on inquiry and action offered by action research with the case study methodology described by Yin (2013). It allows researchers to go beyond the role of neutral observer to a participatory role whilst retaining academic rigour (McManners, 2016), and is seen as instrumental in the transition to a sustainable world (Gustavsen, 2008; McManners, 2015). Case studies are suitable to investigate phenomena in a real life context (Yin, 2013). Single case studies may be chosen because they are unusually revelatory or provide unusual research access (Eisenhardt and Graebner, 2007; Yin, 1994), which was the case in this research.

The unit of analysis is the *experimentation process* adopted by the clothing retailer to innovate their business model for circularity. We describe the different stages in the business model experimentation process, the tools and methods used and the learning observed at each stage. In line with Hallstedt et al., (2014), the following elements were used to organise the results:

- The *process* of business model experimentation and lessons learned in relation to an established business pursuing circularity oriented business model innovation.
- The *tools* and *methods* used during the process
- The *roles/ people* and *organisational* implications
- The evolution of *business model change* in this process

Within this in-depth case study, the data collected included: workshops and meetings attended (observations and recordings), templates used during workshops, materials prepared in advance of meetings and workshops, notes taken during and after meetings by project members, and outcomes and outputs of the meetings and interviews with key project members (Table 1). Furthermore, fifteen interviews with the key project members enriched the understanding of the business model experimentation process over time (Table 2): the emergent project process, the steps in Figure 2, and the evaluation of the full process. The bulk of the recorded data was transcribed verbatim. The corpus of data was then analysed using thematic analysis (Saldaña, 2009) with the business model experimentation process as the main ‘anchor point’. Thereafter the project team reviewed and verified the details within each of the stages, the logic and interpretation of the results.

#	Description	Collection method and data preparation	Timing	Lengths (hrs)
1	Steering group 1: project kick-off steering group	Meeting notes	September 2014	2
2	Ideation workshop 1	Observation protocol & meeting notes	October 2014	48
3	Ideation workshop 2	Meeting notes	October 2014	2
4	Idea clustering workshop	Meeting notes	November 2014	2.5
5	Steering group 2: workshop outcomes & planning	Meeting notes	December 2014	1
6	Business model workshop	Meeting notes	December 2014	
7	Steering group 3: Project lean startup method, clustered ideas, volumes and value of clothing.	Meeting notes	January 2015	1
8	Business model learning workshop	Face-to-face recording & verbatim transcript	February 2015	3

9	Experimentation roadmap workshop	Face-to-face recording & verbatim transcript	March 2015	3
10	Planning workshop for experiments	Face-to-face recording & verbatim transcript	March 2015	2.5
11	Meeting clothing retailer internal - 1	Recording & verbatim transcript	April 2015	1.5
12	Meeting clothing retailer internal - 2	Recording & verbatim transcript	April 2015	1
13	Steering group 4: agree on experiments	Meeting notes	April 2015	1
14	Experiment review workshop	Recording & verbatim transcript	August 2015	4
15	Research meeting	Recording of meeting	August 2015	2
16	Data burst session	Recording of meeting	August 2015	7.5
17	Data burst session	Recording of meeting	August 2015	6
18	Experiment review 1	Meeting notes	August 2015	2
19	Experiment review 2	Recording & verbatim transcript	August 2015	2
20	Steering group 5: agree on next steps after experiments	Meeting notes	September 2015	1
21	Business model development workshop	Meeting notes	November 2015	48

Table 1: Data overview of meetings.

#	Interview purpose	Organisation	Organisational area	Collection method	Timing	Length (hrs)
1	Evaluate emergent project process from different perspectives	Clothing retailer	Product innovation	Face-to-face interview	August 2014	1
2		University	Research	Phone interview	March 2015	0.75
3		Clothing retailer	Business sustainability	Face-to-face interview	March 2015	1
4		University	Research	Face-to-face interview	March 2015	1
5		Clothing retailer	Product innovation	Face-to-face interview	April 2015	1
6		University	Project management	Face-to-face interview	June 2015	1
7		Clothing retailer	Product innovation	Phone interview	June 2015	1
8		Clothing retailer	Business sustainability	Phone interview	June 2015	0.5
9		Clothing retailer	Clothing sustainability	Face-to-face interview	July 2015	1
10		Government funding	Project funding monitoring	Phone interview	September 2015	0.5
11	Validate and discuss steps in Fig. 2	Clothing retailer	Project management	Face-to-face interview	June 2016	0.85
12		Clothing retailer	Project execution	Face-to-face interview	June 2016	0.85
13	Reflect on full project process	University	Research	Face-to-face interview	October 2016	1
14		University	Research	Face-to-face interview	October 2016	1
15		Clothing retailer	Product innovation	Face-to-face interview	October 2016	1.5

Table 2: Data overview of semi-structured interviews.

Figure 2 includes the visual overview of the steps (dark grey) and respective outcomes (light grey). This case study focuses on the stages up until “Refining”, which was the final phase of the funded project. Table 3 includes the activities from Table 1 per phase.

