Sustainable business model innovation: Process, challenges and implementation

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This dissertation is submitted for the degree of Doctor of Philosophy

February 2019

Abstract

The capability to rapidly and successfully move into new business models is an important source of sustainable competitive advantage and a key leverage to improve the sustainability performance of organisations. However, research suggests that many business model innovations fail. Despite the importance of the topic, the reasons for failure are relatively unexplored, and there is no comprehensive description of the sustainable business model innovation process in the literature.

This research addresses this gap by sequentially employing four research methods. First, a literature review is conducted to synthesise a conceptual model as a framework for an empirical investigation. This investigation used two focus groups with ten participants, interviews with 61 senior managers of 24 organisations, and active participatory research, in which the researcher joined the teams of two different business model innovation projects for several months.

The research provides the most comprehensive literature review on the definition and process of sustainable business model innovation to date. It identifies five different process steps of sustainable business model innovation as well as a comprehensive list of key activities and challenges associated with each step of the process. It also discusses how the resulting process framework could be translated into a management tool and outlines some insights on the organisational setup of the process and success factors.

These findings can serve as hypotheses to guide further research on sustainable business model innovation and adjacent phenomena. It also provides direction for practitioners engaged in sustainable business model innovation in similar context as the ones investigated. As a result, the research can help organisations to structure their activities better, anticipate key challenges, and build up sustainable business model innovation capabilities.

Acknowledgements

I am very grateful to my absolutely wonderful friends and colleagues who have accompanied me on this journey at the University of Cambridge, UC Berkeley, Stanford University, and TU Delft. Their unfailing expertise and great support have benefitted myself and my work immensely. I am not only grateful to the practitioners who interviewed with me, but also the practitioners who invited me into their workplaces. Their efforts have enhanced this research greatly.

I am grateful to the people who have supported me financially throughout this journey. I thank the Foundation of German Business, the Engineering and Physical Sciences Research Council, the School of Technology, and Gonville & Caius College for their generous support over the years. I also thank my children's great grandfather for providing us with the final piece of funding.

I want to particularly thank my supervisor and great mentor, Steve Evans, without whose inspiration and encouragement, I would not have dared to embark on this challenge in the first place. I feel extremely fortunate to have the mentorship and friendship of Steve and hope it will continue for years to come.

I would like to thank my family for their unwavering support, enthusiasm, and encouragement and considerable patience with me throughout the PhD process. Especially my twins, Sophie and Paul, for developing so nicely despite me having to welcome them while juggling this thesis and finding a job.

Above all, I want to thank my much better half, Julia, for making all this possible, for the indescribable love and support.

Declaration

This dissertation is the result of my own work and includes nothing which is the outcome of work done in collaboration except where specifically indicated in the text. It is not substantially the same as any that I have submitted, or, is being concurrently submitted for a degree or diploma or other qualification at the University of Cambridge or any other University or similar institution except as declared in the Preface and specified in the text. I further state that no substantial part of my dissertation has already been submitted, or, is being concurrently submitted for any such degree, diploma or other qualification at the University of Cambridge or any other University or similar institution except as declared in the Preface and specified in the text

I declare that this dissertation does not exceed the prescribed word limit for the Degree Committee of the Department of Engineering, as it has been submitted with 52,833 words (including tables, references, and appendices) and contains 19 figures. The Department's limits for the PhD thesis are 65,000 words and 150 figures.

Martin Geissdoerfer
Cambridge, February 2019

Publications

Geissdoerfer, M., Vladimirova, D. and Evans, S. (2018), “Sustainable business model innovation: A review”, Journal of Cleaner Production, Vol. 198, pp. 401–416.

Geissdoerfer, M., Morioka, S.N., de Carvalho, M.M. and Evans, S. (2018), “Business models and supply chains for the circular economy”, Journal of Cleaner Production, Vol. 190, pp. 712–721.

Geissdoerfer, M., Vladimirova, D., Van Fossen, K., Evans, S., Fossen, K. Van and Evans, S. (2018), “Product, service and business model innovation: A discussion”, Procedia Manufacturing, Haifa, Israel, Vol. 21, pp. 165–172.

Geissdoerfer, M., Savaget, P., Bocken, N.M.P. and Hultink, E.J. (2017), “The Circular Economy – A new sustainability paradigm?”, Journal of Cleaner Production, Vol. 143, pp. 757–768.

Geissdoerfer, M., Savaget, P. and Evans, S. (2017), “The Cambridge Business Model Innovation Process”, Procedia Manufacturing, Vol. 8, pp. 262–269.

Geissdoerfer, M., Bocken, N.M.P. and Hultink, E.J. (2016), “Design thinking to enhance the sustainable business modelling process – A workshop based on a value mapping process”, Journal of Cleaner Production, Vol. 135, pp. 1218–1232.

Lehmann, M., Bocken, N., Steingrímsson, J. and Evans, S. (2015), “Incorporating Design Thinking into Sustainable Business Modelling”, Second International Conference on Sustainable Design and Manufacturing, Seville, Spain, 12-14 April 2015.

Morioka, S.N., Geissdoerfer, M. and Evans, S. (2016), "A combined discussion on sustainable development and circular economy business models", 23rd European Operations Management Association Conference, EurOMA, 17 - 22 June 2016, Trondheim, Norway.

Oguntoye, O., Geissdoerfer, M., Nuwarinda, H. and Evans, S. (2018), "Facilitating industrial symbiosis programmes in developing countries: reflections from Gauteng, South Africa", Development in Practice, Routledge, pp. 1–7.

Savaget, P., Geissdoerfer, M., Kharrazi, A. and Evans, S. (2019), "The theoretical foundations of sociotechnical systems change for sustainability: A systematic literature review", Journal of Cleaner Production, Vol. 206, pp. 878–892.

Turner, C., Tiwari, A., Pizarroso, J.L.R., Moreno, M., Vladimirova, D., Zaki, M. and Geißdörfer, M. (2017), "Digital redistributed manufacturing (RdM) studio: A data-driven approach to business model development", in Giampaolo Campana, Howlett, R.J., Setchi, R. and Cimatti, B. (Eds.), Sustainable Design and Manufacturing 2017: Selected Papers on Sustainable Design and Manufacturing, Springer, Berlin, pp. 515–524.

Van Fossen, K., Geissdoerfer, M., Kim, S. and Evans, S. (2018), "Digital Transformation's Impact on Open Innovation Challenges: A case study of Alice Waters' Open Innovation Ecosystem", World Open Innovation Conference (WOIC) 2018, 13-14 December, San Francisco, US.

Vladimirova, D., Geissdoerfer, M., Yang, M. and Zaki, M. (2017), "A conceptual framework for sustainable re-distributed manufacturing business models based on data-driven decision making", British Academy of Management (BAM) Conference 2017, 04-07 September 2017, Warwick, UK.

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1. Introduction

This chapter provides an overview of the motivation for this research in Section 1.1, before it illustrates the underlying industrial problem in Section 1.2. This industrial problem points to a research gap that is outlined in Section 1.3 and translated into research questions in Section 1.4. The chapter concludes with an overview of the structure of this thesis in Section 1.5.

Parts of Sections 1.1 to 1.4 are based on work published as Geissdoerfer et al. (2016, 2017b, 2018b).

1.1 Motivation

The capability to quickly and successfully innovate ones business model becomes an increasingly important competitive advantage for organisations, due to falling returns on technology (Chesbrough, 2007), growing complexity (Jensen, 1997), and falling cost of capital (Mankins et al., 2017). This might be amplified through the increasing disruption of digital transformation (Andal-Ancion et al., 2004; Berman, 2012; Christensen and Overdorf, 2000), as is indicated by the considerable market valuation of relatively new tech conglomerates with innovative digital business models (Parker et al., 2017).

Thus, business model innovation capabilities are not only suspected to yield higher returns than product or process innovations (Chesbrough, 2007; Lindgardt and Reeves, 2015), but might prove to become a “renewable” competitive advantage (Afuah, 2004; Casadesus-Masanell and Zhu, 2013; Chesbrough, 2007; Magretta, 2002; Slocum et al., 1994), which would further increase their importance for organisational strategy (Casadesus-Masanell and Ricart, 2010; Richardson, 2008; Teece, 2010).

Business model innovation is also a critical tool for organisations to meet their social and environmental ambitions by leveraging environmentally, socially, and economically effective technologies and solutions (Boons and Lüdeke-Freund, 2013; Geissdoerfer et al., 2016; Rashid et al., 2013). Companies engaged in sustainable business model innovation can improve their financial, social, and environmental performance (Nidumolu et al., 2009; Porter and Kramer, 2011) and improve resilience and exposure to risks from their environment (Evans et al., 2009; Freeman, 1984).

The importance of sustainable business model innovation becomes evident in two examples, the market capitalisation of companies with innovative business models and the Sustainable Development Goals. According to Hunter et al. (2018) the five companies with the highest market capitalisation are all technology firms with innovative business models, while ten years earlier these were all conglomerates based on traditional business models like banking or oil and gas (PwC, 2013).

The Sustainable Development Goals (SDGs) illustrate, how much the attention of policy maker, the public, and private business has shifted towards sustainability considerations (Economist, 2015; Lagarde, 2018). The UN itself lists more than 4000 voluntary commitments and multi-stakeholder partnerships that explicitly refer to the 17 goals (United Nations, 2019).

The strategic importance of business model innovation is accompanied by high failure rates (Hochberg et al., 2007; Pinfold, 2000). While the evidence is patchy, failure rates of new ventures might be as high as 90% (Patel, 2015). The reasons for this industrial problem remain relatively underexplored in the literature and there is little guidance for practitioners. This thesis aims to address this gap.

1.2 Industrial problem

There seems to be an underperformance in business model innovation implementation, especially evident in the start-up context (Hochberg et al., 2007; Patel, 2015; Pinfold, 2000). This is caused by various challenges along the process. For sustainable business model innovation some of these challenges were identified in a literature review by Evans et al. (2017) and are listed in Table 1.

Table 1: Challenges for innovation towards SBM (Evans et al., 2017)

Challenges	Description	Authors
Triple Bottom Line	The co-creation of profits, social and environmental benefits and the balance among them are challenging for moving towards sustainable business models.	(Hart et al., 2003; Schaltegger et al., 2012; Stubbs and Cocklin, 2008)
Mind-set	The business rules, guidelines, behavioural norms and performance metrics prevail the mind-set of firms and inhibit the introduction of new business models.	(Boons and Lüdeke-Freund, 2013; Johnson et al., 2008; Yu and Hang, 2010)
Resources	Reluctance to allocate resources to business model innovation and reconfigure resources and processes for new business models.	(Björkdahl and Holmén, 2013; Chesbrough, 2010; C Zott et al., 2011)
Technology innovation	Integrating technology innovation, e.g. clean technology, with business model innovation is multidimensional and complex.	(Hart et al., 2003; Yu and Hang, 2010; Zott et al., 2011)
External relations	Engaging in extensive interaction with external stakeholders and business environment requires extra efforts.	(Boons and Lüdeke-Freund, 2013; Stubbs and Cocklin, 2008; Vladimirova, 2012)
Methods and tools	Existing business modelling methods and tools, e.g. Osterwalder and Pigneur (2010) and Johnson et al. (2008), are few and rarely sustainability driven.	(Björkdahl and Holmén, 2013; Girotra and Netessine, 2013; Yang et al., 2014)

These challenges are confirmed by a range of authors in adjacent disciplines, including the business model innovation, strategic management, and change management literature.

For business model innovation, Chesbrough (2010) remarks that a key challenge is the identification of the appropriate business model for new technologies or solutions, which often prevents organisations from

innovating. Christensen (1997) and Christensen and Raynor (2003) see the problem further down the line, in conflicts with the current business model and organisational logic that prevent implementation. These scholars see the difficulties that disruptive technology pose for firms not in the identification of the appropriate business model to exploit it, but in the organisation's inertia to change their current business model. This inertia is caused by gross margins of the incumbent technology often being higher in the crucial early phases, which leads to a misallocation of resources. Similarly, according to Amit and Zott (2001), novelty, lock-in complementarities and efficiency are inherent aspects of business model innovation that require changes in the configuration of existing assets. This can cause conflicts with the managers of these assets who will consequently resist the innovation process.

This is reinforced in the Strategic Management discipline by Prahalad and Bettis (1986) and Bettis and Prahalad (1995)'s concept of dominant logic that describes how organisations assess, select, and interpret information in often chaotic and uncertain environments. This can prevent companies to utilise value creation opportunities that are too different from their current business model and therefore lie outside of that logic.

