



Delft University of Technology

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DOI

[10.1016/j.jclepro.2016.11.009](https://doi.org/10.1016/j.jclepro.2016.11.009)

Publication date

2017

Document Version

Final published version

Published in

Journal of Cleaner Production

Citation (APA)

Weissbrod, I., & Bocken, N. (2017). Developing sustainable business experimentation capability: A case study. *Journal of Cleaner Production*, 142(Part 4), 2663-2676. <https://doi.org/10.1016/j.jclepro.2016.11.009>

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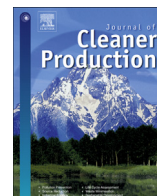
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Developing sustainable business experimentation capability – A case study



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ARTICLE INFO

Article history:

Received 16 May 2016

Received in revised form

6 October 2016

Accepted 1 November 2016

Available online 2 November 2016

Keywords:

Experimentation

Triple bottom line value creation

Urgency

Circular economy

Sustainable business model

Business model innovation

ABSTRACT

This research paper shows how a firm pursues innovation activities for economic, social and environmental value creation in the context of time sensitivity. We make a conceptual link between lean startup thinking, triple bottom line value creation, and organizational capabilities. The case study firm uses a novel experimentation approach to pursue the goal of diverting all of its sold clothing from landfill through a two-year project. This requires substantial changes to the current business practice because in 2012, the clothing retailer recovered 1% of all garments sold. The fibre input value for all garments sold in 2012 exceeded \$7m. We found that despite a stated need for fast learning through project experiments, the experiments were not executed quickly. (1) The desire to plan project activities and the lack of lean startup approach expertise across the whole project team hampered fast action. This led to the extension of the project timeline. However, project team confidence about learning by doing increased through privately executed experiments. (2) Some project experiments were not fit to meet the triple bottom value creation project goal and were dropped from the project. Overall, the corporate mindset of economic value creation still dominated.

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1. Introduction

Combining economic, social and environmental value is anchored in the definition of sustainable development as meeting “the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987, p.37). Business operationalizes the concept of sustainable development through putting equal importance on economic, social and environmental value creation (Dyllick and Hockerts, 2002; Elkington, 1994), called ‘triple bottom line’ value creation (Elkington, 1994). The common business cases for operationalizing sustainable development are the increase of sales, cost savings, pre-empting regulation, long-term competitiveness, staff satisfaction, and increased customer retention or reputation (Schaltegger et al., 2012). Economic success must be achieved through “environmental or social activity” (Ibid.; p.98) as opposed

to existing in parallel to such activities (Dyllick and Hockerts, 2002; Schaltegger et al., 2012).

Firms find it easiest to operationalize sustainable development from an efficiency perspective (Dyllick and Hockerts, 2002). Several studies show that the efficiency of current use of resources must significantly increase to reduce the loss of environmental and social value (Bocken and Short, 2016; Schmidt-Bleek, 2008; Tukker and Tischner, 2006; Weizsäcker et al., 1996). This is called eco-efficiency and concerns the ratio between value created and resources used. It is called sufficiency when coupled with a simultaneous overall absolute reduction in consumption (Bocken and Short, 2016; Figge et al., 2014). Irrespective of the success of efficiency strategies, the trajectory of change in industry falls short of that which is necessary (Tennant, 2013). As recently as 2006, approximately 50% of the “3 billion tonnes of total waste generated in the EU-27 was landfilled” (Martin et al., 2010, p.73), resulting in economic and environmental value loss. A linear view of economics and business as usual activities can only result in incremental, gradual innovation and product improvements (Boons et al., 2012; Dewberry and de Barros, 2009; Dyllick and Hockerts, 2002). Incremental changes

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are insufficient to address the draining of natural resources and other sustainable development challenges such as reducing carbon emissions into the atmosphere in a timely manner (Ashford and Hall, 2011; Boons et al., 2012). In contrast, the concept of circular economy asserts that business must divert from a linear view of activities, encouraging innovation beyond eco-efficiency and sufficiency (Blomsma and Brennan, 2016; Brennan et al., 2015).

Innovation activities that aim to create triple bottom line value are necessary. The time left to address the draining of natural resources (Martin et al., 2010) and other sustainable development challenges such as slowing down the already record levels in global temperature increase (NASA, 2016) requires rapid and “revolutionary change” (Ashford and Hall, 2011, p.138) at the firm level. However it has been highlighted that conventional radical innovations take at least 10 years from ideation to commercialization and adoption (O'Connor and McDermott, 2004). Timelines also exceed 10 years for the commercialisation of radical innovations that aim to create economic, social and environmental value (Hanna et al., 2015). There is no research that explores how a firm might pursue economic, social and environmental value creation in the context of time sensitivity. This paper addresses this important gap in the research.

The case study firm, a clothing retailer, explicitly set out to significantly stretch its current innovation practice within two years through pursuing a highly ambitious triple bottom line value creation goal, with the potential effect of destroying the existing business model of the firm. The firm looks to divert all its clothing from disposal at landfill: recover and reuse use of all clothing fibres sold to customers. At the same time, the retailer seeks to maintain the highest possible economic value of recovered clothing fibres. In 2012, the retailer recovered approximately one per cent of clothing fibres sold in the same year through shared initiatives. While this fibre recovery rate has gone up since, it is still less than five per cent.

This illustrates three things. Firstly, the current resources flow of the retailer is largely linear: it starts with clothing materials sourcing, continues with clothing manufacturing and ends with the sale to customers. The retailer has little to no control over the sold clothing after the sale to the customer. Secondly, the project at the heart of this case study requires radical innovation of products and services from the clothing retailer. This product and service innovation will result in the retailer having to experiment with new innovation activities and business models. Thirdly, the increase in clothing recovery has been very low and improvement is insufficient for the trajectory of change needed to address sustainable development challenges.

The case study shows how a firm might develop new capabilities to pursue sustainable development within a finite timeline. The project activities are discussed in the context of literature reviewed at the beginning of the paper. This research paper offers insights to the following research question: “*How might a large firm develop the organizational capability of experimentation to reach an ambitious value creation goal that looks to transform the business model from linear to circular?*”

In this case study paper, the term ‘project’ solely refers to the two-year collaboration between the firm and a UK university.

2. Literature

The data discussion presented in this paper is based on the theory foundation presented here. The literature was identified through a two-step process. The first step comprised of an initial

keyword search: radical innovation, radical innovation process, sustainable entrepreneurship. Two literature-summarising papers identified through the keyword search started the second step, a snowballing process of identifying further literature: Garcia and Calantone (2002) and Linton (2009).

2.1. Radical innovation in established businesses

This section presents an overview of the dimensions of corporate radical innovation activities and their implications for business models.

Furthering knowledge in the corporate innovation field requires the articulation of a clear research perspective on innovation dimensions perspectives to avoid confusion (Bessant et al., 2009; Garcia and Calantone, 2002; Linton, 2009). Linton (2009) argues that the characteristics of innovation can be summarised into two dimensions: technical and social. The social and technical dimensions as proposed by Linton (2009) mirror the two innovation dimensions from Abernathy and Clark (1985): Markets/Customers (= ‘social’ in Linton, 2009) and Technology/Production (= ‘technical’ in Linton, 2009). The perspectives of the technical dimension as highlighted by Linton (2009) are threefold: technology, process and product. Perspectives of the social dimension may relate to the individual as user, the individual as direct or indirect customer, the business unit, the firm or organization, or an industry and the supply chain. This case study takes the process perspective on the technical dimension and the firm perspective on the social dimension.

The literature links radical innovation to high risk, high uncertainty and with the potential to “vastly influence the marketplace” (O'Connor and McDermott, 2004, p.13); or as having “high impact on technology, production, the market and customers” (Abernathy and Clark, 1985). Innovative products at the macro-level are “new to world, the market, or an industry” (Garcia and Calantone, 2002, p. 118), whereas at the microlevel a high degree of innovativeness applies to newness at the firm or customer level. At the core of radical innovation lays the notion that it generates new-to-the-world outputs and changes the status quo of doing things at the level of the firm (Chang et al., 2012; Linton, 2009). This paper uses the term ‘radical innovation’ to encompass corporate product and service innovations that are new to the market and require new capabilities at the level of the firm.