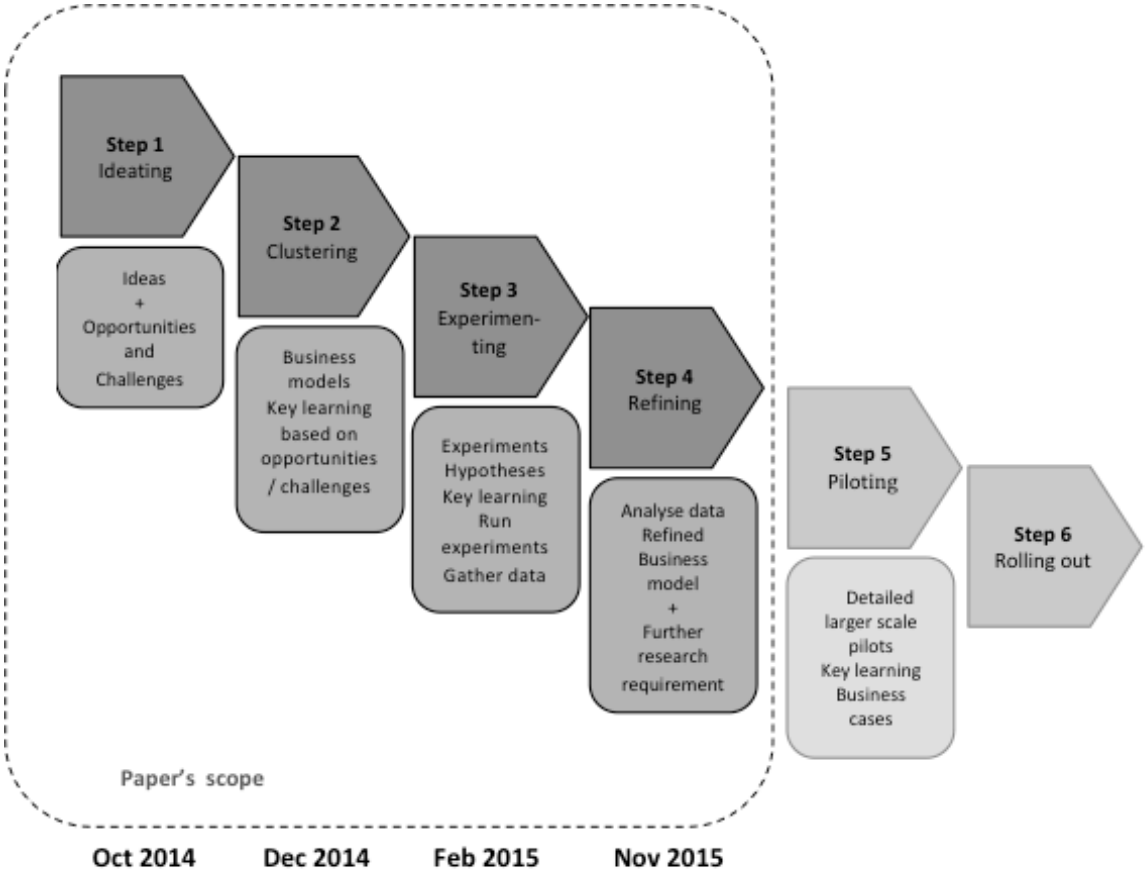

Figure 2. Stepwise process of business model experimentation pursued.

	Step 1 **Ideating**	**Step 2** **Clustering**	**Step 3** **Experimenting**	**Step 4** **Refining**
	Start: **October 2014**	**Start:** **November 2014**	**Start:** **February 2015**	**Start:** **November 2015**
Activities	• Ideation workshop 1 +2 *(#2+3 in Table 1)*	• Clustering workshop • Business model workshop *(#5+ 6)*	• Business model learning workshop *(# 8)* • Experiment roadmap meeting *(#9)* • Experiment planning workshop *(#10 in Table 1)* • Follow-up meetings *(#11 + 12)* • Running experiments • Experiment review workshop *(#14)* • Research meeting *(# 15)* • Data burst sessions 1 +2 *(#16 + 17)* • Experiment review 1+ 2 *(#18 +19)*	• Business model development workshops *(#21)*
Steering groups	Steering groups 1 +2 *(#1+ 4)*	Steering group 3 *(#7)*	Steering group 4 *(#13)*	Steering group 5 *(#20)*

Table 3. Activities and data across timeline. *Note. The number in brackets/ italics refers to the meeting number in Table 1.*

4. Findings: Business Model Experimentation for Sustainability

The findings are presented according to the different stages on the sustainable business model experimentation process: ideating, clustering, experimenting and refining.

4.1 Ideating

The purpose of the ideation phase (Step 1), which lasted one month, was to rapidly generate as many viable business model ideas as possible, with a positive environmental impact (reduced clothing waste to landfill) and business potential. According to the industry project manager *"The first phase ideation … was the one we were most clear about when we wrote the proposals. We … wanted to stretch people's thinking and to use external people rather than just [company] people. We wanted to really be ambitious and learn from other industries (…)"* (interview 11).

Process, tools and methods

In the ideating phase, two separate workshops were conducted. First, a two-day multiple-stakeholder workshop was organised with twenty-seven participants (Ideation workshop 1; Table 3). Experts in entrepreneurship, innovation, sustainability and clothing from the company itself, suppliers/ partners, NGOs and academia gathered to develop new business model innovation ideas that could significantly cut down on waste and deliver business value. Several stimuli were sent to participants in advance in a pack (e.g. a video on the clothing industry, project information booklet and a roadmap of startups, business models, technologies). The setup of the workshop was visually engaging, including examples of new technologies (e.g. recycled yarn and fabrics).

Other stimuli included: examples of value missed and destroyed in other industries based on the value mapping tool (Bocken et al., 2013), examples of other experiments within the retailer's business, and a presentation on the state of the clothing industry. The workshop was run by an external facilitator using a typical product innovation ideation format, with various short stimuli followed by small group discussions. The groups also spent time identifying barriers to more sustainable behaviours towards clothing, which helped catalyse business model ideas. A voting system suggested by Osterwalder et al. (2014) was used to select the 'winning ideas' at the end of the two days.

In relation to process enablers it was noted by the industry project manager that*: "Having the money from Innovate UK really helped because it allowed us to experiment and take risks around workshops* [and new] *ways of working (...). We wanted to try a business competition. I don't think they work brilliantly, but we tried* [and made] *it competitive. We went offsite* [which] *really helped* [to get everyone in the right mindset]*"* (interview 11).

After the main stakeholder ideation workshop the academic partner held a second (two-hour) workshop (Ideation workshop 2; Table 3) using the Value

Mapping Tool and the Business Model Canvas, with twelve academics in the fields of sustainability, innovation and policy. The intention of this two-hour workshop was to generate additional, more radical ideas to feed into the process, although the themes were broadly similar to the initial ideation event.