Similarly, change management refers to organisational inertia as a reason why change efforts fail (Hughes, 2011). This inertia is caused by different barriers to organisational change, like insufficient top management involvement, job security concerns, power struggles, and agency problems (Burnes, 1996; Kegan and Lahey, 2001; Kotter, 2007) that also apply to business model innovation as a particularly comprehensive and complex change effort. An overview of some of the challenges is provided in Table 2.

Table 2: Change management stages, actions, and pitfalls (Kotter, 2006)

Stage	Actions needed	Challenges
Establish a sense of urgency	Examine market and competitive realities for potential crises and untapped opportunities. Convince at least 75% of your managers that the status quo is more dangerous than the unknown.	Underestimating the difficulty of driving people from their comfort zones Becoming paralyzed by risks
Form a powerful guiding coalition	Assemble a group with shared commitment and enough power to lead the change effort. Encourage them to work as a team outside the normal hierarchy.	No prior experience in teamwork at the top Relegating team leadership to an HR, quality, or strategic-planning executive rather than a senior line manager
Create a vision	Create a vision to direct the change effort. Develop strategies for realizing that vision.	Presenting a vision that's too complicated or vague to be communicated in five minutes
Communicate the vision	Use every vehicle possible to communicate the new vision and strategies for achieving it. Teach new behaviours by the example of the guiding coalition.	Undercommunicating the vision Behaving in ways antithetical to the vision
Empower others to act on the vision	Remove or alter systems or structures undermining the vision. Encourage risk taking and non-traditional ideas, activities, and actions.	Failing to remove powerful individuals who resist the change effort
Plan for and create short-term wins	Define and engineer visible performance improvements. Recognize and reward employees contributing to those improvements.	Leaving short-term successes up to chance Failing to score successes early enough (12-24 months into the change effort)
Consolidate improvements and Produce more change	Use increased credibility from early wins to change systems, structures, and policies undermining the vision. Hire, promote, and develop employees who can implement the vision. Reinvigorate the change process with new projects and change agents.	Declaring victory too soon—with the first performance improvement Allowing resistors to convince "troops" that the war has been won
Institutionalise new approaches	Articulate connections between new behaviours and corporate success. Create leadership development and succession plans consistent with the new approach.	Not creating new social norms and shared values consistent with changes Promoting people into leadership positions who don't personify the new approach

Based on these insights, I assume that there is an industrial problem that I define as the design-implementation gap of sustainable business model innovation: *the set of challenges that prevents organisations from successful sustainable business model innovation.*

1.3 Research gap

Even though business model research is a relatively young field in management studies (Baden-Fuller and Morgan, 2010; Zott et al., 2011), a broad discourse on business model innovation has evolved in the last decade (e.g. Chesbrough, 2007, 2010; Chesbrough and Rosenbloom, 2002; Demil and Lecocq, 2010; Johnson, 2010; Johnson et al., 2008; Mitchell and Coles, 2003, 2004; Teece, 2010; Zott et al., 2011).

However, the way organisations actually implement new business models is still unexplored (Chesbrough, 2007; Foss and Saebi, 2017; Teece, 2006), despite successful market introduction being an integral part of some definitions of innovation (Boons and Lüdeke-Freund, 2013). Even less research has been conducted on sustainable business model innovation, and the concept still remains underexplored (Boons and Lüdeke-Freund, 2013; Schaltegger et al., 2016; Wells, 2008).

There is a range of approaches that are addressing single phases or activities of the sustainable business model innovation process (Bocken et al., 2013; Evans et al., 2014; Geissdoerfer et al., 2016; Joyce and Paquin, 2016; Lüdeke-Freund et al., 2018; Upward and Jones, 2015; Yang et al., 2017b) or combine different tools into a more comprehensive process (Evans et al., 2014; Girotra and Netessine, 2013). However, while these tools can provide some support with the conceptual design of business models, they offer only limited guidance through most of the remaining business model innovation process.

Finally, there seems to be little research on the challenges that business model innovation faces and on the reasons for low success rates in implementation in the reviewed literature. While there are theoretical discussions on the causes of the design-implementation gap, for example by Amit and Zott (2001), Chesbrough (2010), Christensen (1997), and Christensen and Raynor (2003), there is little empirical research on the underlying failure modes and root causes.

This indicates that there is a knowledge gap in the literature and that the sustainable business model innovation process and its challenges are understudied.

1.4 Research questions

The objective of this research project is to improve the understanding of how organisations move to new, sustainable business models. The research addresses the industrial problem and the theoretical research gap described in the previous two sections, Sections 1.2 and 1.3. To do so, it investigates both the business model innovation process and the failure of organisations to successfully develop and launch sustainable business models.

The research aim is to help organisations create new, more sustainable business models in practice. From this objective, the following three research questions are derived (Creswell, 2014):

RQ1: What steps does an organisation undergo when creating sustainable business models?

RQ2: What are the key activities in each of these steps?

RQ3: What are the key challenges that an organisation faces when creating sustainable business models?

While research question one and two provide a contextual framework for the challenges and address the research gap of how organisations conceptualise and implement sustainable business models, research question three was selected because it is directly investigating the challenges underlying the industrial problem.

1.5 Structure of the thesis

This thesis is structured in six chapters: Chapter 1 provides a short introduction into the topic, before Chapter 2 explains the employed research method. Subsequently, Chapter 3 illustrates the result of the conducted literature review, before Chapter 4 presents the findings from the empirical three-stage analysis. The thesis concludes with a discussion of the findings in Chapter 5, before some final conclusions in Chapter 6. An overview of the different sub-sections is provided at the beginning of each chapter.

Parts of the author's research underlying this thesis have been published or have informed publications and have been included in this document where appropriate. This is highlighted in the respective chapter introductions. A full list of the author's publications is provided in the section, Publications of the Preface.

For better readability, this thesis avoids abbreviations in the text. However, to address space constraints in some tables and figures and their captions, the abbreviations BM for business model, BMI for business model innovation, SBM for sustainable business model, SBMI for sustainable business model innovation, BU for business unit and TM for top management might be used. Additionally, I will use abbreviations that are commonly used in the Business and Management research field, like OEM for original equipment manufacturer, PLM for product lifecycle management, R&D for research and development, or B2B for business-to-business. As will be illustrated in the literature review, I assume that the unit of analysis of business model innovation is an organisational unit (e.g. a business unit, a department, a subsidiary, etc.). This unit can also be the organisation as a whole. Since the results of this research affect both the organisational units involved and the overarching organisation, the terms organisational unit and organisation are used interchangeably outside of definitions and where not made explicit otherwise in the text.

2. Method

This chapter illustrates the research approach of this study. First, it provides an overview of the employed research design in Section 2.1, before it describes each of the four main research methods employed in this design: (1) a review of the literature in Section 2.2, (2) focus groups in Section 2.3, (3) qualitative interviews in Section 2.4, and (4) participatory action research in Section 2.5. The chapter concludes with a short summary of the selected research approach in Section 2.6.

Parts of this section are based on the researcher's First Year Assessment Report and were partly published in Geissdoerfer et al. (2018b).

2.1 Research Design

As illustrated in, the research employed a combination of different methods to address the research questions. Following the recommendations of Easterby-Smith et al. (2015) and Edmondson and McManus (2007), mainly qualitative methods are used because of the exploratory nature of the required data. This is due to the richness and open-ended nature of the described phenomena, which requires interviews and observations to explore and describe the sustainable business model innovation process of organisations through the behaviour and perceptions of its agents. (Creswell, 2014; Platts, 1993)

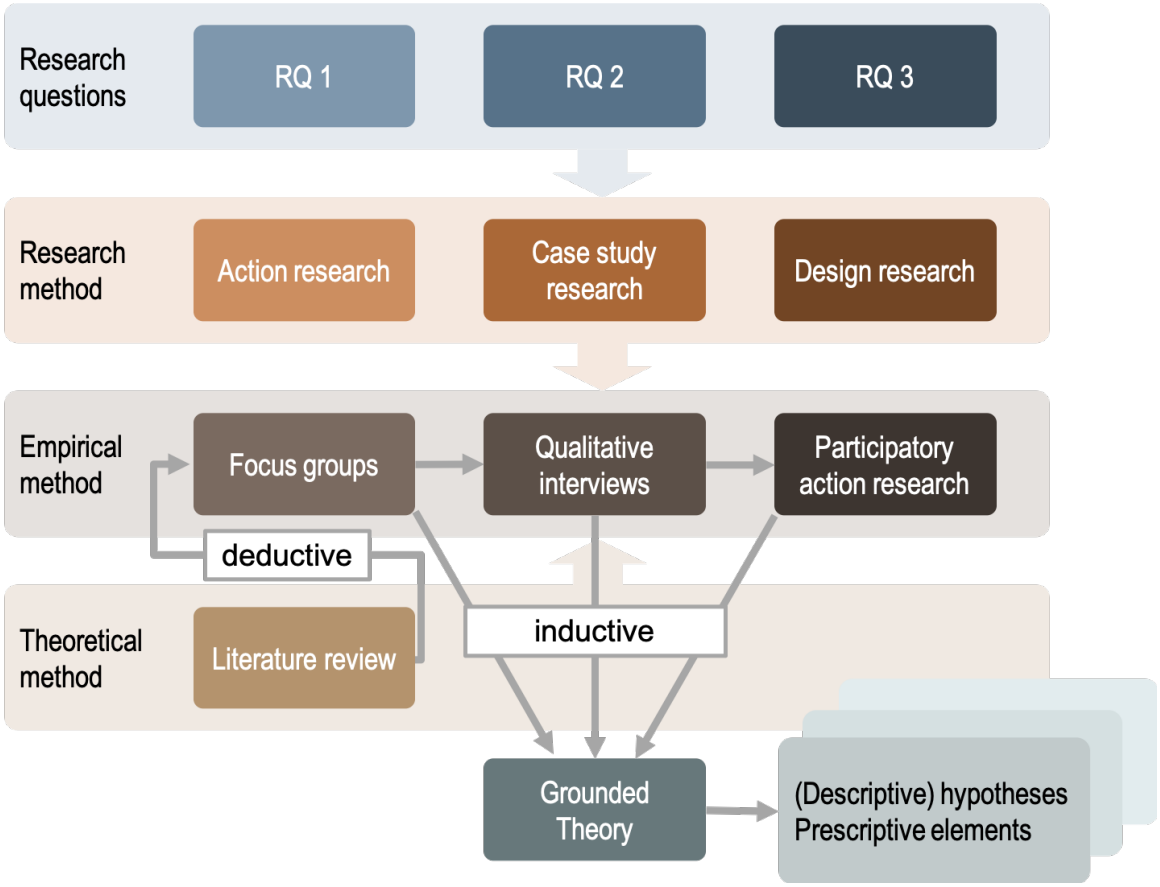


Figure 1: Research design overview, developed from Easterby-Smith et al. (2015) and Creswell (2014)

The research is based on the grounded theory concept. Grounded theory aims to develop theory by comparing the same event, or in this case process, in different settings to gain insights and extend theoretical knowledge; this is done by interviewing representatives from different organisations or organisational units for triangulation (Bryant and Charmaz, 2007; Easterby-Smith et al., 2015; Glaser and Strauss, 2017; Locke, 2003). Easterby-Smith et al. (2015) have identified three distinctive schools of thought for grounded theory: by (1) Glaser (1978, 1992), (2) Corbin and Strauss (2015), and (3) Charmaz (2000). An overview of these schools is provided in Table 3.

Table 3: Three schools of grounded theory, developed from Easterby-Smith et al. (2015) and Charmaz (2000)

Aspect	Glaser (1978, 1992)	Corbin and Strauss (2015)	Charmaz (2000)
Ontology	(Internal) realist: World is out there	Nominalist: Reality and experience are constructed	Nominalist: Reality and experience are constructed
Epistemology	(Weak) positivist emphasises systematic and reductionist analysis of data	More constructivist: data should be analysed in its entirety	Constructivist: Primacy of stories and experiences
Theory	Emerges from data itself	Arises from theory/data interaction	Arises from researcher/research subjects interaction
Researcher role	Maintain distance and independence	Active interrogation of data	Active interaction with research subjects
Pre-understanding	Avoid literature from immediate area	Flexible approach. Insights from many sources	Critical handling of other people's work

Organisational systems like the ones investigated in this study blur the lines between ontological and epistemological schools because the investigated instances of phenomena are too complex, short-lived, and context dependent to lend themselves to strictly positivist and realist modes of enquiry. This is even more true in a grounded theory approach, since it does not aim at a descriptive investigation of individual instances, but conceptual abstraction through comparison of multiple ones. To the triangulation of interviews in different organisations proposed by grounded theory, this research adds an additional layer of comparative inquiry by not only triangulating different cases but also different research methods.