Research has attempted to cut across these macro and micro categories to challenge firms to introduce new to the world innovations (Bocken et al., 2012). Product and service offerings (i.e. the business value proposition) that are significantly different from the existing product and service offerings result in new business activities (i.e. value creation), and cost and revenue streams (i.e. value capture). Combining this with triple bottom line value creation means that the fundamental shift in product and service offerings include the natural environment and society at large as stakeholders: the business explores a sustainable business model (Dyllick and Muff, 2015). At the same time, sustainability is an afterthought in the most commonly used business model tool, a ‘canvas’ proposed by Osterwalder and Pigneur (2009). In contrast, Boons and Lüdeke-Freund (2013) investigate business models and explore the organizational structures needed to embed sustainability into a business. They assert that challenging the neoclassical economic worldview (i.e., linear) of growth and infinite resource is necessary and organizations have to be restructured towards serving sustainable development (Bocken et al., 2014; Boons and Lüdeke-Freund, 2013). However, a recent review of successful business

renewal and business model innovation strongly argues that the nature of the innovation attempted and its consistency with current business priorities hold the key for success (Christensen et al., 2016). This implies that firms with strong existing strategies to operationalize sustainable development have a greater chance of success in restructuring towards serving sustainable development.

The authors acknowledge the body of research investigating sustainability-oriented innovation (e.g. Adams et al., 2015; Jay and Gerard, 2015). We draw on Hall et al. (2010) and Hansen and Große-Dunker (2013), who propose that radical sustainability-oriented is explicitly linked to entrepreneurship – and entrepreneurs are the main drivers of radical innovation. Sections 2.3–2.4 explore these areas, whereas the wider academic discourse on sustainability-oriented innovation is excluded.

2.2. Radical organizational innovation capabilities

Corporates looking to create products and services associated with high levels of uncertainty need to develop specific organizational innovation capabilities. Experimentation has been highlighted as the most important innovation capability to succeed in radical innovation activities because it helps organizations to overcome inertia.

Search, selection and implementation are the three elements of all innovation activities (Bessant et al., 2014; Leifer et al., 2000; Seebode et al., 2012; Tidd and Bessant, 2013). Introducing radically new products to any market requires specific organizational capabilities “*embedded in structures, communication channels, and information processing procedures*” (Garcia and Calantone, 2002, p. 122) and that this is a difficult process for established firms (Chesbrough, 2010; Garcia and Calantone, 2002; Leifer et al., 2000; Sandberg and Aarikka-Stenroos, 2014). In large firms, the key barriers to radical innovation have been identified as restrictive mindset and lack of competences (Sandberg and Aarikka-Stenroos, 2014). These barriers most affect the ‘Search’ or ‘Discovery’ competence, encompassing firm activities “*that create, recognize, elaborate, and articulate radical innovation opportunities*” (O'Connor and DeMartino, 2006, p.489).

The organizational capabilities necessary to succeed in radical innovation are explored by Chang et al. (2012). They researched organizational capabilities along the organizational innovation process from product inception to commercialisation. According to Chang et al. (2012) overcoming structural inertia to radical innovation in established businesses relies on: the ability to search (i.e. openness capability), to plan (i.e. strategic integration capability), to tolerate (i.e. autonomy capability) and to commercialize (i.e. experimentation capability). All four organizational capabilities for radical innovation have a positive effect on increasing radical innovation performance within established firms. However, only the experimentation capability “*has a significantly positive relationship with the radical innovation performance*” (Chang et al., 2012, p. 448) and is, therefore, more important than the other three capabilities. This means that organizations who have a finely developed ability “*to probe, experiment with, test, and commercialize radical ideas and concepts, across R&D, manufacturing and marketing disciplines*” (Chang et al., 2012, p. 445) are more likely to be able to pursue radical innovation projects. This paper adopts the experimentation definition offered by Chang et al. (2012) to explore experimentation in the project.

We argue that the organizational capabilities necessary to enable radical innovation at the organizational level as proposed by Chang et al. (2012) are dynamic capabilities. Dynamic capabilities enable organizations to address fast changing organizational operational environments beyond a purely resource-based strategy

for value creation (Eisenhardt and Martin, 2000; Teece and Pisano, 1998). Dynamic capabilities are implemented by firms who “*integrate, build, and reconfigure internal and external competencies to address rapidly changing environments*” (Teece et al., 1997, p. 516), important to adapt to the urgency of sustainable development challenges.

2.3. Sustainable entrepreneurship and corporates

Radical innovation aimed at furthering sustainable development is intrinsically linked to entrepreneurship (Hall et al., 2010; Hansen and Große-Dunker, 2013). Furthermore, Hockerts and Wüstenhagen (2010) argue that, because of their complementary skills and challenges, a co-evolution of sustainable startups and ‘more sustainable’ incumbents is necessary to achieve a sustainability transition. Small firms can react quicker to change than large firms (Chesbrough, 2010; Hockerts and Wüstenhagen, 2010), however large firms are likely to address multiple environmental and social issues with their activities through their sustainability management system. Hence large corporates “*strengths lies in process innovation*” (Hockerts and Wüstenhagen, 2010, p. 487) that addresses a wider range of sustainability issues.

Entrepreneurship focuses on new value creation though product and service offerings (Greenberg et al., 2013). What motivates people to pursue sustainable entrepreneurship as opposed to conventional entrepreneurship differs in one key aspect: personal values (Bocken, 2015; Tennant, 2015). These personal values result in organizational activities with the purpose of creating and increasing social and environmental value rather than solely economic benefits (Parish, 2010 in Bocken, 2015; Schaltegger and Wagner, 2011).

We suggest that personal values may equally drive entrepreneurship in large corporates, coined ‘intrapreneurship’ (Ford and Probert, 2009) or ‘corporate entrepreneurship’ (Buckland et al., 2003; Katz and Shepherd, 2004). Grey literature has suggested that the personal motivation to deliver social change is a common character trait for ‘social intrapreneurs’ (SustainAbility, 2008).

Irrespective of sustainability, interpreting a complex situation and communicating well within a team is a key element to help achieve entrepreneurial goals (Alexander and van Knippenberg, 2014; Guarana and Hernandez, 2014). Guarana and Hernandez (2014; p. 17) acknowledge that leaders who encourage “*learning and positive team member interactions*” are likely to succeed in creating the exchange of ideas and decision-making processes with their followers that are needed for interpretation and decision-making in complex situations.

2.4. Startup thinking

Developing a customer base for new products and services is strongly linked to starting up business activities. The complex operational business environment that businesses face today requires innovation activities that are able to adapt quickly to learning derived from product and service experiments.

The 2011 publication ‘The lean startup’ (Ries, 2011) brought the term ‘pivoting’ into many business conversations. A pivot refers to a change of direction as a result of learning from business experiments. However according to Ries (2011) a pivot is only useful if data enables to establish where a company is at present through a Minimum Viable Product (MVP), and many experiments have been run to close the gap between the performance of the MVP and the ideal level of product/service performance. Only then a firm should consider pivoting. Ries

(2011) views each experiment as product iteration and with each such iteration a firm must ensure to test existing or future business prospects. This process is called validated learning and includes both qualitative and quantitative learning: “(...) *poor quantitative results force us to declare failure and create the motivation, context, and space for more qualitative research. These investigations produce new ideas - new hypotheses-to be tested, leading to a possible pivot. Each pivot unlocks new opportunities for further experimentation, and the cycle repeats.*” (Ries, 2011, p. 125)

This learning cycle as proposed by Ries (2011) is based on Steve Blank and his notion of ‘Customer development’ (Blank, 2013). Customer development is a four-step process –customer discovery, customer validation, customer creation, company building-where the customer discovery is almost identical to what Ries calls ‘lean’. Blank (2013) clearly states that customer development is a separate process from product development. Product development processes focuses on execution, whereas customer development “*emphasises learning, discovery, failure, iterations and pivots*” (Blank, 2013, p. 52). Fig. 1 shows how the learning concepts developed by Blank (2013) and Ries (2011) are linked.