Roles/ people and organisational implications

In this first phase, the industry partner took the lead. An external company previously used by the retailer with experience in product innovation was selected to facilitate the workshop. The facilitator's brief was to create a professional atmosphere to meet experienced participants' expectations. The inputs from the academic partner were focused on generating data and useful examples (e.g. in the form of a technology roadmap) and helping participants use proven academic tools as part of the process (e.g., Value Mapping Tool). The academic partner organised the second separate workshop to generate more ideas on the basis that the tools were not fully utilised in the initial workshop - essentially the tools had been moved to the background as the external facilitator controlled the first workshop.

In relation to the structure of the project team and use of external agents the funding was fundamental as the project manager explained: [It] *gave this extra pot of money to be able to do experiments that may have not been justified on the normal budget in a business.* (…) *it was also an opportunity to collaborate with academics (…) so they would take a more thought-through approach (…) rather than just starting and seeing what happens,… they wanted to have some method behind it so they could perhaps… do it again* (interview 6).

Moreover, the budget allowed the team to focus on experiments, which prospect beyond business as usual (interviews 6 + 11-15). While the external project funding allowed the business to innovate, it also led to a slow start with the first three months heavily focused on administrative duties (interview 6, 11). At this point the core project team was one academic and one manager from the retailer.

Business model ideas

This phase generated over 200 ideas between the twenty participants of the first workshop and fifty from the second ideation workshop. The key outputs of the first stage of the project – ideas report and opportunities/ barriers, consumer insights, understanding of new business models, and assessment of the biggest clothing categories in terms of volume and potential landfill waste - were then presented at the Steering Group 2 meeting (Steering Group 1 had focused on project planning). The Steering Group, composed of four senior executives from industry partner and two from the academic partner, wanted to develop the ideas into more detailed business models. However, it was evident that even at this stage there were tensions created by the process, which were explained by the industry project manager:

"I think we also focused very heavily right from the start making the stimulus input a lot about the customer rather than the environmental aspect of it… at

that stage in the project that really helped. I think that became a downside later on when because we hadn't spent a lot of time thinking about the environmental stuff. We [questioned] *"Hang on a minute do these things even make a difference?"* (interview 11).

The wider academic and industry project team were also keen at this stage for more disruptive ideas to emerge. "[W]*e were hoping for more radical ideas, so I think that's something we need to keep pushing as well, so once we've done some small pilots how can we think about something more radical…? I think the reason for that is that as a large business, something that seems easy (…) will have a huge impact on the whole business and the whole financial system so it might not sound radical* [as others market players have similar models] *but the change within the organisation will be quite disruptive* (interview 6). *So for instance, reusing…would be quite a radical innovation for them if they were to change their whole business model around it, but for the industry this has been done before. But it is more about mainstreaming a new reality I guess"* (interview 6).

4.2. Clustering

Step 2 was about clustering the plethora of ideas into in-depth business models. In Steering Group meeting 3, the core team described this project phase as moving from 'ideating' to 'clustering' in preparation for 'developing pilots'. The more precise term of "experimentation" rather than pilot was not used consistently until Step 3. This switching of terminology reveals how the project unfolded in unintentional forms through time. Another example is provided as originally the team planned to do some detailed business modelling in this phase: *"I thought when we wrote the* [project] *plan that… we would do* [modelling], *but because we ended up then spending a lot of time going, "Let's not work up a proposition let's actually experiment." We didn't do that. (…) it was analysis* [of the business models] *wasn't it"* (interview 11).

For the academic team this step in the process was especially rich in learning as: *"some of the industry team were so keen on particular business model ideas (…) they were 'go, go, go' and set up their own small experiments for instance ordering products and trying new service models* [available from] *the competitor marketplace. Although these were low risk as they were invisible to the business we argued the need to be more reflective, pull back, do more research, this was about adjusting the teams expectations"* (interview 14).
What this revealed was while only clustering was intended in this phase activities in reality became blurred.

Process, tools and methods

During this three-month long step, the lean startup method (Ries, 2011) and the use of 'minimal viable products' were first introduced. This was required as the retailer team were unused to the notion of experimentation as depicted by Ries (2011).

Two key workshops were organised: one to cluster the ideas from the previous ideation workshops into broad business model themes (Clustering

workshop; Table 3), and one to develop more detail for each of these themes that emerged from the previous workshops (Business model workshop; Table 3), to come closer to the development of business models. The term 'themes' was adopted to encapsulate key idea clusters. As identified earlier in this section, project team members had started to run small experiments to test their own thinking outside of these workshops.

Detail on the clustering exercise can be found in Appendix A. The clustering step led to five key themes to be progressed as well as a range of opportunities and barriers. Four themes focused on extending and retaining the useful life of clothes, whereas one theme was about improving circularity by recycling used clothing. As these ideas are commercially sensitive, the specifics are not included here. The opportunities and challenges are however broadly described in Table 4 (Bocken et al., 2015).

Opportunities & challenges	**Clothing retail example**
Business case	Long use of clothes = less sales
Technology	Upcycling rather than downcycling
Design	Design for disassembly
Consumer acceptance	Of timeless design
Supply chain and reverse logistics	How to recover materials
Legal issues, ability to scale up	Retaining quality
Collaboration	With authorities, designers
Cultural and societal factors	Re-segmentation of markets

Table 4. Case study clothing retailer business model opportunities and challenges (based on Bocken et al., 2015)

The second part of the clustering phase consisted of gathering market and competitor data, and qualitatively assessing the sustainability and customer impact for each theme in preparation for the third Steering Group meeting**.** The sustainability assessment was about investigating whether the ideas contributed to circularity by slowing loops (extending product life), closing loops (recycling), or narrowing loops (efficiencies) (Stahel, 1994; Braungart et al., 2008; Bocken et al., 2016b). The radicalness of ideas within a given theme was assessed using the graphs below, based upon the concept of 'innovation graphs' that investigate whether something is new to the company or industry (Garcia and Calantone, 2002). The customer impact was assessed based on views by the industry team in combination with the market and competitor data gathered by the academic team.