This allows to combine the advantages of the different grounded theory schools of thought, by combining (1) a method that largely maintains distance and independence from the subjects in the more or less formal interviews; (2) with more active interrogation of data in the focus groups, and (3) in-depth interaction between the researcher and their research subjects in the participatory action research. While this aims at a structured and to some extent reductionist analysis of the data presented in Chapter 5, it also leaves

scope for more exploratory elements that consider the data in its entirety, and leaves room for excerpts from stories and experiences discussed in Chapter 6.

The methods are employed within the framework of case studies, as defined by Yin (2014). Case studies are a research strategy that employs empirical descriptions of one or more instances of a phenomenon to derive propositions, models, or theories from empirical evidence, based on a variety of data sources (Eisenhardt, 1989; Ketokivi et al., 2014; Yin, 2014). As illustrated in Table 4, the case study is the most indicated initial method for this research because (1) it essentially answers "*How*" research questions, (2) because of its lack of control of behavioural events within the investigated organisations, and (3) because of its focus on contemporary events in present or not long passed events, like the investigated business model innovation processes (Yin, 2014).

Table 4: Relevant situations for different research methods (Yin, 2014)

Method	Form of research question	Requires control of behavioural events?	Focuses on contemporary events
Experiments	How, why?	Yes	Yes
Survey	Who, what, where, how many, how much?	No	Yes
Archival Analysis	Who, what, where, how many, how much?	No	Yes/no
History	How, why?	No	No
Case Study	How why?	No	Yes

However, while the proposed research path is lacking control over the behavioural events of the investigated organisational representatives, it requires to influence the agents' behaviour to an extent that is not considered in orthodox interpretations of the case study method, like Eisenhardt et al.

(2007) or Yin (2014). The underlying positivist interpretation of the scientific method requires little intervention and high reproducibility.

Both requirements are hard to implement in the context of this study, because of the high level of interaction between the researcher and the organisation and the dynamic nature of the investigated phenomenon (Brydon-Miller et al., 2003). To limit the interaction with the research subjects and disregard the dynamic nature of the phenomenon would strongly limit the contribution to knowledge, while the subject and context of this research would still severely restrict validity, generalisability, and reproducibility (Creswell, 2014).

To address these issues, action research can complement the case study method in an interactive and solution-oriented way (Lewin, 1946; Van de Ven, 2007) because the approach involves both collaborative problem solving and data-driven analysis of personal and organisational change processes (Bradbury-Huang, 2015; Rapoport, 1970; Susman and Evered, 1978).

The next important basis for evolving this research is the design research method (Archer, 1981; Frayling, 1993; Simon, 1996), a "systematic inquiry whose goal is knowledge of, or in, the embodiment of configuration, composition, structure, purpose, value, and meaning in man-made things and systems." (Archer, 1981, p.31). According to Bayazit (2004), Blessing and Chakrabarti (2009), and Koskinen et al. (2012), man-made systems, like business models, business model innovation processes, and management tools lend themselves to this method. While the employed empirical methods might not satisfy some stricter interpretations of this method, I want to point to the research tradition into design processes, in this case the business model innovation one, and its influence on this research

Figure 2 illustrates a suggested research path combination of the three different methods, case study, action, and design research in a Venn diagram (Venn, 1880).

Figure 2: Key research methods

In conclusion, the proposed research path is not only aiming to describe the sustainable business model innovation process in practice but also to gain knowledge through interaction and problem-solving activities with organisational actors. The combined employment of the case study, action research, and design research method with a focus on qualitative data gained through interviews and observation seems most appropriate to address the research gaps and to work towards answering the research questions.

Based on the presented methodological considerations and following the recommendations of Easterby-Smith et al. (2015) and Creswell (2014), one theoretical and three empirical research methods were selected: (1) literature review; (2) focus groups, (3) qualitative interviews, and (4) participatory action research. An overview of the four methods and their function in the research is provided in Table 5.

Table 5: Overview of employed theoretical and empirical methods, developed from Easterby-Smith et al. (2015) and Creswell (2014)

Sequence	Method	Main scope in this research	Type	Main input	Main output	Framework version
1	Literature review	Conceptual framework building	Theoretical	Search string-based database search	Conceptual framework	0
2	Focus groups	Conceptual framework piloting	Empirical	Discussion guide	Data on steps, activities, challenges	1
3	Qualitative interviews	Main data collection	Empirical	Interview guide	Data on steps, activities, challenges	2
4	Participatory action research	In-depth data and triangulation from participant perspective	Empirical	Observation scope	Data on steps, activities, challenges	3

The literature review is the theoretical method used to build the conceptual framework from the literature. Focus groups are then employed as the first empirical method to gather data and to pilot the conceptual framework and identify any gaps and differences between academic and practitioner terminology and understanding for the next method. Qualitative interviews are the second empirical method and the main data collection step for this research. Therefore, is considerably more comprehensive than the other two research methods. As the third empirical method, participatory action research is employed gain richer insights and triangulate previous results with the participants' perspective. All three methods and the reasons for their appropriateness in this research are discussed in greater detail in the following Sections 2.2 to 2.5.

Based on this, the research process illustrated in Figure 3 is proposed. In this process the four different research methods are applied sequentially. The findings of each step are combined into a conceptual framework, which informs the scope of the data collection for the subsequent method.

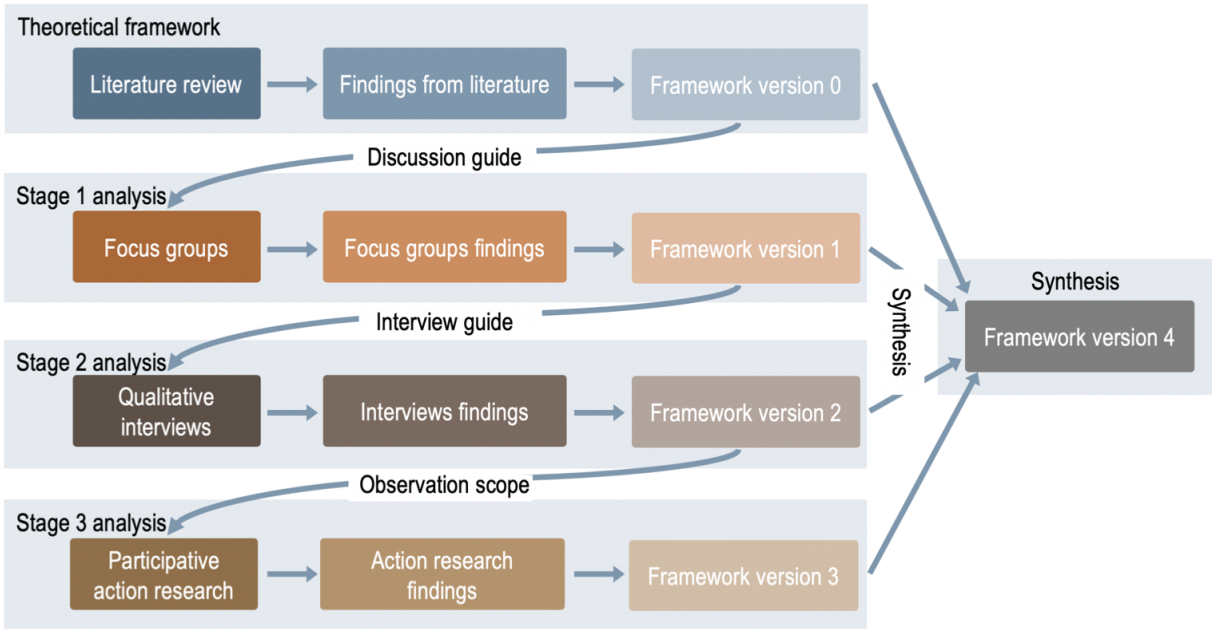


Figure 3: Research process

As a first step, a literature review is conducted. The method for this literature review is illustrated in the following section, Section 2.3 and its findings are illustrated in Chapter 3 and 4. Based on the findings of this review, the theoretical framework, framework version 0 is formulated.

This theoretical framework is the basis for three steps of empirical analysis, based on the three research methods: (1) focus groups, (2) qualitative interviews, and (3) participative action research.

The first step of this analysis, focus groups, is based on discussion guides developed from the theoretical framework. The method for the focus groups is presented in Section 2.3 and the findings are presented in Section 5.1. The findings are combined into framework version 1.

The second step, qualitative interviews, is conducted with interview guides developed from framework version 1. The method for the focus groups is

described in Section 2.4 and the findings are illustrated in Section 5.2. The findings inform framework version 2.

The scope of the third step, participative action research, is based on framework version 2. The participative action research method is presented in Section 2.5 and the findings are described in Section 5.3. The findings inform framework version 3.

All framework versions are subsequently synthesised at the end of Chapter 5 and discussed in Chapter 6.

2.2 Literature review method

This section presents the approach employed for the literature review. Parts of this section are based on a similar review conducted by the author and published in Geissdoerfer et al. (2017a).

First, a bibliometric research was conducted, an established form of meta-analytical research of literature (Kim and McMillan, 2008). This is a method that analyses published data, measuring texts and information such as authorship, affiliation, citations, and keywords (Bellis, 2009), unveiling articles and illustrating linkages between and among articles about a certain research topic (Fetscherin and Usunier, 2012). It can be used to describe, evaluate and monitor the state of a particular field over time, evaluating meta-analytically the development of a given research area to identify its key components and underlying theoretical frameworks (Fetscherin and Heinrich, 2015). The bibliometric review was therefore conducted to identify the articles that describe the business model field, while also revealing the most cited authors, keywords mentioned, and the journals in which they were published.

The selection of the business model field is based on the assumption that sustainable business model innovation is a sub-discipline of both sustainable

business models and business model innovation, both of which, in turn are sub-disciplines of the business models field. This is illustrated in Figure 4.

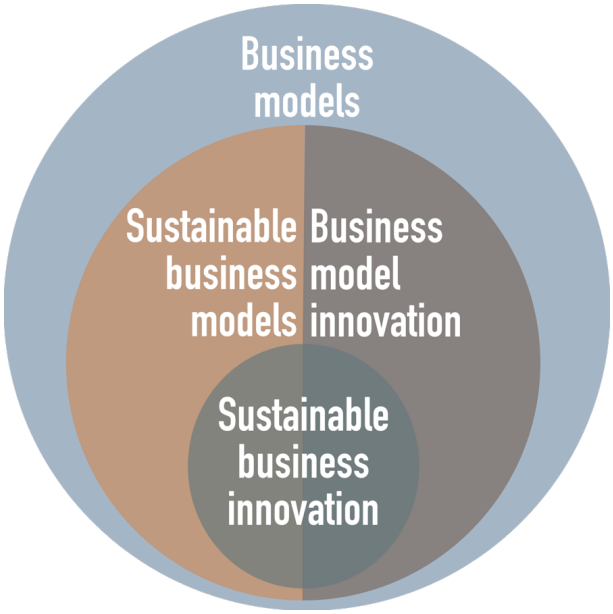


Figure 4: Disciplinary fields covered in literature sampling

Data were collected from the Elsevier Scopus database in January 2016 and updated on 12 July 2018 using the following search string:

(TITLE("business model") AND KEY("business model*")) AND (LIMIT-TO(DOCTYPE,"ar") OR LIMIT-TO(DOCTYPE,"re") OR LIMIT-TO(DOCTYPE,"ip")) AND (LIMIT-TO(LANGUAGE,"English")) AND (LIMIT-TO(SRCTYPE,"j"))*

The search string includes relevant search terms on sustainable business model innovation that include "business model*" in their title and keywords. This includes the terms "business model", "business model innovation", "sustainable business model" and "sustainable business model innovation", as well as variants of this term, like "business models" or "business

modelling" through the asterisk operator. The string limits the search to reviews, articles, and articles in press published in journals in English. Consequently, other document types, like conference articles or book chapters, manuscripts in other languages, like German or Korean, or in other publication types, like conference proceedings and books, are excluded.

The Elsevier Scopus and Clarivatics Web of Science databases are both adequate to construct the initial literature sample and both seem to be widely used in the review methods employed in the business model field. A search conducted on 12 July 2018 with the search string "business model*" in Title (without any filtering for better comparison) indicated that the covered publications mainly overlapped, but Scopus had 43% more results (5,558 compared to 3,886) and more comprehensive filtering options. By choosing Scopus exclusively, duplicates and redundancies could be avoided while the comprehensiveness of the results was compensated through snowballing and a random sample check.