Startups are highly focused and look to increase user benefits through fast product iterations (Blank, 2013; Ries, 2011). According to learning derived from the most successful seed fund globally, Y Combinator, achieving product/service fit with the market through intensive user engagement will enable startups to scale to successful companies (Graham, 1993-ongoing). The people involved in startups, especially the founders, persevere in the face of uncertainty in order to build products and services that users will want (Livingston, 2007). Complete focus on one task makes startups more likely to succeed at speed in primary innovation than large corporates (Graham, 1993-ongoing).

There is no research on how startup thinking may be used to maximise the success of radical innovation with a sustainability goal in large corporates, previous work solely explored the small vs large firm dynamics (Hockerts and Wüstenhagen, 2010).

Others have linked customer discovery and validation to business model generation, however without any sustainable development dimension (Osterwalder et al., 2014). The urgent need to pursue sustainable development makes this an important new research area. Our case study starts to fill this gap in the knowledge through linking startup thinking, triple bottom line value creation and the organizational capability identified as most important for radical innovation success in corporates: ‘experimentation’.

3. Methods

The organizational capability of experimentation has been investigated by Chang et al. (2012), who conducted a deductive quantitative research study. The purpose of this paper is to gain a deeper understanding of research finding by Chang et al. (2012) in the context of economic, social and environmental value creation. An inductive research method is used and data was collected with the aim of gaining information about how the clothing retailer develops the organizational capability of experimentation (Savin-Baden and Howell Major, 2013; Stake, 2005). The case study is instrumental (Stake, 2005) to explore the organizational reality of an organization looking to develop this capability. The key risk of conducting an instrumental case study is that of confirmation bias (Savin-Baden and Howell Major, 2013). To monitor research bias, the lead author kept a reflection diary during the whole of the case study process, including the writing of this paper.

3.1. Research design

The case study consisted of two main data collection phases, with data analysis taking place in parallel to data collection (Fig. 1). The scoping phase included the review of the project brief and attending the initial two-day residential project workshop. The second phase included the recording of planning meetings and project progress review workshops and ten semi-structured interviews with project team members. Fig. 2 shows the case study research design.

3.1.1. Scoping phase

The case study project was the result of a longer-term desire to collaborate between the clothing retailer and the university. Project details were agreed together and resulted in a project proposal that included the project ambitions, key project milestones, and a timeline for completion. Project funding was secured through Innovate UK's funding call “Supply chain innovation towards a circular economy” (InnovateUK, 2013).

The submitted project proposal was reviewed to determine project goals and the suitability of the case study to answer the research question. The proposal indicated that the retailer would be required to pursue, at the very least, new to the firm product and service innovation. Furthermore, the project proposal explicitly acknowledged the need for the retailer to experiment with unknown product and service propositions in order to achieve the goal of reducing clothing fibre going to landfill by 100%.

The first main project event took place in October 2014: a two-day residential workshop that was attended by delegates from the clothing retailer, the university and individuals from external organizations. External participant selection was based on prior engagement where these individuals displayed visionary qualities in regards to product and service innovation (Interviews IDs 43, 49). All delegates related to the clothing fibre value chain of the retailer. In total, 28 people attended. The workshop was aiming to

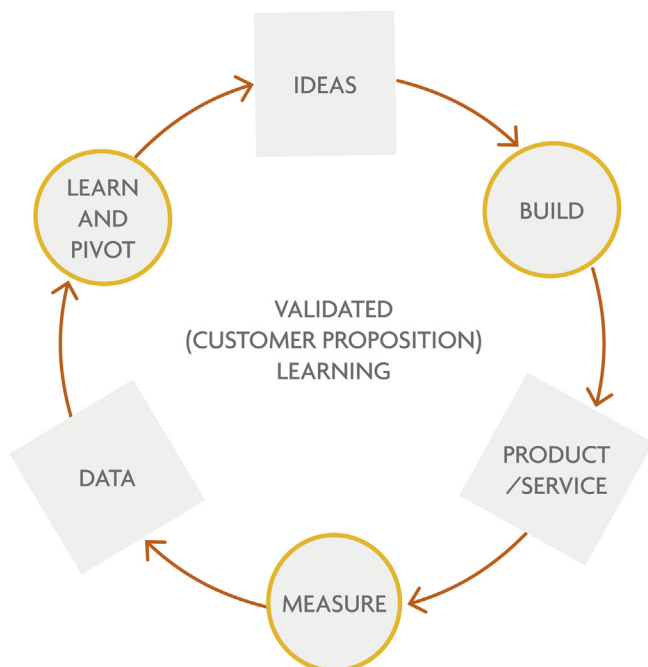


Fig. 1. Lean startup approach, adapted from Ries (2011) and Blank (2013).

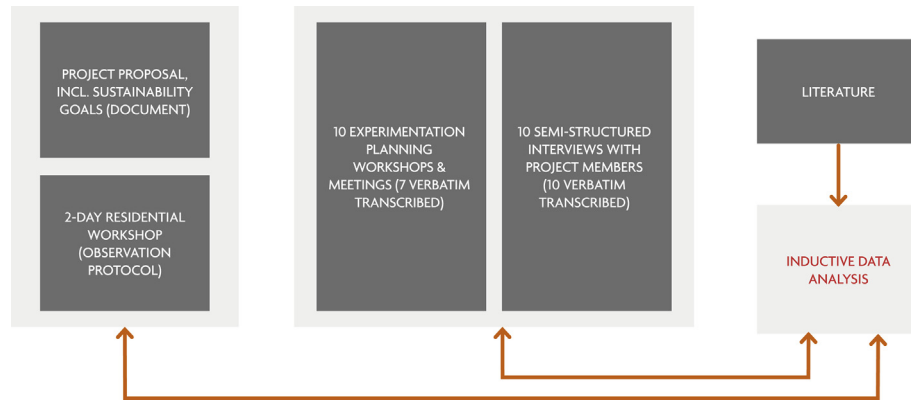


Fig. 2. Case study research design.

develop ideas for new products and services that would enable the clothing retailer to meet the project goal. The generated ideas were envisaged to build the foundation for project experiments to be executed during the two year project, with the view to develop more resource-intensive pilots towards the end of the two-year project timeline.

The workshop process was captured through an observation protocol with the categories of (1) physical setting, (2) activities, (3) participants, (4) interactions, (5) delivery of information and (6) subtle factors (based on Thomas, 2011). The structured observation protocol was populated ongoing during the workshop, where the lead author watched informally but methodically in and among the participants (Savin-Baden and Howell Major, 2013). The observation protocol was shared and discussed with another researcher who attended the workshop in observational capacity to check for confirmation bias.

The scoping phase indicated that the case study was suitable to research how a firm might develop the organizational capability of experimentation to reach an ambitious value creation goal that looks to transform the business model from linear to circular.

3.1.2. Workshops and interviews

Experiment planning workshops as well as key meetings were data events that allowed exploring how the clothing retailer endeavoured to develop products and services necessitating the development of new capabilities and with the potential to be new-to-the-world. Hence, all these ten data events were recorded (Table 1). Of the ten recordings, seven were transcribed ad verbatim.

Ten semi-structured interviews (Table 2) were conducted to gain insights into how project team members view the inception, planning and execution of the case study project. The six clothing retailer interviewees were selected to cover the key aspects of the project: sustainability, business and technology. The three

university interviewees were selected to cover the academic input into the project: during inception, through leadership, and implementation. The final interview was conducted with a funding monitoring representative.