According to the industry project manager, there was significant uncertainty from the company's side in relation to moving from clustering to pilots, which was where the use of the word "experiment" was seen as valuable. *"We realised there were lots of unknowns and uncertainties that we wanted to test and prove. That was where the concept* [grew] *of breaking it down into mini experiments rather than pilots. Even the language, (…) about experimenting rather than piloting really helped. The pilot is very much like everything has to be slick and go well. If the pilot doesn't work you can't proceed. I think being able to do experiments, which may or may not work, but which help us learn was quite important"* (interview 11).

At this stage the industry team felt that there was little deliberate process and the notion of experimentation from the lean startup method (Ries, 2011) was found to be useful: *"This process was like jelly…, we had to make it up as we went along (…) normally we have very rigid structures and this makes us feel comfortable. I suppose from the outside it looked as if we were in control and being logical (…) we were resilient because we had built social capital earlier in the project, which we relied on to make things happen throughout the process"* (interview 15). "[As project managers from the industry and academic side, we were] *constantly thinking, "What is the next step? What should we do? Who should we involve?"* (interview 6).

This constant collaborative reflection provided a valuable mechanism for more carefully sense-making in determining how the next steps in the process should unfold.

People, roles and organisational implications

To simplify the presentation of the themes derived from the clustering, 'idea templates' were developed and populated initially as 'one pagers' (Appendix B). These contained an overview of the idea from different perspectives (e.g. customer, commercial, environment), the challenges to be tested in the experiments based on opportunities/barriers, and the timetable of ordering the experiments based on implementation difficulty. At Steering Group Meeting 3 the 'one pagers' were used, but additional insights were requested. The Steering Group raised specific questions related to the customer, and the business viability of the potential business model ideas. Analogously to the work by Blank (2013) and Ries (2011), customer acceptance and the business case were identified as key assumptions to test. It was imperative to learn from what competitors (including startups) were doing and mimicking what startups would do by scanning the market - as well as understanding the environmental benefits of the new ideas. This revealed to the project team a 'time' tension between needing more information to make decisions and providing information at a glance.

Time also arose in relation to stakeholder management within the business. *"We* [as the industry project team] *were mindful there was… change management to be done. We were always taking advantage of opportunities when they arose and jumping on band wagons; that was good. The downside was those resources then got deflected from other parts of the project and that was just how it was."* (interview 11). This insight reveals that an effectual approach was taken, building on emerging opportunities and continually engaging with key stakeholders.

Business model ideas

The "clustering" step was about condensing and refining ideas to ensure the new business model propositions could be feasibly adopted by the retailer. On the one hand, ideas needed to be simplified into 'one-pagers', but on the other hand, greater analysis (market, customers) was needed to develop the ideas further in preparation for the next phase.

4.3. Experimenting

In the experimentation phase (Step 3), two workshops were organised to move from the one-pagers derived from idea templates to experiments. This phase included running experiments and gathering data (e.g. surveys) to support the understanding of the experiments. Overall this phase lasted for ten months of the 27-month project. Because of commercial sensitivity details of the experiments are not described here.

Process, tools and methods

The business model learning workshop (Table 3) was intended to germinate key hypotheses to 'test' through the experiments, similar to what is suggested in Blank (2013), Ries (2011) and Osterwalder et al. (2014). This session was attended by a wider group of stakeholders from the company and the academic partner to help broaden the perspectives. A follow-up meeting (Table 3) with members of the core team focused on preparing the experiments' plan. 'Theme templates' were used to map the key learning for each of the experiments (Appendix C1). At this point, the idea clusters were formally renamed 'themes'.

The 'theme templates' served as an input to the experiment-planning workshop (Table 3), which was attended by a wider group of stakeholders from the company and the academic partner to gain a shared understanding of the experiments and internal support. Experiment cards (Appendix C2) were used and while some of the wording was slightly adapted, these cards are effectively the same as the test cards in Osterwalder et al. (2014, p. 212). The templates and cards gave an overview of the hypotheses and quick learning for each experiment. For each of the themes, multiple experiments were devised.

Finally, an experiment canvas (Appendix C3) was developed from the work of Osterwalder and Pigneur (2010) to show the 'operational aspects' of each experiment, this assisted with cross-team communications and experiment planning. The experiment canvases helped bring the experiments into practice by providing a logical sequence of activities and dependencies. Additionally these provided a platform for the project team to communicate with key stakeholders in the company.

Each experiment was allocated a *"main learning and secondary learning"* (interview 2) (Appendix C1). *"From that learning… we developed the experiment*" (interview 2). An experiment "*needs to be deliberate, we need to have thought about the key questions we need to answer before, we need to capture data in a structured way and we need to learn from those data or that analysis of that data,* [what we] *should do next... Initially we wanted to make a whole roadmap of all the experiments… but I think that's not realistic because you need to adapt the experiment, probably, based on the learning in the first experiment, so we might form ideas of what we want to do but I think it should be a bit more iterative"* (interview 6).

Two sequential data sessions (termed data bursts) with the project team were then organised (Table 3) to gather and synthesise market, customer and environmental data to gain more confidence about the potential commercial success and environmental benefits of the new business models resulting from the experiments. "*[I]t was all quite theoretical and academic and I think we felt that this wasn't the right thing to do. Once we actually started I said "Right,… let's divvy up and research and look at things and let's just come back with some solution or some information," I think that worked really well.(…) From the data burst our master spread-sheet came out with all the information and actually that's quite good because we kept referring back to it"* (interview 12).

Finally, two experiment review meetings (Table 3) took place to understand the implications of the experiments' results and plan for the next step of piloting. The analyses of collated data were condensed into a pre-workshop information booklet in preparation for a business model innovation workshop. Key project members from the industry and academic partners' teams, the Steering Group members, as well as further industry participants with relevant knowledge attended the two-day workshop. The workshop aimed to distil the business models and make informed decisions based on the analysed experiment results.