This search helped identifying the initial sample of papers that was subsequently investigated in depth through an extensive literature review. Furthermore, as business models is a recent research topic, I observed the importance of analysing its emergence and progress before the content analysis. Therefore, for the 1,502 records of the search, Scopus was used to carry out the statistical and network analysis functions needed to uncover and quantitatively describe my dataset.

This statistical and network analysis was done using the recommendations of Knutas et al. (2015) for the open source software NAILS. This software was initially used but eventually stopped working due to data format changes in the Web of Science database. For the reasons outlined earlier in this section, Web of Science was subsequently excluded from the approach. It is important to mention that all abstracts resulting from the searches were scanned to filter out irrelevant publications. The most relevant results are demonstrated below, in Figures 5 to 9.

As my search string indicates, I have put no publication year restrictions into my sample, although the oldest record is from 1984. As Figure 5 shows there is a steep increase in the number of publications on business models, reaching a more than tenfold growth in published articles in the last 10 years. This finding suggests that research on business models may be far from saturated, and there is great room for improvement in terms of conceptual development and cross-fertilisation from other research fields.

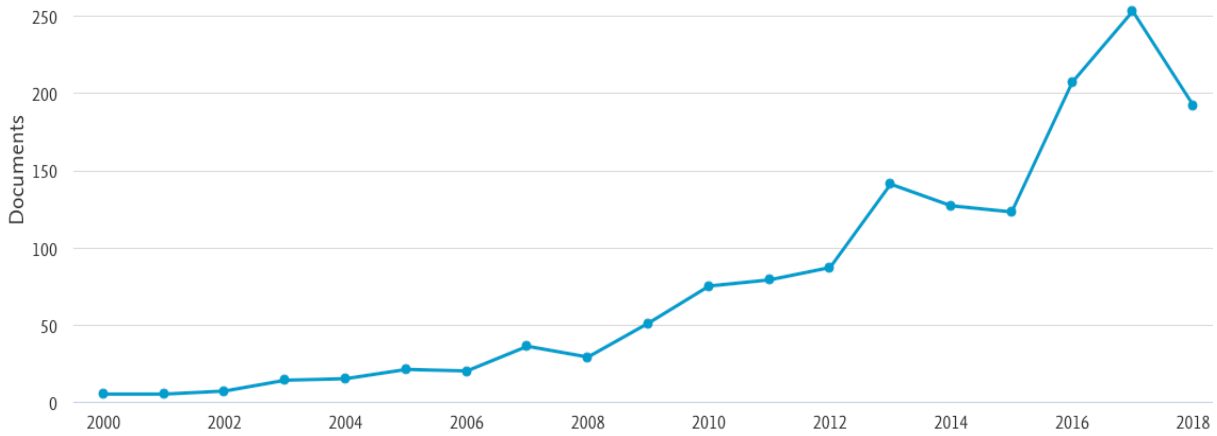


Figure 5: Number of reviews and articles per year

Figure 6 and Figure 7 show, respectively, the most common locations of authors per country and per institution. Only one country, the United States, has more than 200 publications, closely followed by the United Kingdom and, with a little more distance, Germany. These three countries are followed by a more homogeneous group comprised of several European countries, China, Australia, and Canada, that have all originated more than 50 articles, with only the Netherlands having more than 100.

With 40 articles TU Delft in the Netherlands is the research institute with the highest output, making up almost half of all articles from the Netherlands.

This is closely followed by Cambridge University's 36 articles, which correlates to around 20 percent of all publications in the UK. This trend continues for all of the 15 most represented institutes, which are all from Europe and all dominate the research landscape of their respective country to a certain extent, with the exception of Kassel, respectively Germany, where there is less concentration on individual institutes. The other countries in the sample seem to have much more dispersed academic landscapes in this field. For example, not a single US institution is in the top 15 research institutes despite the largest overall output of this country.

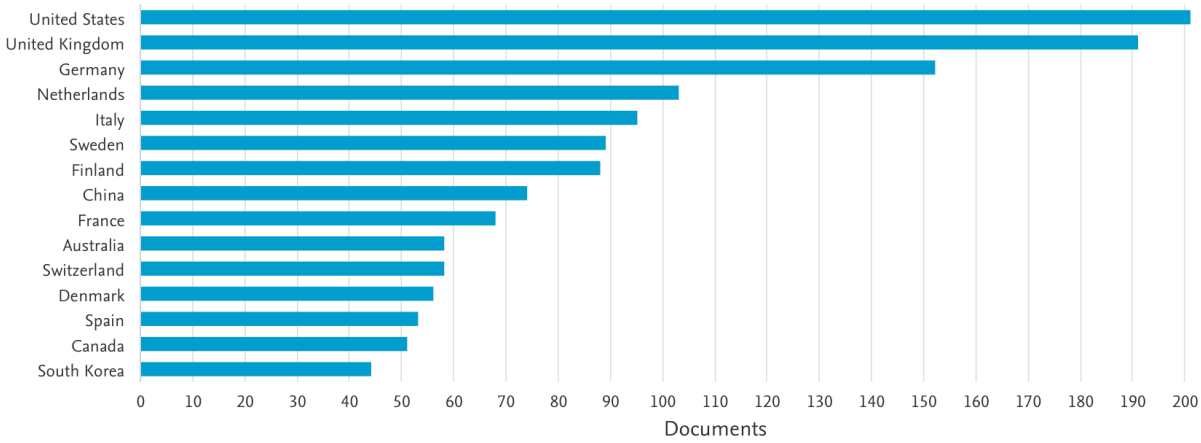


Figure 6: Most common geographical locations of authors

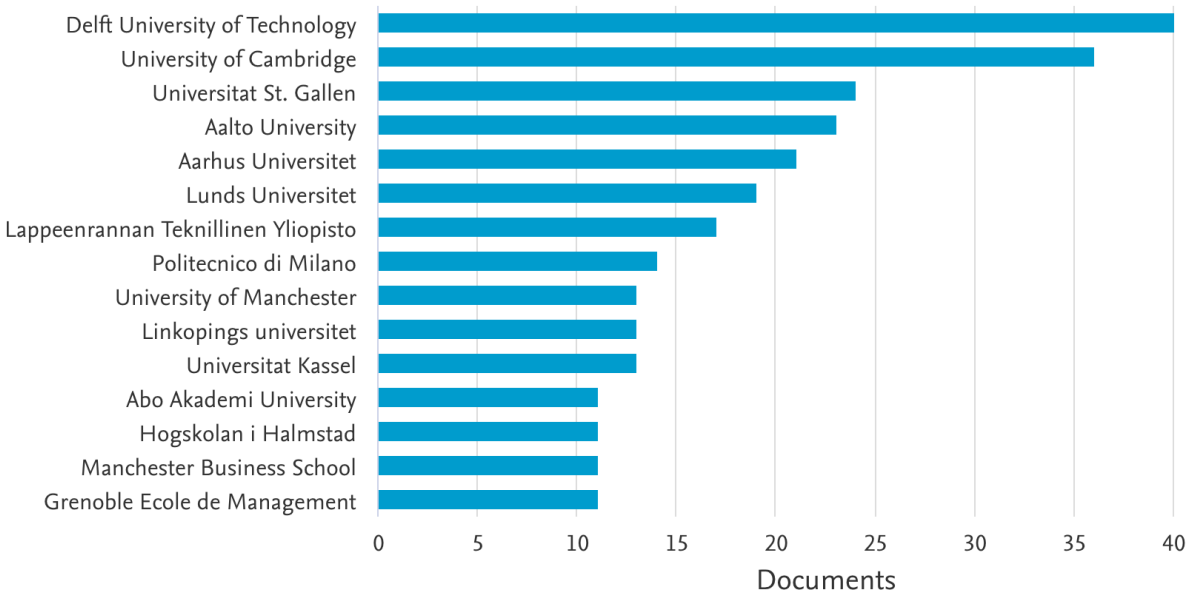


Figure 7: Institutions with the highest number of publications

Figure 8 shows, the publications that publish the most articles on business models. The first, Journal of Cleaner Production, has almost twice the number of publications than the second in the ranking. This publication's outsized role in the field is compounded by two observations: (1) almost half of the articles of the follow-up publication, Long Range Planning, were published in a special issue on the topic eight years ago, while most years there was not a single article on the topic; and (2) the number of articles on business models grows exponentially in Journal of Cleaner Production. Since the journal has a strong focus on sustainability, this also indicates that sustainable business model innovation plays an increasing role.

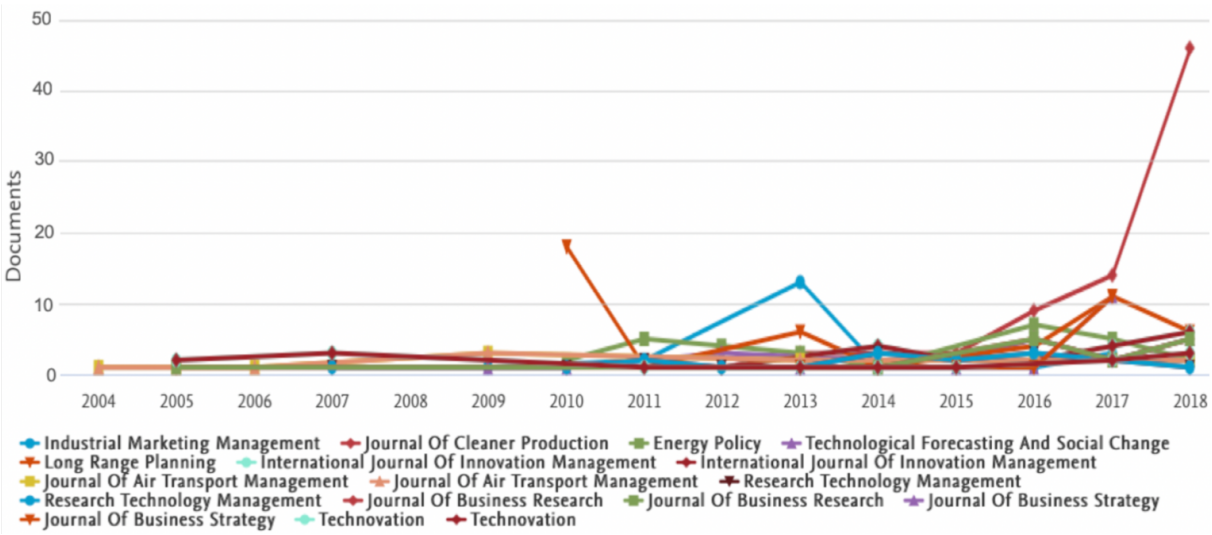


Figure 8: Publications with most business model articles

This observation is also reinforced when considering the most productive authors in the field, illustrated in Figure 9. Three of the five top authors in this ranking have an explicit focus on sustainability. Many authors listed are associated with the two most productive research institutes in Cambridge and Delft, indicating that they have strong research groups in this field.

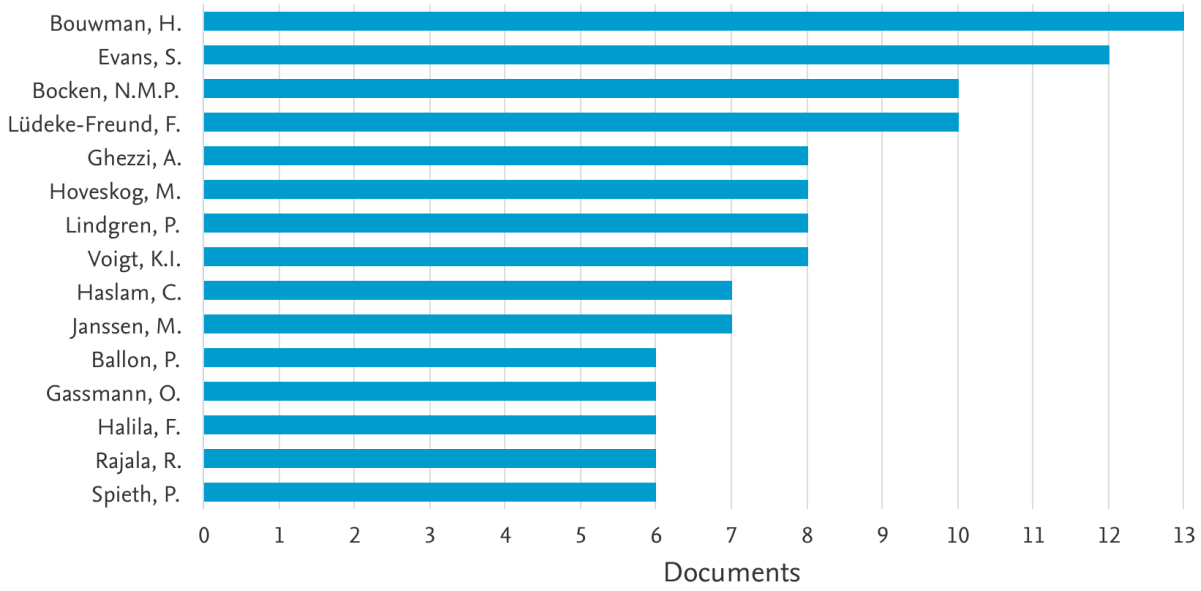


Figure 9: Authors with most publications on business models

These steps offer a better understanding of the coverage of the research topic and contributed to identifying the sample of articles that should be investigated in depth through an extensive review of the literature.