The ten semi-structured interviews used the same 12-question template (Appendix A), with follow-up questions probing deeper into project aspects that related to the planning and implementation of the project experiments. The interviews were conducted by the lead author, audio-recorded and fully transcribed ad verbatim according to the same transcription guidelines.

3.2. Data analysis

The case study used the “big three” (Langley, 2009, p. 411) data sources used in qualitative research: interviews, observation, and archival documents. The project brief, residential workshop observation protocol, interview transcripts, meetings and workshop transcripts were interpreted (Savin-Baden and Howell Major, 2013; Thomas, 2011) with the recordings of three workshops (Research meeting; Data crunch session 1 and 2) supplementing the text files. The data sources and associated types of data fulfilled different purposes during data analysis, as shown in Table 3.

The transcripts were analysed with the qualitative data analysis software program ATLAS.ti. The academic literature presented earlier in this paper provided the content prompts for highlighting text in the reviewed documents. As starting point to identifying interesting text sections, the ATLAS.ti auto coding function was used to find sentences that include key words (e.g. ‘lean’, ‘radical’, ‘value’) from the reviewed literature. In addition, all transcripts were read in full to enable the coding of the full data corpus (Friese, 2012).

Two strategies helped to interpret meaning in the data. Firstly, ‘organizing principles’: how project members talked about themselves in relation to the planning and execution of the project

Table 1
Data overview of 10 workshops and meetings.

Description	Collection method and data preparation	Timing	Lengths (hrs)
Workshop	Face-to-face recording & verbatim transcript	February 2015	3
Experimentation roadmap workshop	Face-to-face recording & verbatim transcript	March 2015	3
Planning workshop for experiments	Face-to-face recording & verbatim transcript	March 2015	2.5
Meeting clothing retailer internal - 1	Recording & verbatim transcript	April 2015	1.5
Meeting clothing retailer internal - 2	Recording & verbatim transcript	April 2015	1
Experiment review workshop	Recording & verbatim transcript	August 2015	4
Research meeting	Recording of meeting	August 2015	2
Data crunch session - 1	Recording of meeting	August 2015	7.5
Data crunch session - 2	Recording of meeting	August 2015	6
Project progress meeting	Recording & verbatim transcript	August 2015	2

Table 2

Data overview of 10 semi-structured interviews.

Organization	Organizational area	Collection method	Timing	Lengths (hrs)
Clothing retailer	Product innovation	Face-to-face interview	August 2014	1
University	Research	Phone interview	March 2015	0.75
Clothing retailer	Business sustainability	Face-to-face interview	March 2015	1
University	Research	Face-to-face interview	March 2015	1
Clothing retailer	Product innovation	Face-to-face interview	April 2015	1
University	Project management	Face-to-face interview	June 2015	1
Clothing retailer	Product innovation	Phone interview	June 2015	1
Clothing retailer	Business sustainability	Phone interview	June 2015	0.5
Clothing retailer	Clothing sustainability	Face-to-face interview	July 2015	1
Government funding	Project funding monitoring	Phone interview	September 2015	0.5

experiments, how decision were justified, and how project team members saw themselves in relation to each other. The second strategy used was ‘oppositional talk’: project team members define a project aspect or process by saying what it is not (Savin-Baden and Howell Major, 2013). The coded text sections received descriptive labels, consisting of a nouns and adjectives: these were the 121 1st-order codes. Once the first coding cycle was completed, the ATLAS.ti co-occurrence tool was used to reveal associations between 1st-order –lower level-codes, their intensity and meaning (Contreras, 2011; Friese, 2012). Co-occurrence of codes means enclosing or overlapping of different codes in the same data text section (Contreras, 2011). Revisiting the transcripts and paying close attention to text sections with co-occurring codes (example in Appendix B) aided the grouping of the 1st-order codes into 2nd-order –conceptual- codes through developing “a sense of categorical, thematic, conceptual, and/or theoretical organization” (Saldaña, 2009, p.149). Table 4 presents the 1st-order and 2nd-order codes that resulted from the inductive data analysis.

The 2nd-order codes formed the basis of the case study discussion in this paper. The data provided a rich picture of the project team efforts to develop products/services outside the organizational status quo, the process of developing the project experiments, and the challenges associated with linking a sustainability dimension to radical innovation activities within the boundaries of the firm.

3.3. Research limitations

There are two limitations of the research approach used for this paper. Firstly, a single case study means that learnings are drawn from a single set of organizational learning. We concur that findings might not apply to other firms looking to develop the organizational capability of experimentation, either in the same sector or in others sectors. However, the single case was carefully selected to meet the research objectives and findings might be transferred to and build on by other firms (Flyvbjerg, 2006). The second research limitation is that parts of the data analysis were conducted by a single researcher: to ensure confidentiality, all interview transcripts were solely analysed by the lead author. This means that the data analysis was conducted by a single researcher, increasing the individual bias applied to the data set. However this was a conscious decision. All interviews were kept confidential between the lead author and the interviewee and this was communicated during data collection. This enabled a great degree of openness by the interviewees, essential to collect data suitable to meet the research objectives.

4. Findings and discussion

The narrative is presented in the order of the 2nd-order codes shown in Table 4, with a selection of quotes from 1st-order coded

text sections used to illustrate the narrative.

4.1. Reinforcing the organizational innovation status quo

From the project proposal (ID0) and the detailed observation protocol (ID55) is it undisputable that the project was intended to explore products and services with the potential to destroy the existing business model. This aligns with the sustainable business model literature (Bocken et al., 2014; Boons and Lüdeke-Freund, 2013). At the same time, the need to create new technical and process capabilities was clearly acknowledged (IDs 0,55), again aligning with the literature (Abernathy and Clark, 1985; Garcia and Calantone, 2002). The retailer was comfortable to pursue innovation activities with strategies that went beyond purely resource-based strategies for economic value creation (Eisenhardt and Martin, 2000; Teece and Pisano, 1998). The initial idea generation process of searching for radical ideas was flawed as indicated in the observation protocol. This was acknowledged even during the ideation workshop:

“(..) the ideas were an accumulation of team discussions (..) it was communicated that the ideas articulated in participant notebooks and on team displays would be taken forward into the next phases of the project” (Observation protocol; ID55; p.2)

However, the project started to encounter major barriers after the ideation workshop. The team was keen to apply familiar innovation process tools. Workshops (IDs 47A-D, 51A-B, 52A-B) illustrated the strong desire by the whole project team to plan the project using tools such as road mapping, developing decision matrices, or linking the project to planned corporate activities. This exchange between two participants provides an illustration:

“I think it'd be good to have a general chat about what works and what doesn't work in experimenting. So taking 2 or 3 sentences from 'The Lean Startup', (..) what works and what doesn't work in experimenting.” – “Does that then give us the matrix that we devise during the session to work to?” (March 2015 workshop; ID47A; p. 7)

The desire to apply known process tools reinforced the innovation status quo of the retailer. Project activities that would have required the development or implementation of ‘uncomfortable’ (i.e. new) capabilities at the individual or firm unit level were discussed. However, the responsibility for conducting these activities was established to be outside the project scope: the establishment of a spin out business and personal limits of technological skills are two examples articulated where it was deemed unfeasible to develop new capabilities.

The term ‘experimentation’ invoked language based on the

Table 3
Case study data sources and use.