People, roles and organisational implications

During Steering Group meeting 4, it was agreed that a first experiment could be run in June 2015. Thus nearly a year had elapsed since the start of the project. This experiment was conducted covertly in one of the retail stores and fitted into existing sustainability events. As noted by interviewee 12, who was responsible for the experiment execution: *"I have never done so much lying* [about a] *project."* As this experiment involved considerable practical activities it was complicated to operate in a covert fashion so that even colleagues in the business would be unaware. The academic team closely observed and asked participants questions while partaking in the event. In this way the hypothesis was being actively tested. As this experiment was successful, it was extended beyond the project boundaries *"and absorbed as business as usual"* (interview 15). This was the case because there was sufficient customer and business support to implement successfully. As a result, the project team could focus more intensively on other experiments.

The Steering Group also supported other 'covert' (hidden from broader organisational view) experiments – e.g. running in parallel split tests of websites in relation to new services and a service-orientated experiment in the industry partner's head office. Both were seen as important for the business' learning. [The online tests] *were definitely helpful. It was a good methodology that we can deploy again… around testing demand without putting our head above the parapet. I think that is one we will share* [internally] *definitely (...). It helps people see that we have followed good practice in terms of qualifying ideas (…). Involving* [our internal project 'entrepreneurial expert' in the context of the project] *early was an important part of helping us build credibility in the business as well. (…).* [He] *now uses us as the example when other people come and talk about, "I had this new idea."* (interview 11).

The inclusion and guidance provided by the 'entrepreneurial expert' was widely identified by interviewees (interviews 11-15) as a strong positive factor in experimentation.

Business model experiments

During this phase there were *four* main themes, as one theme was dropped due to its niche nature and was absorbed into an existing theme. The four themes led to complexity: *"I think because we had four things it was quite difficult. Maybe it would have been better if more people did (…) fewer things"* (interview 12). Interviewee 15 noted that: *"running multiple experiments around four themes (some in parallel and others in a linear fashion) was akin to organising a city subway system operating in four dimensions".*

Part of the complexity related to resources, where original allocations of people with specific skills such as website design/data analytics evaporated due to other business priorities driven by turbulent market forces. This required the team to rethink and identify where resources that could fill gaps could be procured rapidly, which was challenging as in total the team developed approximately two to three experiments per theme. In the follow up meeting (Table 3) further detailed planning took place**.** Fundamentally it was recognised that the company wanted more experiments than was feasible within the time and human resource constraints.

During the fourth Steering Group meeting, the experiment proposals were presented and agreement was sought for the next steps. Extensive planning had occupied the five months up to this point; one 'visible' and two 'covert' experiments were agreed upon, each testing "*specific make or break facets*" (interview 13) of the themes. The 'visible' experiment was conducted in a store, while the other two 'covert' experiments occurred in the retailer's head office and online. Hence, these were not immediately customer-facing. For the fourth theme, no experiment was set-up because legal and technological impediments made it impractical within the project time frame.

Overall, the experimentation phase was seen as vital as it offered learning about a mechanism to interrogate whether a business model would be prone to failure: *"I think it empowered us to try to do things"* (interview 12). Experiments in essence enabled the subsequent business model refining phase to be more tailored as these unlocked key aspects of each proposal. Furthermore the process helped the project team develop resilience as the results were not always favourable, which in turn augmented rethinking capabilities. The ten-month duration however was far more "*messy and protracted*" (interview 15) than perceived initially by the team. Interestingly, during the final team meeting several members were disturbed when the project timeline was mapped in totality.

4.4. Refining

In the refinement phase (Step 4), the final learning from all case study experiments was collated, and further data collected where needed (e.g.

market, competitors, operational and environmental aspects) in preparation for the piloting phase, which is outside the scope of this paper.

Process, tools and methods

During the business model innovation (November 2015) workshop, the following 'tools' and analyses were used:

1. Market (competitor analysis) and environmental stimuli (e.g., environmental opportunities based on data from WRAP, 2012).
2. Analysis of pivoted business model using terminology from the value mapping tool
3. An adapted version of the Osterwalder and Pigneur (2009) business model canvas – which allows for more flexibility in generating ideas - referred to as the 'Honeycomb Business Model Tool' (Miller et al., 2016a; Park et al., 2016)
4. Consumer insight based on personas derived from earlier consumer segmentation work (Miller et al., 2016b) and stimuli from the experiments (live user interview following testing of new business model in head office).

While the earlier phases felt uncertain due to untested nature of the project, the project team considered that the workshop worked well.
I felt we improvised a lot. We would end up sitting in a room together going, "We know we need to do something. (…). How might we do this? We don't know." We were trying to figure out. (…) I think what definitely worked was having the workshop in November and although it caused quite a lot of stress getting ready for it forced us to have a conversation even if we didn't feel fully prepared. Some standouts from it were dressing the room [with stimuli], *holding it offsite and making it experiential. Having one of the 'customers' who had participated in an experiment come in was really a good learning about always doing that in future."* (interview 11)

People, roles and organisational implications

This phase was principally about gaining additional confidence in the more radical business model for circularity ideas that would disrupt existing non-circular ones. The senior management team of the industry partner felt that extra evidence was needed before another visible experiment could take place. The role of the academic partner, as well as external contractors was to gather more data (customer, market, pricing, environmental) to try and predict the business and environmental viability of a business model.

Evolution of business model change

During this phase, one theme was officially 'stopped' in favour of a radical new idea generated through collaborative brainstorming. The 'stopped' idea was already being partly adopted by the business in Step 3 *(Experimenting*). This stop was not perceived as a significant risk as in total there were four themes at this stage, with the addition of the highly innovative idea.

The multiple themes were however seen as difficult by the interviewee responsible for project execution*: "I think it was quite difficult. Everybody was supporting their* [ideas], *but we came up with (...) completely new things that we hadn't looked at, which I'm not sure if that necessarily was what we were expecting* (interview 12).