For this structured literature review, the recommendations of Creswell (2014), Easterby-Smith et al. (2015), Tranfield et al. (2003), and Wohlin (2014) were followed. A systematic database search was conducted, followed by cross-reference snowballing, as illustrated in Figure 10.

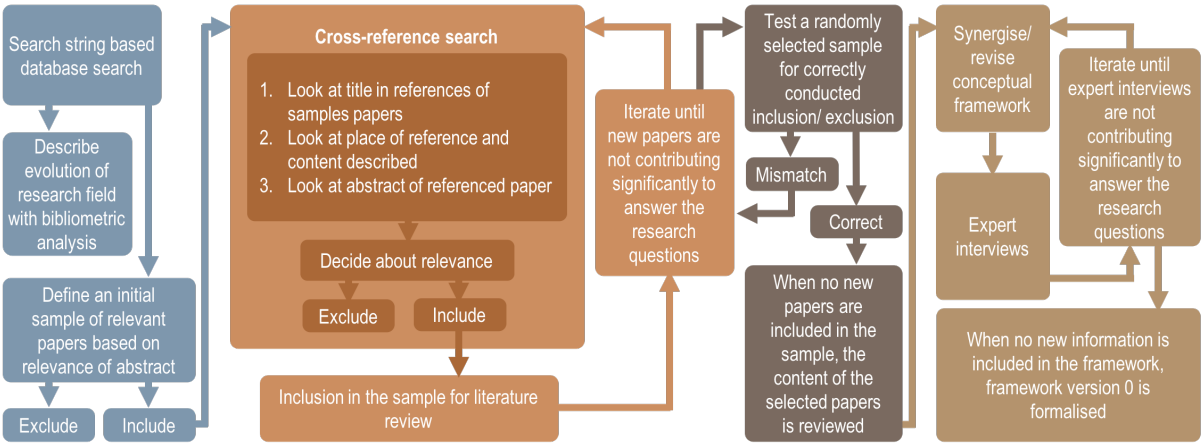


Figure 10: Literature review approach, developed from Geissdoerfer et al. (2018b)

The snowballing started with the definition of an initial sample of relevant papers, based on the 1,502 records documents identified in the initial search described previously in this section for the bibliometric analysis. The abstracts of these publications where scanned to define an initial sample of relevant literature.

In a second step, relevant cross-references were identified in the initial sample by first scanning the publications' title in the reference section and their context and cited content in the text. The abstracts of the identified additional publications were scanned to determine whether the paper was relevant. Relevant references were subsequently added to the sample and analogously scanned for relevant cross-references. This process was repeated until no further relevant cross-references could be identified.

Next, to improve confidence in the final sample, a randomly selected sample of 50 papers was tested for triangulation. 25 papers identified in the initial database search and 25 papers selected in the previous step were revisited for the correct application of the inclusion and exclusion criteria. If an

incorrectly attributed paper would have been identified, the previous phase would have been repeated until no further misattributions would have appeared in the random sample. This was not the case.

Subsequently, the identified literature was reviewed, and a conceptual framework draft was developed. On this basis, 53 peers and experts in the field were interviewed to validate and complement the review results. An overview of the participants is illustrated in Table 6.

Table 6: Interviewed peers and experts

Role	Organisation	Role	Organisation
Head of Strategy	Anthros Consulting	Postdoctoral Researcher	UC Berkeley
Professor	Cass Business School	Executive Director	UC Berkeley
Professor	Delft University of Technology	Commercial Director	University of Cambridge
Professor	Delft University of Technology	Research Associate	University of Cambridge
Professor	Delft University of Technology	Lecturer	University of Sussex
Visiting Professor	EAE Business School	Research Associate	University of Cambridge
Research Analyst	Ellen MacArthur Foundation	Deputy Director MPhil	University of Cambridge
Lecturer	ESCP Europe	Research Associate	University of Cambridge
Director	Ex McKinsey	Professor	University of Cambridge
Plant Manager	Former Glaxo Smith Kline	Doctoral researcher	University of Cambridge
Professor	Harvard Business School	Professor	University of Cambridge
Professor	IESE	Support staff	University of Cambridge
Senior Fellow	IfM ECS	Lead researcher	University of Cambridge
Product Manager	IfM ECS	Director	University of Cambridge
Professor	LMU Munich	Professor	University of Cambridge
Sustainability Advisor	PWC	Professor	University of Cambridge
Professor	Stanford University	Lecturer	University of Cambridge
Research Director	Stanford University	Lecturer	University of Cambridge
Research Director	Stanford University	Lecturer	University of Exeter
Adjunct Professor	Stanford University	Professor	University of Exeter
Co-Founder	Stratgyzer	Postdoctoral Researcher	University of Helsinki
Assistant Professor	EPFL	Adjunct professor	University of Helsinki
Doctoral researcher	Technical University of Berlin	Doctoral researcher	University of Kiel
Senior Scientist	TNO	Professor	University of Sao Paulo
Professor	University of Lund	Professor	University of Sao Paulo
Professor	UC Berkeley	Doctoral researcher	University of Sao Paulo
Professor	UC Berkeley		

In a last step, the findings were integrated, synthesised, and compiled into the literature review presented in Chapter 3 and 4.

2.3 Focus group method

Focus groups originated in the 1940's and were developed by the research group of Paul Lazarsfeld and Robert Merton at Columbia University (Bloor et al., 2001). They initially focused on market research but were since used in a wide range of fields (Easterby-Smith et al., 2015; Silverman, 2013). Focus group research is based on "loosely structured, guided conversations among a group of individuals" (Easterby-Smith et al., 2015, p. 136). It is a group interview in which each participant can express his experience and perspective on the topics discussed.

Why is this appropriate?

According to Silverman (2013) and Easterby-Smith et al. (2015), the focus group method can be used as (1) a standalone way of gathering qualitative data or as (2) an exploratory tool to identify and clarify conceptual issues for subsequent interviews. Therefore, the method is particularly appropriate for this research to identify and address potential conceptual and communication issues with the employed conceptual framework, while already providing rich qualitative data to advance the conceptual framework.

Data collection

While the focus group should leave room for the participants to express their perspective and unforeseen areas to emerge, it should still have a clear structure (Stokes and Bergin, 2006). This structure is provided by a topic guide that broadly defines the discussed topics for the focus group moderator (Easterby-Smith et al., 2015). For this research, the topic guide (Appendix A) is derived from the first conceptual framework resulting from the literature review and described in Chapter 4 (Framework version 0).

Besides this, the framework is employed in two complementary ways: (1) without the key activities and challenges entries from literature as a blank framework for brainstorming (Appendix B) and (2) with the key activities and challenges from literature as a discussion anchor (Appendix C); as described in the following.

Based on the recommendations of Silverman (2013), Wilkinson (2011), and Bloor et al. (2001) and the focus group based data collection of this research followed five steps, illustrated in Figure 11.

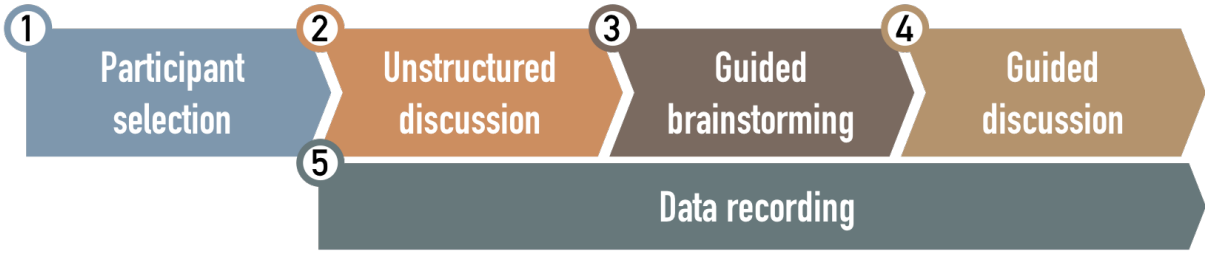


Figure 11: Focus group data collection process, developed from Silverman (2013), Wilkinson (2011), and Bloor et al. (2001)

1. Two small groups of people were selected who share the following characteristics:
    a. They are concerned with business model innovation
    b. They are in a position to have an overview of organisational business model innovation activities
    c. Their organisation has improved sustainability performance as a central and strategic objective

2. At the beginning of the session, the moderator encourages an informal discussion among the participants focused on sustainable business model innovation. As in the subsequent stages, the moderator does not

address the participants individually but mainly facilitates group members to interact with each other through guiding questions and examples. This step is performed to:

   a. Identify gaps in the knowledge and vocabulary of individual participants
   b. Create a common understanding of the underlying concepts
   c. Collect background information about the participants and their role within their organisation

3. The first, blanked out poster of the conceptual framework is discussed. Participants are encouraged to first individually and then jointly brainstorm key activities and challenges for each phase of the framework. They are provided with sticky notes that they can stick to the poster. This is done to identify additional challenges and activities that the participants have encountered in practice but are not yet covered by the literature.

4. The second, filled in poster of the conceptual framework is discussed. Participants are encouraged to discuss missing content as well as theoretical items that they have not encountered in practice. They are provided with pens to directly add to and alter the poster. This is done to check the practical relevance of the theoretical framework and adapt it to the real-world processes encountered by the participants.

5. The sessions were audio recorded after it was explained to the participants that the collected data will only be used for research purposes in an aggregated and anonymised way. Each individual participant was asked to give his explicit consent to this process. To avoid peer pressure, I repeated this for each individual in private after the event. In the second workshop, the lead researcher was also assisted by three colleagues who shared and discussed their observations after the event.

The process followed the rules outlined by Stringer (2014):

- Each person can express their opinions and perspectives
- There is a respectful and non-judgmental atmosphere
- The procedures were explained clearly and in advance to all participants and room for questions was provided, this specifically includes audio recording and timeframes
- The focus questions and frameworks were explained clearly and in advance to all participants and room for questions was provided
- It was ensured that all participants have equal chance to contribute
- It was ensured that the discussion stays focused on the focus questions and the group was supported in summarising and synergising their discussions
- Outcomes and new information were recorded (1) by the participants, on the posters, (2) by colleagues keeping notes, and (3) by audio recording
- The facilitator asked questions to clarify or extend the information provided and provided opportunities for participants to extend or clarify points

Two sessions of focus groups were conducted with ten participants with senior positions in manufacturing and management consulting, for a total of six hours. Table 7 provides an overview of the conducted focus groups.

Table 7: Overview of focus groups

Focus group	Participants	Roles	Time
F1	5	Management consultants	4h
F2	5	Senior managers of large UK manufacturing firms in the aerospace, oil & gas, defence, and public utilities industries	2h

Data analysis

The recorded focus group data is analysed using conventional techniques for qualitative data, in this case content and thematic analysis (Easterby-Smith et al., 2015; Robson and McCartan, 2015; Silverman, 2013).

Content analysis is, "an approach that aims at drawing systematic inferences from qualitative data that have been structured by a set of ideas or concepts" (Easterby-Smith et al., 2015, p. 188). Content analysis can be used for both qualitative and quantitative studies and can aim at both hypothesis testing and theory building (Easterby-Smith et al., 2015) This is mainly done from documents or other forms of texts (Robson and McCartan, 2015).

The qualitative data gathered with this and the two following methods is dense and rich, and therefore, not all of it can be used. Consequently, some of the data has to be disregarded. The inclusion and exclusion is guided by themes. (Creswell, 2014; Guest et al., 2012).

As with the more complex coding illustrated in the context of the qualitive interviews of the next section (2.4), these themes were directly taken from the research questions. The themes already informed the conceptual framework (framework version 0) developed in the literature review, which, as outlined in Section 2.1, is the basis for the focus group data collection.

In an iterative process, thematic analysis was then used to revise the themes. This was done by revising the data points within the themes for correct attribution and triangulating this with data on correct thematic attribution directly gathered from the participants. (Creswell, 2014; Robson and McCartan, 2015; Silverman, 2013). In concrete terms, the data was analysed along the themes of steps, activities, and challenges, provided by the research questions and the conceptual framework. The data point generated in this, feedback on correct attribution of and gaps in the steps as well as key activities and challenges, where then analysed to revise the themes. As

outlined in the results of this analysis in Section 5.1, this led, for example, to the inclusion of an additional step to the conceptual framework.