Data sources	Type of data	Use in the analysis
Project proposal (7 pages)	Document written through collaboration between representatives of the retailer and the university (1 in total)	• Gather information on whether the case study project is suitable to answer the research question
Observation protocol (13 pages)	Structured observation protocol of 2-day project ideation workshop (1 in total)	• Gather information on project ambition and process
Workshops and meetings (433 pages)	Meeting transcripts (3 in total): • Internal sign-off meetings with senior firm staff (2) • Progress meeting with government funding representatives (1) Workshop transcripts (4 in total): • Experiment planning workshops (3) • Experiment review workshop (1)	Increase understanding of the project goals and proposed process to achieve project goals • Gain understanding of how senior management views project goals and processes to achieve project goals • Corroborate understanding of project progress derived from semi-structured interviews and project team workshops and meetings • Gather information on process of developing the organizational capability of experimentation • Gather information on how project team views progress on project experimentation
Semi-structured interviews (101 pages)	Interviews with academics (3 in total) Interviews with firm employees (6 in total)	Corroborate understanding of developing organizational capability of experimentation from workshops and meetings Corroborate understanding of developing organizational capability of experimentation from workshops and meetings
Meetings (14h and 15min)	Interviews with funding monitoring representative (1) Meeting recordings (3 in total): • Research meeting for a single experiment content with external contractor (1) • Fact finding sessions to research market data for experiments (2)	Support accounts from other semi-structured interviews • Examine whether details of experiment planning add value to accounts from semi-structured interviews • Corroborate 1st-order codes on how the project team endeavours to adopt lean startup principles
Private project website	Website hosted by the clothing retailer containing project documents, experiment details, team calendar	Integrate and crosscheck project process details and timelines from workshops, meetings and interviews
Interview notes (part of 101 pages)	Short paragraph written at the end of 10 interview transcripts	Track and examine interaction between researcher and interviewee, capture immediate stand-out points of interviews

scientific design of experiment literature in the team: ‘testing variables’ (ID56A), ‘hypotheses to prove’ (ID60B), and ‘control group’ (ID61B) are examples. However solely the technical team member articulated how the firm used statistical design of experiment principles during implementation of customer discovery (Blank, 2013) and customer validation activities (March 2015 workshop; ID51A–B).

4.2. Creating internal buy-in

The need to engage in iterative processes to explore how product and service propositions might be linked to customer value propositions has been highlighted as a key component of the lean startup approach (Blank, 2013; Ries, 2011). The data shows that the project team was keenly aware of the need to create buy-in from decision-makers and corporate budget holders in order to test customer value propositions.

“(..) if it something a bit more radical, a bit more mad, then it needs to go into this mechanism and be supported or not supported, (..) You need to kill things quickly or support things quickly to get them through.” (Interview ID 43; p. 7)

From the beginning of the project the retailer engaged staff members across all business functions, a characteristic of experimentation for the pursuit of radical innovation highlighted in the definition by Chang et al. (2012). However the data also indicates a lack of clarity about the internal buy-in process and project team accountability about (1) how experiments were to be planned and (2) how experiments were to be executed for this purpose.

During project meetings the need for creation of buy-in from senior members of clothing retailer staff was repeatedly articulated. In particular the need to ‘internally sell’ product/service

innovations that are new to the retailer customer base were perceived as high risk due to the uncertainty of how consumers might engage in or react to new products or services.

“That [consumer reaction], of course, is the big unknown at the moment and we probably won’t even really know at the end but we might have a half decent idea” (Interview ID 66; p. 4)

The clothing retailer interviewees repeatedly cited the involvement of the university as a suitable mechanism to enable the project team to reflect on these and other project risks and challenges. This reflection was viewed as a useful means to think through how to communicate the innovation activities outside the organizational status quo within the clothing retailer. However, the uncertainty relating to customer reaction inhibited customer engagement in the project experimentation until month eight of the project. This late customer engagement is in stark contrast to the lean startup literature (Blank, 2013; Ries, 2011).

During year one of the project, a limited number of senior staff of the clothing retailer was exposed to the project. While this initial non-exposure was done intentionally to nurture the project ‘under the radar’, once positive results started emerging, buy-in was required from senior staff.

“We talked about the tactics all the time, we talked about how we’d have to bring it up on different board meetings, how we’d have to key it into strategy reviews, and then working back from that who would do that and who would get time with the different sponsors at board level to share the knowledge and share the findings and convince them.” (Interview ID 49; p. 3)

This suggests two things. First, involving the senior staff at the right moment is a real balancing act. Involving too many senior staff

Table 4
1st-order codes and 2nd-order codes.

1 st -order codes	2 nd -order codes		
• Ambidexterity • Antibusiness • Business model • Decision-making toolkit as output • Decision at the edge of chaos • Desire to plan and control • Design of Experiment principles in project experiments • Embedding innovation in firm • Experiment planning inhibits action • Experiment vs pilot • Explore new business model • Extending organizational capability • Board engagement • Business leadership • Collective goal • Corporate structure hindering radical innovation • Executive innovation input • Innovation culture • Internal relationship network	• Generating radical innovation ideas • History as innovation inspiration • Ideation • Innovation vs Business model innovation • Limits of technology • Merger and Acquisition • Need for corporate innovation • Open innovation • Reinforcing firm's innovation process status quo • Spin out company • Technical capability • Technology as process enabler • Influencing tactic to enable organizational change • Leadership • Organizational values • Project is too comfortable to be radical • Project leader • Senior firm staff pushing some experiments • Senior leadership • Strategy to engage senior staff • Environmental value creation • Experiment learning • Fibre recovery rate • Goal • Other firms used as decision guidance • Social value creation • Struggling to keep experiment scope small • Sustainable development goal • Freedom to explore innovation opportunities • Gauging demand for new product • Identify gaps in market • Lean startup in corporate • Misunderstanding entrepreneurial mindset • No entrepreneurial experience • Reluctance to engage customer • Startup finance • Technical lead as 'agile coach' of team • User acquisition cost • Whole team engaged in market testing • Project team communication • Slow organizational timeline • Speed • Time to commercialize innovation • Outsourcing organizational innovation Capabilities • Past business experience bias • Staff serving multiple roles	Organizational innovation process	
• Value proposition • 4 key themes • 11 experiments • Aim to increase resource efficiency • Complexity in project • Decision making in complex situation • Economic value creation	• Academic rigour hampers action • Acting like entrepreneurs • Action • Applying lean startup approach • Consumer engagement • Customer discovery • Customer focus • Customer validation • Digital customer testing • Entrepreneurial experience • Experimentation action • Deadline driving project action • Innovation changes whole industry • New team member • Project delay • Collaboration benefit • Collaboration challenges • Emotions not managed • Fragmentation • Incognito customer testing • Experimentation = quick learning • Innovating outside status quo • Personal experiments • Carbon emissions • Circular economy • Economic value creation is highest priority • Experienced business person • Finance to bear risk • Hunger for templates to apply • Innovation accountability • Link experiments to status quo firm events • Process confusion • Academic input • Discard experiment not leading to project goal • Researcher displays bias • Sharing project learning with others	• Personal values • Sustainable development values driving innovation • Unplanned learning	Creating internal buy-in
	• Project experiment reason • Public funder input • Resource use • Statistical robustness • Throwing toys out of pram • Triple bottom line value embedded • University asked to drive radical innovation • Using familiar project management tools	Increase of ambition and complexity of sustainability goals	
	• Experiment completed	Embedding entrepreneurial principles	
		Time	
		Multiple roles	
		Unplanned, action-based learning	
		Tension between environmental, social, economic value creation	
		Discarding experiments	
		Research Process codes	

too early might lead to the cancellation of product and service innovation experiments plans because they are deemed too risky, whereas involving key staff too late might mean experiment content will not 'stick' or gain traction in the wider organization. Second, consistent with the arguments of the radical innovation capabilities literature (Chang et al., 2012) and entrepreneurial goals literature (Guarana and Hernandez, 2014) staff needs to be

'allowed' by senior management to experiment and engage in uncertain innovation activity outcomes.

4.3. Multiple roles

None of the project team members worked fulltime on the project, which is different to people developing products and

services in a startup business (Graham, 1993–ongoing; Livingston, 2007). Senior members of the project team were leading content development in workshops. However, two new team members were introduced to the project and the project ambitions and participants of the workshop varied widely. This resulted in variations of project goals. In effect, workshops were led by different team members throughout year one. In addition to shifts in team membership, some team members had to combine different mandates.