"In this workshop some of us did not really understand all the elements (…) the thing about value was really complicated; trying to balance what was needed with the economic, social and environmental parts and how these were to be traded off" (interview 15). This point was reinforced: *"I think that (…) we started to see the real tension of trying to think in so many dimensions at the same time. We were asking people to think long-term, which is fine, [about] customer need, profitability, environmental value, social value and value not yet defined. People were having a bit of a meltdown. I think that is still a massive challenge trying to flip between those different things."* (interview 11).

This event also revealed that the industry partner's teams realised the tensions between established business and start-ups, as for start-ups there is potentially less pressure on generating business models that are immediately profitable. Here in contrast was a need to understand how to persuade others in the organisation without having the specific metrics traditionally relied on. This was referred to as having the permission to do: "*more leaps of faith for things* [without having] *to make everything jump over the same hurdle."* (interview 11). While this workshop created a sense of excitement and collective responsibility towards the next step in the process with senior management becoming 'theme owners', it resulted in the team sensing the complexity of delivering business model innovation within a large incumbent organisation.

5. Discussion

5.1 Reflection on the experimentation process

5.1.1 Overall business model experimentation approach

The experimentation in this project can be described as effectual in nature (Sarasvathy, 2001; 2009), as the team used whatever resources (primarily people) available, or that could be procurred (bird-in-hand principle), to test as optimally as possible. Evidence of Sarasvathy's 'crazy-quilt principle' (2009) was also offered with the creation of a broader stakeholder network, who generated new elements (ideas, data) by reconfiguring extant methods and resources. Moreover the principles of the lean start-up (Ries, 2011) and notion of business model innovation (Osterwalder and Pigneur, 2009) were present for the largest part of the project**.**

It was found that the company started to experiment in the business relatively quickly (pre-experiments by team members followed by 'authorised' experiments), some covert and others visible and there was a pragmatic approach to 'get things done' (as also found in Weissbrod and Bocken, 2017). One 'covert' experiment led to on-going new activity around clothing life

extension being taken forward outside the project and rolled out in five cities at the point of writing**.** *Visible* customer proposition testing however did not happen until beyond November 2015. This time lag disappointed the retailer team, as a startup would test propositions much more rapidly facilitating the quicker implementation of new business models (Osterwalder et al., 2014; Blank, 2011) and involvement of all key people in the business.

5.1.2 People, roles and organisational implications

The project was challenging from a team dynamics and stakeholder management perspective. Team composition and dynamics were insufficiently thought-through in contrast to what startup literature recommends (Franke et al., 2008). The small core project team also struggled with the complexity of multiple experiments and themes running in parallel, and this was compounded as specialist resources evaporated due to shifting business priorities. While the external project funding allowed the business to innovate in new ways, it also led to a slow start with the first three months focusing heavily on administrative duties**.** This time could have been spent better on planning and identifying a cohesive team as recommended by literature (Franke et al., 2008). Moreover, not all team members were familiar with the lean startup approach (Ries, 2011), the business model canvas and value proposition design (Osterwalder et al., 2014). Finally, because the lean startup method has not been applied widely to large business, there was no clear project approach or template, which made some of the steps in the process uncertain and ponderous such as experimenting and (more specifically planning) for three themes. In contrast, greater agility was evident where the pathway had clarity and there were sufficient resources as in the ideating phase.

5.1.4 Process, tools and methods

The project sought to combine existing startup and business model methods – e.g. business model canvas, value mapping, lean startup – to develop a unique approach to business model experimentation for a large incumbent business. While novel, it also led to uncertainty in the process.

The lean startup approach (Ries, 2011) was formally introduced in Steering Group 3. While the language changed from ‘pilots’ to ‘experiments’, which was useful to indicate the element of learning and testing, it was observed that not everyone in the team understood the concept fully - let alone in a new large business context. Unplanned action based learning was useful, in addition to deliberate learning and enabled project members to become more confident with how to negotiate experiments with uncertain outcomes (Weissbrod and Bocken, 2017). The learning from early experiments fed into early Steering Group presentations. Steering group meetings were critical as these, upon reflection, provided in combination with the tools described most of the structure to the project.

Meetings more often than not were run differently than originally planned or were cancelled late on. Cancellations resulted from the business’ need to react to fluxing market conditions (Miller, 2016). In addition, multiple iterations

of activities were required before moving to the next phase. This implies an emergent project process, which was not 'designed' and this originated from the uncertainty about the next steps to take in the business model innovation process, due to limited understanding of how large incumbent businesses undertake transformation (Chesbrough, 2010). It demonstrates the importance of regularly analysing the lessons learned. From the Experimenting phase onwards, the project content became very uncertain (interview 11). The evidence gathered and input from key stakeholders guided the next steps indicating this was an effectual approach (Sarasvathy, 2001). The ability to conduct fast learning cycles and focused project problem solving was only achieved in 2016 (interviews 11, 12).

This project sought to develop sustainable business models while bridging the gap between entrepreneurship and innovation in a corporate environment. Although Ries (2011) recommends a customer-driven approach, real customer involvement only happened late in Step 4 with a focus on profitability. This issue illustrates the difficulty of modifying a corporate mindset (Sandberg and Aarikka-Stenroos, 2014) focused on driving short-term profitability. Moreover, while there is a constant need to focus on environmental as well as economic goals in circular business innovation (Weissbrod and Bocken, 2017), this can be difficult in an uncertain experimentation process.

Finally, while the process was iterative and emergent, there were some broad recurring activities that can be identified. These include:

1. Prepare market, customer and environmental data (desk research type)
2. Conduct workshop with ideation and engagement purposes (involving various stakeholders)
3. Generate new questions for further analysis (involving various stakeholders)
4. Run experiment and collect further data

These steps were reiterated during each of the phases in various forms. The approach of desk research, followed by workshops and generating questions for further analysis was found to be a useful sequence to foster deliberate learning and also absorb new emerging findings – from market and customer insights as well as experiments run.