2.4 Qualitative Interview method

Qualitative interviews are guided conversations based on a range of more or less stringently guided questions that range from a set sequence of prepared questions to more or less casual chats (Easterby-Smith et al., 2015; Jones, 1985; Lofland et al., 2005; Silverman, 2013). Qualitative interviews are a more exploratory form of enquiry than strict questionnaire-based methods that allow for space to expand on answers and follow up on topics emerging in the process (Easterby-Smith et al., 2015).

In cases where personal interviews were not possible due to geographical distance and time restraints, remote interviews were also conducted. Remote interviews are not conducted face-to-face but via communication technology like phone or videoconferencing (Easterby-Smith et al., 2015).

Why is this appropriate?

Qualitative interviews aim to access subjective information about hard to observe phenomena in context (Easterby-Smith et al., 2015; Tracy, 2013). Similar to a semi-structured questionnaire in its most stringent form, a structured but open-ended questionnaire allows to get in-depth data into phenomena and flexibly explore emerging aspects (Easterby-Smith et al., 2015; King, 2004; Kvale and Brinkmann, 2014). Depending on the skill and expertise of the researcher and the quality and flexibility of the topic guide, interviews can not only investigate a phenomenon but also gain insights on its interpretation from the interviewees point of view (Easterby-Smith et al., 2015; Kvale and Brinkmann, 2014). Thus, because of the subjective and hard to observe nature of the phenomenon, sustainable business model innovation, and the exploratory nature of the research, qualitative interviews

are a particularly adequate method to gather rich, in-depth data for this investigation.

The main advantage of remote interviews is greater flexibility and less necessary commitment from the interviewees, but there is a ray of disadvantages, like lack of contextualisation and non-verbal communication that decreases the depth of the gathered information (Easterby-Smith et al., 2015). For this reason, for this research: (1) video-calls were only conducted, if a face-to-face meeting was not possible, (2) telephone conversations were only considered, if video conferencing was not available, and (3) more indirect communication, like emails or questionnaires were entirely avoided (Easterby-Smith et al., 2015; O'Connor et al., 2008; Tracy, 2013).

Data collection

Designs for data collection based on qualitative interviews can range from very structured and theory led to loose and inductive (Miles et al., 2014). This research aims to combine the advantages of both approaches. As was illustrated in the research design (2.1) section, the data collection of this research is based on a conceptual framework, which is itself based on a comprehensive literature review. Besides this approach to "test and further explicate a conceptualisation", the research allows to "explore […] understudied phenomena" (Miles et al., 2014, p. 19). This corresponds to Easterby-Smith et al.'s (2015) semi-structured interview type, as illustrated in Table 8.

Table 8: Types of interview, developed from Easterby-Smith et al. (2015)

Types	Example	Guidance and preparation	Time
Highly structured	Market-research interview	Detailed interview schedule: questions in a predefined order, potentially with selection of predefined answers	
Semi-structured	Guided open interview	Topic guide: selection of topics or issues to be covered	
Unstructured	Ethnographic interview	Individual questions stimulate an informal conversation; no interview schedule or guide	

Therefore, the conceptual framework (framework version 1, Section 5.1.4) was translated into a topic guide including open-ended and critical incident technique elements. The topic guide is shown in Appendix D. The different elements of the conceptual framework were directly translated into questions 3 to 4, e.g. to discuss the key activities, question 4.1.a was derived, "For each of your steps (using the process phases the interviewee proposed in 3, what were the main activities?".

This was complemented by background questions (question set 1); questions confirming the sustainability focus of the investigated organisational unit (question set 2), and a changing set of questions to investigate an emerging aspect of the phenomena (question set 5). The output of these questions was mainly aimed at allowing for the exploratory nature of this research, as discussed above. Thus, these outputs mainly influenced the discussion of the findings rather than the findings themselves.

Critical incident technique was first proposed by Flanagan (1954) and describes a method for in-depth interviews based on the discussion of specific events or incidents. Because of the abstract nature of business model innovation process, critical incident technique was used to focus the discussion around an individual example of a business model innovation project. However, it was found that the technique was not necessary where formal processes were in place. This formalisation seemed to have increased the abstract understanding of the interviewees and provided them with the

necessary vocabulary. In these cases, the process could be discussed directly.

The sampling of the cases combined aspects of different strategies to utilise their respective strengths in the context of this research, as illustrated in Figure 12. Table 9 provides an overview of the available options.

Table 9: Sampling strategies, developed from Easterby-Smith et al. (2015)

Sampling strategy	Procedure and purpose
Random sampling	Probabilistic selection of cases to reflect the target population
Ad-hoc sampling	Selection based on availability and ease of access; most appropriate where the priority is speed and cost of data collection
Snowball sampling	Interviewees recruit or recommend other participates; useful in settings with limited/difficult access
Maximum-variation sampling	Selection aims to include a wide range of incidents of a given phenomenon, including extreme cases
Typical-case sampling	Selection aims at identifying the most typical cases
Theory-guided sampling	Selection depends in meeting certain theoretical characteristics or embody specific theoretical constructs
Negative-/deviant-case-sampling	Selection of cases that are likely to contradict a theory or explanation

The main guiding principle of the sampling process was theory-guided sampling. The conceptual framework underlying this research requires representatives that have a high-level overview of the business model innovation activities of large corporations that are interested in sustainability. Therefore, senior managers in business model innovation, business development, and innovation departments of multinational corporations that have sustainability performance as a central dimension of their strategy were preferably selected (Silverman, 2013).

Access to this type of interviewee is quite restricted, so this strategy was combined with snowball sampling. Also, the grounded theory approach

outlined in Section 2.1 favours the triangulation that maximum-variation sampling offers. However, the research was implemented in the framework of a PhD project with time and resource restrictions. Therefore, the ad-hoc sampling strategy played an important part in the sampling process.

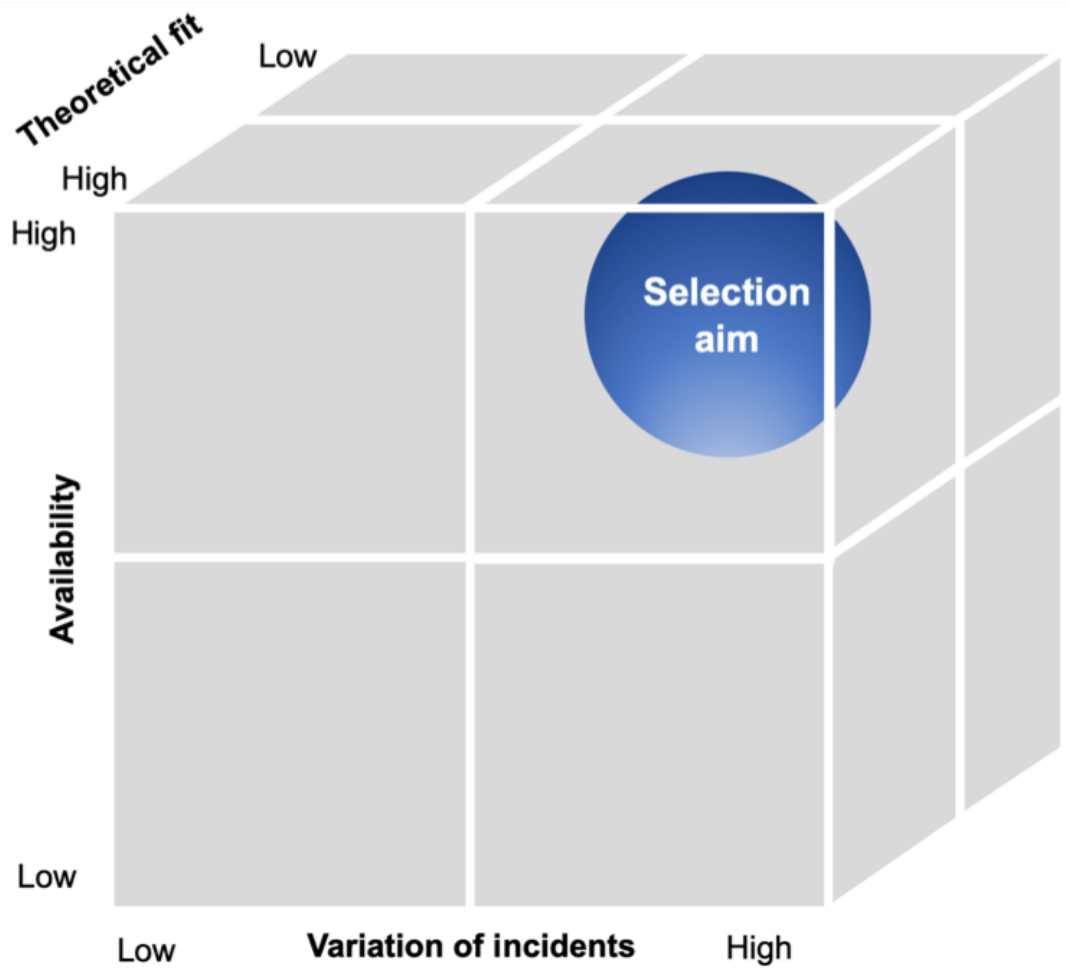


Figure 12: Sampling strategy

The sampling resulted in the selection of 24 companies, illustrated in Table 10. To anonymise the participating companies, only the industry and country is provided. The industry definition is based on the system of the Standard

and Poor's Global Market Intelligence database and the organisations' industry is adopted from the organisation's entry in the database. In cases where no entry is available, for example because it is state owned, the industry is determined by the author and marked with an asterisk. The listed country refers to the location of the interviewed organisational unit. For example, for C23 I interviewed the US based Group Vice President for North America of a Japanese conglomerate. Main interview dates are provided, while dates of shorter interactions, for example for coordination calls or informal chats at conferences are not listed.

Table 10: Overview of cases

Case.	Industry	Country	Main interview dates	Inter-viewees	Lead interviewee role	Est. hours
C1	Oil and Gas Storage and Transportation	Spain	08/05/2017	10	Corporate Entrepreneurship Manager	8
C2	Integrated Oil and Gas	Spain	09/05/2017	3	Head of Innovation	4
C3	Automobile Manufacturers	China	24/05/2017	1	Department Leader	1
C4	Housewares and Specialties Producers	China	24/05/2017	2	Senior Manager of Business Analysis	2
C5	Industrial Conglomerates	UK	25/05/2017	1	Head of Energy Efficiency and Environmental Care	1
C6	High-tech*	China	26/05/2017	1	CTO	2
C7	Heavy industries*	China	26/05/2017	3	CEO	3
C8	E-commerce	China	27/05/2017	1	Head of Business Development	2.5
C9	Apparel, Accessories and Luxury Goods	Germany	30/05/2017, 19/07/2017	10	Director Product Division Sportswear	9
C10	Engineering*	China	31/05/2017	1	Director	2
C11	IT Consulting and Other Services	China	31/05/2017	1	Partner	2
C12	Research and Consulting Services	China	01/06/2017	1	Partner	1
C13	Auto Parts and Equipment	China, Germany	02/06/2017, 06/07/2017	3	Senior Manager Business Development	4
C14	Auto Parts and Equipment	China	05/06/2017	3	Head of International Business Development	2
C15	Research and Consulting Services	China	05/06/2017	3	Senior Partner	2
C16	Electrical Components and Equipment	Spain	08/06/2017	1	Solar Product Operations Manager	1
C17	Food Retail	Netherlands	13/07/2017	1	Director for Market Development	1
C18	Brewer	Netherlands	14/07/2017	1	Director Global Design	1

C19	Research and Consulting Services	Germany	20/07/2017 2	Managing Director	2
C20	Electronic Equipment and Instruments	Germany	28/03/2018,3 19/10/2018	Senior Vice President Strategic Corporate Development & Head of Digital Innovation Partners	5
C21	Automobile Manufacturers	Germany	10/04/2018,2 13/12/2018	Strategy & Portfolio Manager	2.5
C22	Steel	Germany	10/04/2018 3	CTO	1
C23	Automobile Manufacturers	USA	10/04/2018 1	Group Vice President North America	1
C24	Aerospace and Defence	Germany	07/06/2018,3 25/06/2018	Venture Builder and Digital Instigator	3
24		**6**	**61**		**63**

Altogether, 61 representatives of 24 organisations based in six different countries were interviewed. The overall interview time is around 63 hours. Each interviewee was interviewed for at least one hour, but several interviews had more than one participant. For example, I conducted a one-hour interview with the CTO and the coordinator of C22's business model innovation activities, where both participants alternated their answers and complemented one another.