Towards the end of year one of the project, this case study challenge was addressed by the retailer. A project team member was freed up from other commitments to dedicate 50 per cent of working time to the planning and execution of experiments. Almost immediately, this resulted in more frequent communication between members of the project team – and frequent communication was stated as an explicit project need by interviewees (Interviews IDs 49, 56, 58). Allowing a member of staff to spend 50 per cent of their time on the project seems like a suitable mechanism to avoid the ‘processification’ of corporate innovation, manifesting itself as corporate mind set and identified as a key barrier to radical innovation success in large corporates (Sandberg and Aarikka-Stenroos, 2014). Combining staff freedom to pursue innovation goals and the ability to monitor corporate innovation processes was highlighted as a key challenge:

“It’s a fine balance about trying to create a process that doesn’t feel like a process, because obviously if you think people are just going through a machine then it doesn’t create the serendipity that creates innovation.” (Interview ID43; p. 5)

4.4. Ambition and complexity of sustainability goals

In relation to the content of the planned experiments, we found that the ambition was to gradually build up in ambition and resources, which is in line with the iterative lean startup approach (Blank, 2013; Ries, 2011): developing a large number of smaller scale experiments. However the data indicates that up to the final month of data collection, the ultimate ambition of the experiments to be completed were of a nature that was new to the clothing retailer and some novel for the industry, but not new to the world. The sustainability project goal was not articulated on an ongoing basis during the planning of the project experiments. This contrasts the assertions of the literature (Alexander and van Knippenberg, 2014; Guarana and Hernandez, 2014). The task orientation of project team has been highlighted as not unusual:

“(…) there’s always a danger of people becoming just transfixed about achieving a project but not actually really achieving the goal of the project.” (Interview ID43A; p.3)

In the project, the failure to articulate the goal on an ongoing basis resulted in uncertainty about what the experiment parameters might be in regards to sustainability ambition. This mirrors the literature on sustainable entrepreneurship that advocates that corporate process innovation may address a wider range of environmental and social issues at the same time because of better corporate processes than sustainable entrepreneurs who have a narrower focus due to more limited available resources (Hockerts and Wüstenhagen, 2010). In general, this may be viewed as a positive assertion; however during the case study project the broadening of sustainability

scope seemed to hinder action. Towards the end of project year one, the sustainability benefits of project activities associated with each of the project experiments were framed in relation to the project fibre goal as well as wider social and environmental benefits.

4.5. Embedding entrepreneurial principles

Despite a stated desire for exploring product and service innovation outside the organizational status quo in order to address a highly ambitious sustainability goal, breaking out of a corporate mindset requires the ability to think and act continuously like a member of the startup community. This was acknowledged by two interviewees, for example by Interviewee 43:

“Big is best has become big is bad, because actually today being big makes you less nimble and it makes you less able to do the stuff that can happen in a small startup environment. The challenge for all of businesses (…), in my opinion, is how (..) to actually deliver innovation at a business model level which is equivalent to, if not better than, what’s happening in the small startup world.” (Interview ID43; p. 8)

However, acting like a member of the startup community proved challenging for the project team members. The project team meetings and workshop repeatedly articulated that the project was looking to employ a learning approach with fast iterations. The following workshop quote is an example of this:

“We are very much aware that we need to take a lean startup approach (..) we need to learn, and then set up new experiments based on that learning.” (March 2015 workshop; ID 51A; p. 1)

The ambition to embed quick iterative learning, except for some informal unplanned learning referred to in Section 4.7, was not met up until the execution of the first experiment in June 2015. Lean startup thinking fed into the early stages of the project experiments. Only one project team member from the corporate had prior experience in executing the lean startup approach. The team members who had not previously applied the lean startup approach struggled with uncertainty.

Project team members highlighted the need for action to gain validated learning during the semi-structured interview (Interview ID 43A, 48, 49, 50, 58, 60A–B). However for the interviewees the process of how to gain such validated learning varied: in the expected number of action-learning cycles, in the process of establishing assumptions to be tested, in the amount of time to be spent on each assumption, to what degree retail customers would need to be involved, what the ultimate learning success for project experiments would look like. The planning workshops did not seem to fully remedy the disparate understanding of how to gain validated learning (e.g. March 2015 Workshop, ID52A–B). The need for action in order to learn (Blank, 2013) was acknowledged by corporate and academic project team members – but ironically not acted upon until almost a year into the project.

4.6. Time

The pace of progress for the project experiments was perceived as slow by the retailer interviewees (Interview IDs 43, 58, 60), even in comparison to standard corporate product and service innovation. Academic project partners equally acknowledged the slow pace:

“(..) in an ideal way we would have started with some smaller experiments already and learned from that and set up some other small experiments and learn from that again but the pace is a bit slower than everyone might be hoping.” (Interview ID48; p. 5)

The project was expected to exceed the envisaged two-year timeline, a fact openly discussed with the government funder towards the end of data collection (September 2015 workshop, ID65). Multiple roles, creating internal buy-in and other firm priorities were articulated and accepted as the reasons. The project delays and the implication for the urgency of implementing sustainable development (Ashford and Hall, 2011; Boons et al., 2012; Martin et al., 2010) were, however, not discussed. The corporate timeline and slow pace of change were acknowledged, however the implications for the corresponding slow increase in fibre recovery rates were not mentioned in the data collected.

In terms of developing new capabilities (Chang et al., 2012; Eisenhardt and Martin, 2000; Teece and Pisano, 1998) within the project and the retailer, it was clear that the technical lead, the experienced lean startup member of the team, was very stretched for time. The recruitment of a technical contractor to run an experiment relying on technical capabilities remedied this in the late summer of 2015 (Workshop August 2015; ID 61A-C):

“(..) all his knowledge gets retained and his sense of ownership; it's just that the work is going to have to be done by another coder rather than him. It took us probably two or three weeks longer than we would have liked” (Project progress meeting; ID 65; p. 18)

Technical capabilities from other parts of the firm were drawn into the project in other project activities too, indicating that the retailer indeed found it easy to free up extra resources to pursue a triple bottom line value creation goal (Hockerts and Wüstenhagen, 2010). Finally, project deadlines pushed action towards the later stage of the data collection, with two project sessions scheduled to address gaps in the project knowledge (Data crunch sessions; IDs 63A-B, 64A-D).

4.7. Unplanned, action-based learning

The data highlighted two project mechanisms that furthered project learning. Both of these mechanisms developed without longer-term advanced planning and were action-led.

Firstly, members of the project team started to run experiments related to the resource productivity goal ‘on the side’ or in their own time outside of work. The ‘on the side’ experiments were closely related to personal activities, hence had personal meaning for the project team members. This mirrors the literature assertions that valuing sustainability from personal knowledge helps to build triple bottom line creating enterprises (Bocken, 2015; Schaltegger and Wagner, 2011; Tennant, 2015). The learning from these ‘on the side’ experiments was not captured formally. However, the meeting and workshop recordings as well as the interviews show that the learnings are feeding into the project process:

“(..) those are probably pre-experiment I guess, and we need to do something more deliberate at work.” (Interview ID48; p. 6)

The project team also drew on learning from general observations made during the life outside of work. This learning was freely fed in workshops and meetings, for example during the discussion of clothing sharing business models:

“(..) I have friends who have between them a bag with clothes that they share, between a group of five, and that's their pregnancy bag.” (February 2015 workshop; ID47B; p. 26)

Hence, the organizational capability of experimentation for the project was built significantly outside of the organizational boundaries of the clothing retailer.