5.2 Business model evolution

Three themes were kept throughout the project, which confirmed the appropriateness of the ideas: two focused on extending the useful life of clothes and one focused on increasing recycling rates. Thus the focus was on both slowing and closing loops as circularity strategies (Bocken et al., 2016b) - not only recycling (Allwood, 2014) and post-use take back strategies (Kant-Hvass, 2014). Ideas around narrowing loops or efficiency gains were pursued outside the project boundaries, because the focus on the funding was on Circular Economy. Although out of scope, the team kept in mind that efficiency in manufacturing processes and material usage per product should not worsen, but would rather improve. One theme is already part embedded in

the business. This indicates that the themes generated were a good fit with the company. However, it takes significant time and iteration to move from ideating to experimenting in readiness for piloting for circularity.

Although there was a tendency to develop theme owners, a clearer focus of financial and time resources on one problem at a time may have facilitated quicker implementation (Ries, 2011). Nevertheless, the introduction of the experiment cards (Appendix C) helped the project team to plan.

Finally, once the company gets into a 'learning mindset' and develops its business model experimentation capability (Andries et al., 2013; Weissbrod and Bocken, 2017) novel ideas might also emerge. This is essential for the long-term survival of the business (Andries et al., 2013) and the move towards a circular economy. While none of the business model ideas were radical to the industry, it was recognised that these require significant business model transformation for the focal company, and learning about how to approach such a process was clearly obtained.

5.3 Lessons learned

After reflecting on the process in this section and the insights generated the following lessons learned can be described:

1. Business model experimentation approach

- The business model experimentation approach was effectual, (Sarasvathy, 2001; 2009), as there was evidence for the *bird-in-hand principle*, the project being opportunity-driven and using or procuring whichever resources available, and the crazy-quilt principle (Sarasvathy, 2009), with the creation of a broader stakeholder network based on emergent needs.
- The principles of the lean start-up (Ries, 2011) and notion of business model innovation (Osterwalder and Pigneur, 2009) were present for the largest part of the project.
- Different types of experiments from informal to covert and above the radar can stimulate the experimentation capability (see also, Weissbrod and Bocken, 2017), but involving customers earlier on (Blank, 2013) through 'above the radar' experiments could stimulate project progress.

2. People, roles and organisational implications

- Selecting the right type of people (Franke et al., 2008) and investing time and energy on a coherent team understanding of the project approach, including lean startup principles (Ries, 2011), is essential for project progress.
- Enabling key team members to focus on a radical innovation project is essential for project progress (see also Livingston, 2007; Weissbrod and Bocken, 2017).
- Familiar phases for large businesses such as ideation might move more quickly than novel ones such as experimenting, so resources and time should be allocated accordingly.

3. Process, tools and methods

- Variations of established tools and methods (e.g., business model canvas by Osterwalder and Pigneur, 2009; lean startup by Ries, 2011, value mapping by Bocken et al., 2013) could support business model experimentation.
- Because the lean startup method has not been applied widely to large business, there was no clear project approach or template, which made some of the steps in the process uncertain (e.g., experimenting). The steps, tools and methods presented in this paper can support future projects.
- While the process was effectual, similar to the lean startup (Ries, 2011) there were some broad recurring activities: prepare market, customer and environmental data; conduct stakeholder ideation workshop; generate new solutions for further analysis; run experiment to gather more insight.

4. Business model experiments

- Business model experiments and ideas that may not be radical to the industry might be to the focal business (see Garcia and Calantone, 2002; Bocken et al., 2012) and can therefore still be challenging to pursue (Antikainen and Valkokari, 2016).
- Success is challenging to plan and business model adoption benefits from serendipity and favourable business circumstances (e.g., one business model being adopted by the retail shops), which is in line with an effectual approach (Saravasthy, 2001; 2009).
- However, large companies can develop experimentation capability building on the presented approach including lean startup and effectual principles (see also, Weissbrod and Bocken, 2017).

5. Circular Economy as a sustainability driver

- An overall reflection about the process suggests that Circular Economy was a helpful theme to drive sustainable business model experiments (a view on circularity recognised in Geissdoerfer et al., 2017). The specific landfill reduction target further supported the focus.
- The company which is a sustainability leader in its sector, also kept balancing social, economic and environmental issues. This suggests that for sustainability leaders, Circular Economy could give a useful framing, without losing focus on the ultimate sustainability goals and diluting ambitions to 'mere recycling' (Allwood, 2014).
- The Circular Economy focus helped open up themes like 'reuse' (e.g. second hand, renting, leasing, Kant-Hvass, 2014). While not 'new to the industry or world' the project's experimentation approach and circularity focus helped open up challenging ideas and themes in an established business environment.

6. Conclusions

Sustainability has become a complex and critical issue for clothing retailers (Wiese et al, 2012; WRAP, 2012) as multiple economic (e.g. downward price prices), environmental (e.g., water use, chemicals), and social standpoints (e.g. working conditions and fast fashion culture) collide in contemporary contexts (Wilson, 2015). The fast-paced and competitive clothing retail environment (Miller, 2016) can be a challenging environment for established

businesses to experiment with new business models, because of fluxing market conditions. Circular Economy can act as a specific lever for sustainable innovation in clothing retail.

To date, limited in-depth cases have been described on business model experiments for sustainability in established clothing retail businesses (with some exceptions: Kant-Hvass, 2014; Weissbrod and Bocken, 2017). Few cases have reported from 'within' the project and organisation based upon hands-on activity (at the source) and observation of how the process emerged (Weissbrod and Bocken, 2017). The unit of analysis of this study was the experimentation process taken in an established firm to innovate their business model for sustainability. New insight was gained on how established businesses might pursue business model experimentation for sustainability with a strong circularity-oriented goal. This is described through mapping out the process and describing tools and methods used, and how ideas evolved along the way. It was found that the lean startup approach (Ries, 2011), combined with an effectual approach (Saravasthy, 2009) and tested tools (Osterwalder et al., 2014; Bocken et al., 2013) may be a valuable in cultivating the conditions to nurture the uncertain process of business model innovation.