Data analysis

The documentation and analysis of the interview data is illustrated in Figure 13 following recommendations by Creswell (2014), Easterby-Smith et al. (2015), Gibbs (2007), Robson and McCartan (2015), and Silverman (2013).

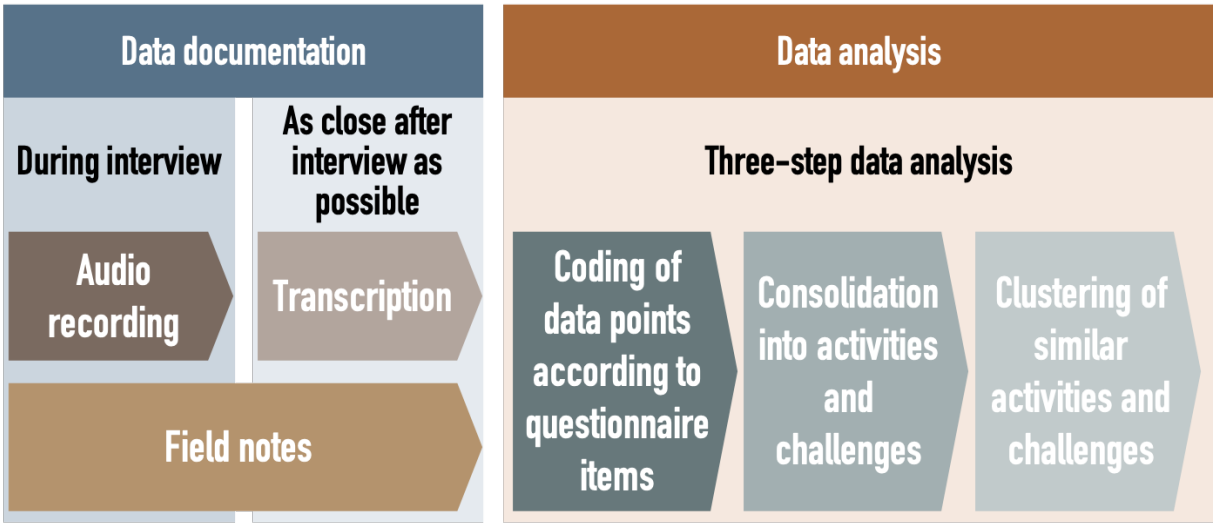


Figure 13: Data analysis for qualitative interviews, developed from Robson and McCartan (2015) and Silverman (2013).

If possible, the interviewees were recorded after explicitly giving their consent to the recording. The recordings were then transcribed as soon as possible after the interview. No transcripts were created for the interviews with C7, C14, C16, and C23 because recording was not possible or the audio quality was insufficient. Additionally, field notes were taken during the interview, or as close as possible after the interview. No fieldnotes were taken for the interview with C5, since this interview was not conducted by the researcher but by his supervisor.

The transcripts and fieldnotes were the basis for the subsequent content analysis based on thematic coding (Easterby-Smith et al., 2015; Robson and McCartan, 2015).

Gibbs (2007) describes coding as being "how you define what the data you are analysing are about. It involves identifying and recording one or more passages of text or other data items such as the parts of pictures that, in some sense, exemplify the same theoretical or descriptive idea. Usually,

several passages are identified, and they are then linked with a name for that idea – the code. Thus, all the text and so on that is about the same thing or exemplifies the same thing is coded to the same name" (p. 38).

Thematic coding can be structured in five phases, illustrated in Table 11.

Table 11: Phases of thematic coding analysis, developed from Robson and McCartan (2015)

Step	Description
1. Familiarising yourself with your data	Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas
2. Generating initial codes	May be done by first devising a framework or template or inductively by interaction with the data. Extracts from the data are given codes in a systematic fashion across the entire data set with similar extracts being given the same code
3. Identifying themes	Collating codes into potential themes, gathering all data relevant to each potential theme. Checking if the themes work in relation to the coded extracts and the entire data set. Revising the initial codes and/or themes if necessary
4. Constructing thematic networks	Developing a thematic 'map' of the analysis
5. Integration and interpretation	Making comparisons between different aspects of the data using display techniques such as tables and networks. Exploring, describing, summarising, and interpreting the patterns. Demonstrating the quality of the analysis.

These phases were translated into a three-step data analysis process. First, the data points were coded according to the items of the interview guide. To do this, a spreadsheet was created, illustrated in Appendix E. Secondly, the data points coded in this way were consolidated into activities and challenges. For this, the spreadsheet illustrated in Appendix F was developed. In the third step, similar activities and challenges were clustered together and consolidated, e.g. "idea generation" reported by CX, "ideation" by CY, and "generating ideas" by CZ were consolidated into "ideation" and all three companies were noted as examples for this data point. To do so, the spreadsheet illustrated in Appendix G was used. Some examples for case evidence are provided in Table 12.

Table 12: Examples for case evidence

Case	Transcribed case evidence	Recorded activities
C1	"the first open call was quite performed very well. We received 63 entries, actually we are not Google, we are not there [...] you can think they are not too much but in a company like C1, for us it was quite a success"	▪ Internal call/competition/campaign
C12	"what is unique [and] stronger as in other departments is our focus on the customer and this Design Thinking approach […] we have established a relatively clear process how we proceed […] to build a prototype and test it […] it is not an MVP but it is operational to demonstrate the principle behind it […] a kind of hack if you want […] and show it relatively quickly to people."	▪ Design Thinking ▪ Prototyping
C13	"we have a pilot in the Bay Area right now, we have 50 people […] they have our app and then they use our services, give us feedback and then we change […] the service and then […] we continue to refine it […] adding new layers to the service […] or bringing another partner into the mix".	▪ Piloting ▪ Scale from pilot
C18	"We had a workshop on sustainability. So we talked through all the elements and what's and where should be to focus"	▪ Sustainability ideation workshop
C19	"we pilot with like 10 or 20 stores and then […] we know a lot more about the concept and all the problems are addressed, and then we roll out to more stores."	▪ Piloting ▪ Scale from pilot

To increase the efficiency of this process, a gap analysis process was established. First, a third of the cases went through all three steps of the analysis. These cases were selected by perceived potential to inform the research question, based on the initial familiarisation with the data. Once the process and the respective spreadsheets were established, the remaining material was directly coded according to step 3 and each resulting data point was checked for overlap with the established activities and challenges in the spreadsheet. In case of similar data points in the table, the case was added as an additional example, in case of no similar data point, the data point was added as a new activity or challenge.

2.5 Participatory action research method

The term action research was introduced by Lewin (1946) as a method to generate knowledge about organisations by interacting with them (Robson and McCartan, 2015). Action research aims to engage in complex dynamics

in social contexts to build knowledge that informs practitioners (Stringer, 2014). The concept of participatory action research emphasises the participation of the researcher in the investigated process (Chevalier and Buckles, 2013; Kindon et al., 2010; Ponciano, 2013; Robson and McCartan, 2015).

Why is this appropriate?

Action research was employed for this study for two reasons: (1) because it enabled the researcher to access richer data compared to the other methods (Stringer, 2014) and (2) to triangulate with a method that is adequate for the investigated phenomenon of business model innovation in its organisational research context while employing a significantly different methodology to the other methods (Creswell, 2014; Robson and McCartan, 2015).

Participatory action research was seen as particularly suited for this research because its focus on the researcher participating in organisational processes (Chevalier and Buckles, 2013; Kindon et al., 2010). On the one hand, business model innovation is a phenomenon that is sometimes conducted in discrete and explicit processes that are open to external participants with appropriate professional qualification. On the other hand, the researcher had the necessary background and professional qualification to get access and be an equivalent and full-fledged member of the team, with no systematic differences to other participants.

Data collection

Two different cases were investigated with this method: (1) Favalley, a Cambridge based social start-up that was founded by the researcher and three other PhD students from Cambridge; and (2) a business model innovation programme by a consortium of six non-competing multinationals and a management consultancy, in which the researcher participated as a member of one of six teams. In both cases all team members were

hierarchical peers. While a business architect role was assigned to the researcher in both cases, in effect he also fulfilled all other roles in the team, especially design and engineering, wherever necessary. For example, the websites and promotion videos of both projects were largely designed by the researcher (Geissdoerfer et al., 2018c; Geissdoerfer and Martiniani, 2016). An overview of the cases is provided in Table 13.

Table 13: Overview of action research cases

Case	Type	Start	End	Team	Members	Role	Current status
Favalley	Start-up	12/02/2016	31/10/2018	self-forming	4	Co-founder	Still running
Business model innovation programme	Facilitated organisational business model innovation programme	02/02/2018	24/04/2018	selected by partner organisations	6	Business architect	Concluded

To reduce the impact of data collection, fieldnotes and documents were employed as the primary data source for this method (Chevalier and Buckles, 2013; Robson and McCartan, 2015; Silverman, 2013). Fieldnotes were created while or as soon as possible after the documented data was generated. For example, during presentation notes could be taken, while workshop activities were recorded after the event on the flight back. Documents that were provided or generated during the process were also considered, this included for example workshop materials from facilitators or presentations created by the team.

Data analysis

As with the previous two methods, content and themes were analysed following the recommendations by Creswell (2014), Easterby-Smith et al. (2015), Gibbs (2007), Robson and McCartan (2015), and Silverman (2013). The analysis was based on the conceptual framework developed in the

previous research step, in this case framework version 2. Because the business model innovation was not completed at the end of the observation, this analysis was only done for the process steps at hand.

2.6 Summary

This chapter has introduced the research design adopted to investigate the research questions outlined in the previous chapter (Section 1.4). This research design is based on a literature review and the three different empirical methods, focus groups, qualitative interviews, and participatory action research, which have been presented separately.

In this chapter, I have outlined the adequateness of both the design as well as the employed methods and the reasons why the choices made are, on balance, an appropriate way to address the research questions. Despite this, the employed design and method selection remain choices that come with trade-offs.

Therefore, this thesis not only presents and discusses the results of this research, in Chapter 3, 4, and 5, but also emphasises its limitations in Section 5.4 and highlights that further research is necessary in Section 7.6.

3. Literature review

This chapter introduces the background of this research by illustrating the key underlying concepts of sustainable business model innovation: sustainability, business models, sustainable business models, business model innovation, and sustainable business model innovation. It discusses their similarities and differences and synthesises working definitions for this research in Sections 3.1 to 3.5. The literature review confirmed the research gap, which is outlined in Section 3.6.

Parts of Sections 3.2 to 3.5 are based on work published as Geissdoerfer et al. (2018b), and parts of Section 3.6 on Geissdoerfer et al. (2017b). Section 3.1 is taken from Geissdoerfer et al. (2017a) and follows a different review process described in that publication.

3.1 Sustainability

Sustainability concerns are increasingly incorporated into both the agendas of policymakers and the strategies of companies. The term *sustainability* itself originates in the French verb *soutenir*, "to hold up or support" (Brown et al., 1987) and its modern conception has its origins in forestry. It is based on the silvicultural principle that the amount of wood harvested should not exceed the volume that grows again. This conceptualisation was written down already in the early 18th century in "*Sylvicultura oeconomica"* (von Carlowitz, 1713), and there seem to be even older sources that follow the underlying principles in face of shortages in wood supply and the husbandry of cooperative systems (Mantel, 1990). Later, it was transferred to the context of ecology, as a principle of respecting the ability of nature to regenerate itself (Duden, 2015), from where the modern definition of being "able to be maintained at a certain rate or level" (Oxford Dictionary, 2010) developed.

Johnston et al. (2007) estimated that there are around 300 definitions of sustainability. To cite but a few, sustainability can be defined as a situation in which human activity is conducted in a way that conserves the functions of the earth's ecosystems (ISO 15392, 2008), a transformation of human lifestyle that optimises the likelihood that living conditions will continuously support security, well-being, and health, particularly by maintaining the supply of non-replaceable goods and services (McMichael et al., 2003), or an indefinite perpetuation of all life forms (Ehrenfeld, 2005).

The concept's uptake can be traced back to the increasing evidence on global-scale environmental risks, such as ozone depletion, climate change, biodiversity loss or the alteration of the nitrogen cycle. These risks have been systematically investigated since the 1960s, raising questions about whether present prosperity trends can be maintained in the future (Clark and Crutzen, 2003; Rockström et al., 2009) and, consequently, revealing many sources of tensions. This includes, for example, the limited store of resources, its uneven geographical distribution and appropriation (e.g. Georgescu-Roegen, 1977) and the implications of the assimilative capacities of ecosystems over economic growth (e.g. Daly and Townsend, 1993).