Secondly, the project team systematically tested customer and market assumptions for the project experiments in August 2015 (Data crunch sessions; IDs 63A-B, 64A-D). In total, over 13 h were spent to determine the commercial and environmental impacts for each of the experiments. The sessions were collaborative and informal research workshops and attended by team members from the retailer and the university. These sessions are closely linked to overcoming the challenge of creating a wider corporate buy-in to the uncertainty associated with the experiments. In effect, the project team is now able to demonstrate to senior staff –the internal investors–that the uncertainties, risks and potential benefits associated with the experiments have been thought about in detail: the corporate project team members gain the mandate to lead high risk activities (Data crunch sessions; ID 63A-B, 64A-D).

4.8. Tension between economic, social and environmental value creation

The project team did acknowledge sustainability feedback loops of each experiment in meetings and workshop discussions. Equally, the worry about potential negative feedback loops associated with conducting project experiments within narrow parameters was articulated. The fear of ‘running off in the wrong direction’ due to running the wrong experiments was a strong theme in the earlier experiment planning meetings and workshops. Rebound effect such as those explored by Figge et al. (2014) were discussed and on some occasions led to heated discussions. However the revolutionary change needed to pursue sustainable development (Ashford and Hall, 2011) and how the project was aiming towards such change internal and external to the firm (Garcia and Calantone, 2002; Linton, 2009) was not discussed. Overall, experiments with clear economic benefits were favoured over experiments with uncertain economic benefits. This was irrespective of the potential social and environmental benefits.

“(..) there was as much tension between customer needs and profitability as there was between the other dimensions [of environmental and social value]. The lean startup says don't worry too much about making money from day one, focus on what the customer needs and the money will come. [Whereas in a large firm] you are forced to at least have an estimate of what the value might be business-wise.” (Interview ID49A; p.8)

The retailer has a strong track record of operationalizing sustainable development, beneficial for a project like this according to Christensen et al. (2016). However, even so the risk associated with uncertainty of project outputs necessitated the seeking of outside funding (Project proposal; ID0, Interview IDs 48, 49, 50, 56A-B, 66). It seemed that this mechanism of reducing the risk for the retailer did not overcome one of the key barriers (Sandberg and Aarikka-Stenroos, 2014) to radical innovation in established firms: restrictive mindset. Financial viability of experiments was a major factor impacting how the team viewed the exploration of new products and services. Triple bottom line value creation as articulated by the literature (Dyllick and

Table 5
Key lessons and insights from the case study interpretation.

Section	Key lesson
4.1.	Radically new products and services lead to new business models (Bocken et al., 2012). The desire to use familiar processes reinforces the firm's innovation status quo, hindering new business models.
4.2.	Creating internal buy-in across all levels of seniority is necessary. The timing in which senior staff is engaged is important: too early will result in 'killing' of projects with high uncertainty, too late will result in lack of senior ownership. This mirrors the literature assertion about the need to create buy-in to the customer development process (Blank, 2013).
4.3.	Despite the corporate practice of multi-project working, enabling key team members to significantly focus on a radical innovation project will enable entrepreneurial focus (Katz and Shepherd, 2004; Livingston, 2007) on testing new value propositions with customers.
4.4.	The resource productivity goal might quickly broaden out to other sustainability issues, such as social sustainability, as suggested in the literature (Hockerts and Wüstenhagen, 2010). Articulating the value creation goal on an ongoing basis (Alexander and van Knippenberg, 2014; Guarana and Hernandez, 2014) helps to maintain and increase the project ambitions.
4.5.	A project that introduces lean startup principles will benefit from highlighting the new social and technological capabilities that are needed to implement this approach. The need for new organizational capabilities for radical innovation has been suggested by the literature (Chang et al., 2012; Garcia and Calantone, 2002), as has the need to create team-wide understanding of the specifics of conducting customer development (Blank, 2013).
4.6.	The urgency of operationalizing sustainable development (Ashford and Hall, 2011; Boons et al., 2012) is easily forgotten when trying to meet short-term project goals and other commitments in the firm.
4.7.	Personal motivation drives action based learning outside of project boundaries. This is desirable and useful to happen in addition to more deliberate learning. Unplanned action based learning will enable project members to become more confident with how to negotiate experiments with uncertain outcomes.
4.8.	The existing corporate mindset (Sandberg and Aarikka-Stenroos, 2014) dominated by economic value creation can block experimentation activities with high output uncertainty, even if highly promising from a social and environmental value creation perspective.
4.9.	Experiments that prove to be unfit to meet the ambitious triple bottom line value creation goal should be discarded. At the same time, process learning lessons can be useful and influence wider corporate sustainability and innovation practice.

Hockerts, 2002; Schaltegger et al., 2012) was, therefore, not achieved.

4.9. Discarding experiments

The tensions between social, economic and environmental value creation was openly discussed after some experiments were started. The first experiment in June 2015 helped to create internal awareness of the project. However it was acknowledged that the social and environmental value creation was not fit to meet the ambitious project goal. Conducting this 'non-project' experiment enabled the project team to get comfortable with engaging

customers in new product and service propositions, essential for successful new business activities (Blank, 2013; Ries, 2011). The experiment was duplicated in other locations without drawing on project funding, although using the learning derived from the initial project experiment.

Other experiments were outright rejected due to missing out one aspect of triple bottom line value creation, in this case environmental value creation in line with the project goal:

"I'm really confident that we can do that. Or at least, build a proper trial (...) if we were doing it in real life. But that doesn't prove anything. As in, that proves that this model is nice. It makes money

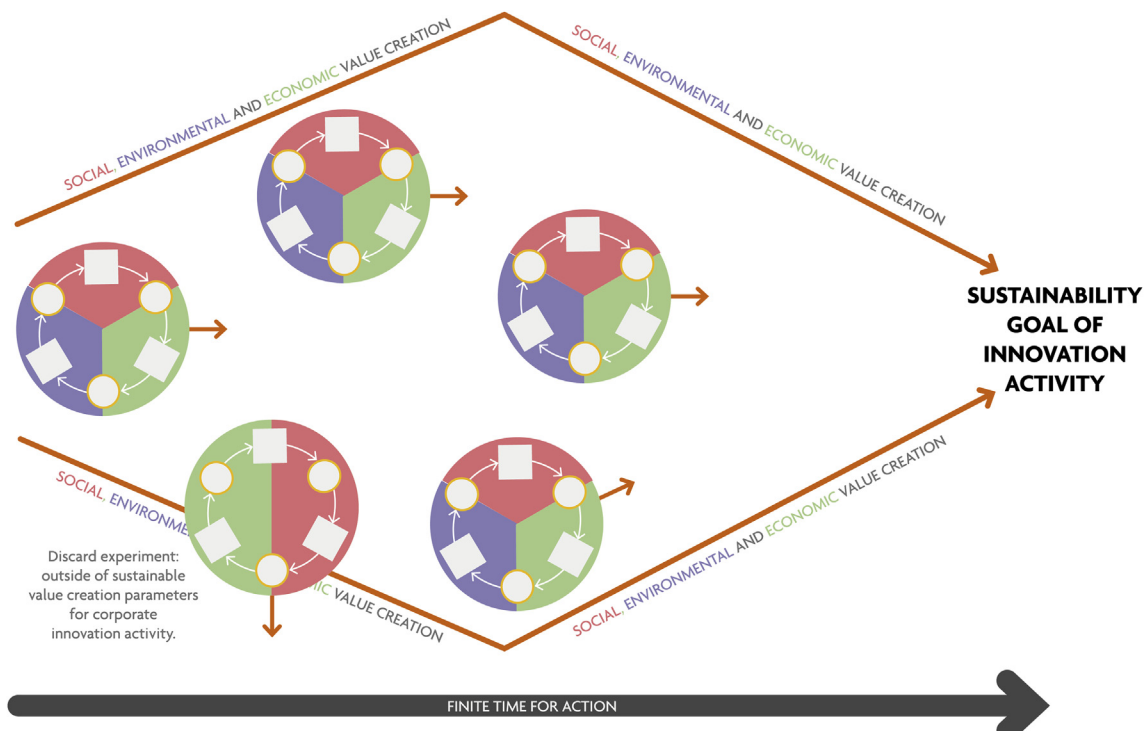


Fig. 3. Urgency of triple bottom line value creation driving corporate experimentation.