While the aspiration of the company was to radically innovate its business model to reduce clothing to landfill significantly, at the time of writing only one business model innovation has been rolled out in retail stores after a successful experiment, which shows that business model innovation in established business is a gradual process.

This research was limited by one in-depth case. Further research is desirable to investigate how different cases beyond clothing retailing could approach business model experimentation for circularity as a driver for sustainability. The steps in Figure 2 could be tested and validated further to develop a robust process for business experimentation. Moreover, effective ways in which established business can collaborate with successful sustainable startups (a topic that emerged during the project but was not explored further) is an interesting opportunity to explore.

We hope that the lessons learned can stimulate businesses to experiment with their business models for sustainability with greater confidence. Additionally it is hoped that future researchers and research funding agencies can utilise the learning in order to accelerate further research in this area to advance the agenda for industrial sustainability and the Circular Economy.

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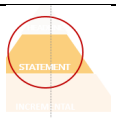
Appendixes

Appendix A – Clustering exercise

Based on the long lists of ideas, barriers and opportunities from Step 1, clustered ideas and opportunities/ barriers were developed. For the clustering exercise – all the outputs from the workshops were transcribed onto separate pieces of paper and printed out: (1) ideas, (2) opportunities (3) barriers. These were grouped in a follow-up session with the core team – by physically clustering the pieces of paper in a joint 2-hour session. First clusters were made by the team members individually for each of the categories: (1) ideas, (2) opportunities (3) barriers. This was followed up by joint grouping and regrouping of the clusters. Both lists of ideas and opportunities and barriers were taken forward to the next step of more detailed analysis.

Appendix B – Idea template

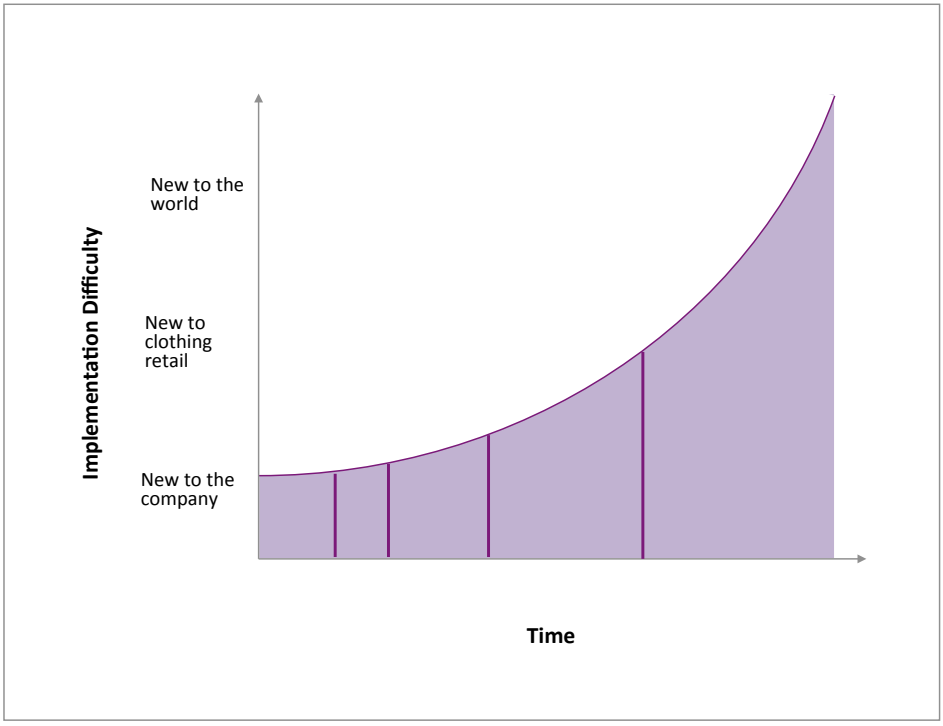
PROJECT Ideas Analysis – Idea xxxx

What's the big idea?		
Supporting facts		
Customer impact – value for customer		
Commercial impact – value for the business		
Environmental impact		
Customer segment applicability		
Key product categories applicability		
Business - license to enter market		
Competitors/ market entrants		
Challenges – customer		
Challenges – Business		
Challenges - environmental		

What are the challenges we want to test in the pilots?

Customer acceptance	**Commercial**

Phasing Opportunities



Potential partners	•
Adjacent industries to learn from	•
Stakeholders in the business	•
Opportunities to test	•

Market and other key data
…….

Appendix C – Experiment planning tools

Appendix C1. Experiment theme cards

Theme name	Short description + environmental aim	
Primary learning:		Secondary learning:
Experiment description:		
DRAFT Experiment Scenario 1:	DRAFT Experiment Scenario 2	DRAFT Experiment Extension:
Testing 1:	Testing 1:	Testing 1:
Testing 2:	Testing 2:	Testing 2:
Variations on experiment:	Variations on experiment:	Variations on experiment:
Key learning:	Key learning:	Key learning:

Appendix C2. Experiment card. Source: adapted from Osterwalder et al. (2014)

PROJECT Experiment Card

Experiment name:	Experiment Theme:
Lead:	Predecessor:

HYPOTHESIS

We believe that: Description:

Key learning :

TEST

To verify that, we will: Description:

METRIC

And measure: Description:

CRITERIA

We are right if: Description:

Appendix C3. Experiment canvas. Source: Design developed from Osterwalder & Pigneur (2010) business model canvas

Experiment canvas	NAME/ DESCRIPTION	Lead: NAME	Version: XX

Key Activities & Milestones	**Duration & Timelines**	**Estimated Budget Breakdown** ....
	Key Partners	**Key Resources** ....

Risks & Issues to be resolved before the start	**Dependencies & Subsequent activities**	**Sign-off:**

REDRESS Experiment Canvas Design inspired by Osterwalder and Pigneur, 2010, Business Model Generation