(...) *It has social value. It has community value. But it doesn't prove that less clothes go to landfill*" (Experiment review workshop; ID61B; p. 13)

4.10. Key lessons and a new framework

From the case study narrative key lessons were drawn, shown in Table 5. These nine key lessons are a start to building a conceptual proposition to link currently disparate domains with a view to increase the understanding of what 'experimentation' means for large firms.

We propose that these key lessons and the lean startup approach building on Blank (2013) and Ries (2011) as the basis for a descriptive framework for radical innovation for sustainability in large firms. The framework (Fig. 3) shows that whilst the broadening out of economic, social and environmental value creation boundaries is acceptable and can be expected, there must be some absolute sustainable development boundaries that frame experimentation activities.

Future work should analyse the implementation of the project experiments of the project, honing in on the most stretching experiment to maximise the learning on challenges and opportunities. We recommend that the key insights derived from this case study are further developed through this. This might be set in the context of the clothing industry to identify whether the insights might be sector specific. Finally, the collaboration between the retailer and the university and its implications for the experimentation capability might provide a fruitful avenue for further research.

5. Conclusions

This paper explored the practice of radical innovation with a sustainability goal from the perspective of a large firm and addressed two important research gaps. Firstly, how a firm might pursue economic, social and environmental value creation in the context of time sensitivity. Secondly, how startup thinking may be used to maximise the success of radical innovation with a sustainability goal in a large firm. This transdisciplinary research made a conceptual link between lean startup thinking, triple bottom line value creation, and organizational capabilities. A new descriptive framework based on the insights generated from the case study is offered as the basis for further research and action. The key insights generated through this case study are a starting point for other large firms looking to develop the organizational capability of experimentation in order to pursue urgent sustainable development challenges.

In our case study, the ambitious project aims were not on track to be achieved during the two-year project timeline. We found that despite a clear articulation of the need for fast learning through project experiments, the experiments were not executed quickly. Rather, the desire to plan project activities, coupled with the lack of lean startup approach expertise across the whole project team hampered fast action. This led to the extension of the overall project timeline. However, in our case study, project team confidence about learning by doing increased whilst generating anecdotal learning through privately executed experiments. Some experiments were not fit to explore the transformation of the business model from linear to circular and were dropped from the project. Still, overall, the corporate mindset of economic value creation dominated the experiments.

Funding

The research materials and travel costs for Ilka Weissbrod for this research were funded by Climate-KIC, created by the European Institute of Innovation and Technology (Regulation (EU) No 1292/2013). Ilka Weissbrod was supported by the EPSRC Centre for Innovative Manufacturing in Industrial Sustainability (Reference EP/I033351/1). Nancy Bocken was supported by the project budget from the Innovate UK competition 'Supply Chain Innovation towards a Circular Economy' (IUK Ref 101902).

Acknowledgements

This work was supported by the Innovate UK competition 'Supply Chain Innovation towards a Circular Economy' (IUK Ref 101902); the EPSRC Centre for Innovative Manufacturing in Industrial Sustainability (Reference EP/I033351/1); and Climate-KIC, the public-private partnership created by the European Institute of Innovation and Technology (Regulation (EU) No 1292/2013). We thank the project team for allowing the recording of meetings and workshops and freeing up precious time for research interviews.

Appendix A. Case study semi-structured interview template

Articulate at the beginning of interview

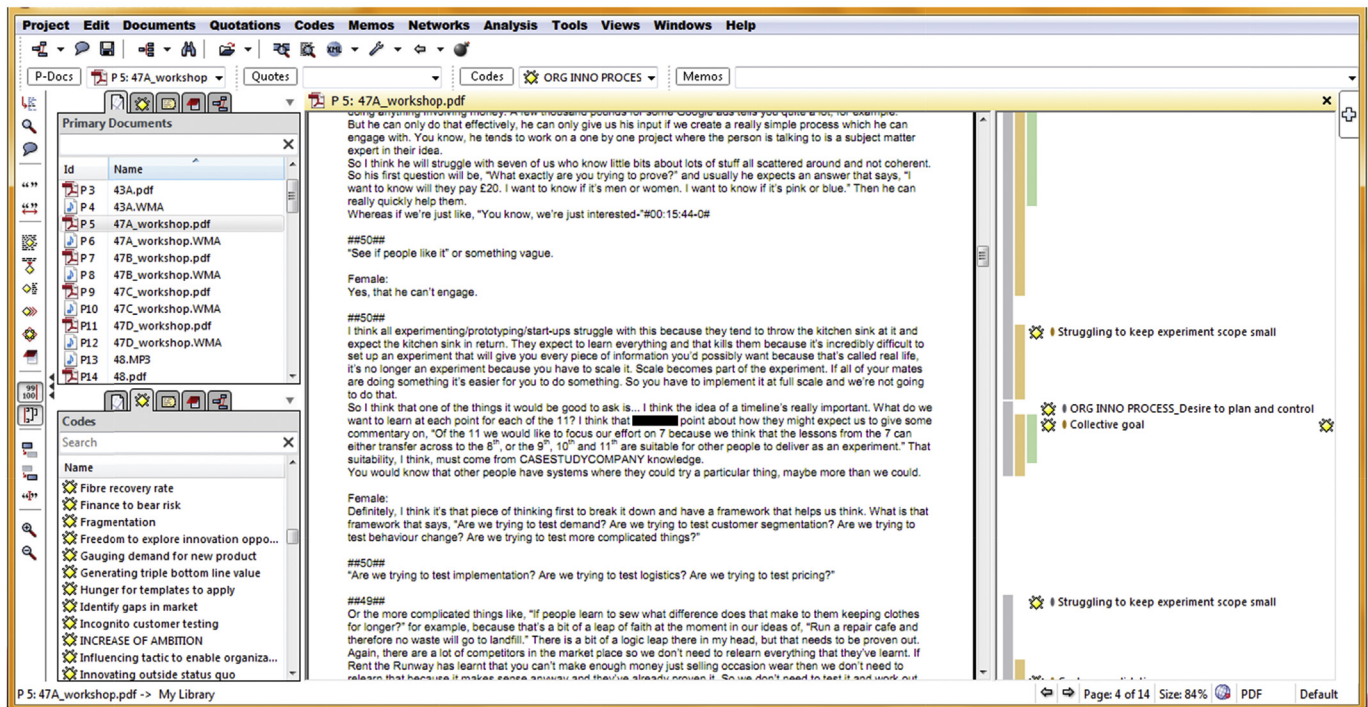
- No materials were shared prior to the interview. No questions were shared prior to the interview.
- The transcript will be shared with the interviewee only. This interview is confidential and no quote/insight/opinion will be shared with other project members. Interview quotes will be anonymised prior to any publication.
- This interview is looking to capture your views and opinions on the project.

Questions

Please introduce yourself and describe how the project was started.

1. Who was involved in the project inception? What were their respective roles?
2. What was the rationale to seek government funding for the project? What collaboration partner did lead on the government funding? What is the reason for this?
3. How is the money split between the delivery partners, has the original project plan been followed?
4. Please describe the sustainability goals of the project.
5. Do you know about any mechanisms to keep the sustainability goals of the project at the forefront of project goals? If yes, please describe these mechanisms.
6. What do you think have been the major changes to the original project plan and the current project reality? Please describe these changes.
7. Please describe the current project phase of the project.
8. What makes an experiment an experiment in this project?
9. Can you describe what success looks like for the experiments in this project?
10. Can you describe what you perceive as the most stretching experiment?
11. Who or what is the driving force of the experiments in the current project phase?
12. Is there any big danger for the experiments at this project stage in your view?

Appendix B. Example of text section with co-occurrence of 1st-order codes in ATLAS.ti



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