These sources of tensions were condensed by the environmentalists Ehrlich and Commoner in their equation "I = P x A x T". Environmental impact (I) is a function of three factors: population (P); affluence, which is a proxy to represent consumption (A); and technologies (T) (Chertow, 2001; Commoner, 1971; Holdren and Ehrlich, 1974). The emphasis given to population, consumption, and technologies, as well as the interrelation between these variables, has varied considerably among scholars. Some emphasise demographic control (e.g. Hardin, 1968), others would rather advocate for reduction in consumption levels (e.g. Woollard and Ostry, 2001), and an increasing number of scholars highlight the role of science, technology, and innovation in fuelling social inclusion and environmental resilience (e.g. Cohen, 2006; Hart et al., 2003; Kemp and Pearson, 2007).

The emergence of such tensions fuelled a series of international discussions on the complex and dynamically interconnected nature of the environment, society and the economy (Kates et al., 2005). These discussions challenged oversimplified development frameworks and their assumptions about economic growth. The Stockholm Conference in 1972 and the report *Limits to Growth* had wide repercussions due to their interpretation of "development" and "environment" as contradictory elements of an intrinsic trade-off (Jackson, 2009; Sachs, 2015). Nevertheless, the most prominent understanding of sustainable development arose with the Brundtland Report (1987), which came not as a reformulation of the terms of such trade-offs, but rather as an answer to its apparent conflicts (Nobre and Amazonas, 2002): "The concept of sustainable development does imply limits – not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities" (Brundtland, 1987:8).

The Brundtland Commission also provided the most commonly accepted definition of sustainability as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987). Despite being initially driven by environmental concerns, the term *sustainable development* has since then accommodated a variety of expectations for desirable progress: "the concrete challenges of sustainable development are at least as heterogeneous and complex as the diversity of human societies and natural ecosystems around the world" (Kates et al., 2005:8). The broad colloquial meaning of the verb "to sustain" refers to maintaining unspecified features over time, while "development" can comprise multiple interpretations, varying according to values, interests and disciplinary conventions. Nevertheless, all perceptions of sustainable development seem to invoke feelings of desirability and goodness (or avoidance and badness), nurturing reflexivity upon shared responsibilities and alternative directions of progress (Stirling, 2009).

Particularly relevant to the widespread diffusion of the term and its most contemporary understandings is the so-called triple bottom line (Elkington, 1997), the three pillars of sustainability: people, profit, and planet. After the World Summit in 2002, the triple bottom line has been referred to as the balanced integration of economic, environmental and social performance. The three spheres are systemically intertwined and continuously and cumulatively affect one another through mutual causality and positive feedbacks (Mckelvey, 2002). In other words, they act as "as interdependent and mutually reinforcing pillars" (UN General Assembly, 2005) that can be adapted to a broad range of different contexts and time horizons (Wise, 2016).

Sustainability working definition

Based on this, and with regards to maintaining the holistic, adaptive, and flexible nature of sustainability, the term sustainability is defined as *the balanced and systemic integration of intra and intergenerational economic, social, and environmental performance* for this research.

Instead of merely setting common goals, sustainability opens up the scope for multiple expectations about, for example, what should be developed and what is to be sustained, for how long, and for the benefit of whom (Acero and Savaget, 2014). It has encouraged reflexivity on how to expand intragenerational prosperity while simultaneously preserving life-support systems needed to meet intergenerational needs.

Despite divergence in the perceived strengths and weaknesses of the term and its associated responses, sustainability has been institutionalised into the agendas of policymakers and strategies of large organisations, becoming cumulatively more embedded into the rules that structure social interventions and shape behaviour (Hodgson, 2005). While incorporating a broad range of contradictions and being ambiguously instrumentalised by diverse interest

groups, the concept proves to be a “political concept as persistent as are democracy, justice and liberty” (O’Riordan, 1993, p. 48).

3.2 Business models

The business model concept gained popularity during the dotcom boom of the 1990’s with a vibrant and diverse research activity more recently (Zott et al., 2011). This activity led to an extensive special issue in the Long Range Planning journal in 2010 and a considerable range of literature reviews, like Bieger and Reinhold (2011), George and Bock (2011), Massa et al. (2017), Schallmo (2013), and Zott et al. (2011), which were integrated, updated, and synthesised into this literature review, whose result is illustrated in Table 14.

During the e-commerce boom of the 1990’s, new innovative revenue mechanisms were introduced. In this context, the business model concept was originally used to communicate complex business ideas to potential investors within a short time frame (Zott et al., 2011). From there, the purpose of the concept developed to be now seen as both a tool for the systemic analysis, planning, and communication of the configuration and implementation of one or more organisational units and relevant parts of their environment in face of organisational complexity (Doleski, 2015; Knyphausen-Aufseß and Meinhardt, 2002; Post et al., 2002), as well as a strategic asset for competitive advantage and firm performance (Afuah, 2004; Casadesus-Masanell and Ricart, 2010; Chesbrough, 2007; Hamel, 2000; Magretta, 2002).

For organisational decision-making and academic research in the context of emerging industrial phenomena, like Industry 4.0 (The Federal Government, 2014) or Re-Distributed Manufacturing (Srai et al., 2016) the business model concept allows to extrapolate from potential customer and value chain benefits to the required configuration and implementation of the other business model elements (Osterwalder et al., 2014; Yang et al., 2017a). The

resulting potential business models provide the necessary information about the implementation of phenomena's conceptual and technological implications that is required as a basis for further research in these.

Table 14: Selected business model definitions (Geissdoerfer et al., 2018b)

Source	Definition
Timmers (1998)	The business model is "an architecture of the product, service and information flows, including a description of the various business actors and their roles; a description of the potential benefits for the various business actors; a description of the sources of revenues" (p. 4)
Chesbrough and Rosenbloom (2002)	The business model is "the heuristic logic that connects technical potential with the realization of economic value" (p. 529). "The business model provides a coherent framework that takes technological characteristics and potentials as inputs and converts them through customers and markets into economic outputs" (p. 532).
Knyphausen-Aufsess and Meinhardt (2002)	A business model is a simplified representation of a profit aimed venture, consisting of its essential elements and their interconnections.
Magretta (2002)	"[Business models] are, at heart, stories—stories that explain how enterprises work [and answer the following questions,] Who is the customer? And what does the customer value? It also answers the fundamental question every manager must ask: How do we make money in this business? What is the underlying economic logic that explains how we can deliver value to the customers at an appropriate cost?" (p. 87)
Richardson (2008)	A business model is "a conceptual framework that helps to link the firm's strategy, or theory of how to compete, to its activities, or execution of the strategy. The business model framework can help to think strategically about the details of the way the firm does business." (p. 135) "The three major components of the framework — the value proposition, the value creation and delivery system, and value capture — reflect the logic of strategic thinking about value. The essence of strategy is to create superior value for customers and capture a greater amount of that value than competitors." (p. 138)
Doganova and Eyquem-Renault (2009)	"The business model is a narrative and calculative device that allows entrepreneurs to explore a market and plays a performative role by contributing to the construction of the techno-economic network of an innovation." (p. 1559)
Baden-Fuller and Morgan (2010)	"business models have a multivalent character as models. They can be found as exemplar role models that might be copied or presented as nutshell descriptions of a business organisation: simplified, short-hand descriptions equivalent to scale models. We can think of them not only as capturing the characteristics of observed kinds in the world (within a taxonomy), but also as abstract ideal types (in a typology)" (p. 167)
Casadesus-Masanell and Ricart (2010)	"A business model is […] a reflection of the firm's realized strategy" (p. 195).
Osterwalder and Pigneur (2010)	"A business model describes the rationale of how an organization creates, delivers, and captures value." (p. 14)
Teece (2010)	"A business model articulates the logic, the data and other evidence that support a value proposition for the customer, and a viable structure of revenues and costs for the enterprise delivering that value" (p. 179).

Zott and Amit (2010)	"we conceptualize a firm's business model as a system of interdependent activities that transcends the focal firm and spans its boundaries. The activity system enables the firm, in concert with its partners, to create value and also to appropriate a share of that value [and is defined by] design elements - content, structure and governance - that describe the architecture of an activity system; and design themes - novelty, lock-in, complementarities and efficiency – that describe the sources of the activity system's value creation." (p. 216).
Geissdoerfer et al. (2016)	"we describe business models as simplified representations of the elements e and interactions between these elements e that an organisational unit chooses in order to create, deliver, capture, and exchange value." (p. 1218)
Wirtz et al. (2016)	"A business model is a simplified and aggregated representation of the relevant activities of a company. It describes how marketable information, products and/or services are generated by means of a company's value-added component. In addition to the architecture of value creation, strategic as well as customer and market components are taken into consideration, in order to achieve the superordinate goal of generating, or rather, securing the competitive advantage. To fulfil this latter purpose, a current business model should always be critically regarded from a dynamic perspective, thus within the consciousness that there may be the need for business model evolution or business model innovation, due to internal or external changes over time." (p.41)
Massa et al. (2017)	"a business model is a description of an organization and how that organization functions in achieving its goals (e.g., profitability, growth, social impact, ...)." (p. 73)

As Table 14 illustrates, there are three main groups of understanding of the term business model in the literature, illustrated in Figure 14. The concept is either described as a model of an organisational system (e.g. Baden-Fuller and Morgan, 2010; Knyphausen-Aufsess and Meinhardt, 2002), as an abstract characteristic of an organisational unit, (e.g. Osterwalder and Pigneur, 2010; Teece, 2010), or with a reduced scope that equates the term with individual elements of other authors' definitions or reduce it to achieve certain means (e.g. Doganova and Eyquem-Renault, 2009). There is a central role of value in most definitions, roughly following the categorisation of Richardson (2008), value proposition, value creation and delivery, and value capture, with some authors also adding the value network (e.g. Zott and Amit, 2010).

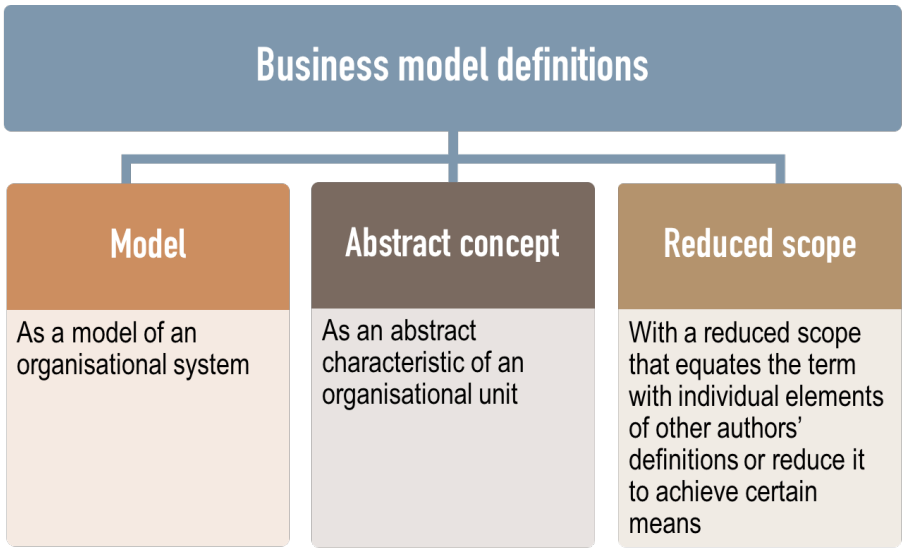


Figure 14: Three types of business model definitions (Geissdoerfer et al., 2018b)

Business model working definition

Based on this analysis, I define business models as *simplified representations of the value proposition, value creation and delivery, and value capture elements and the interactions between these elements within an organisational unit.*

However, since there can be several representations of the same organisational unit, perceptions of the term must be considered that assume an underlying abstract concept that is characteristic of the entity – analogue to capabilities, resources, or strategies, which can be documented in different ways without the document becoming the underlying concept. Not fully considered can be definitions with reduced scope that assume identity of the business model with one of its elements, for example, the revenue model.

3.3 Sustainable business models

The academic and practitioner interest in sustainable business models, or business models for sustainability, has grown rapidly, with special issues in Journal of Cleaner Production (Vol. 45, April 2013), and Organization and the Environment (Vol. 29, Is. 1, March 2016), which provide an excellent overview over the topic. There is also a growing range of review articles by Bocken et al. (2014), Boons and Lüdeke-Freund (2013), Evans et al. (2017), and Schaltegger et al. (2016). Following on from this work, an updated and complemented literature review was conducted. An overview of the considered definitions is provided in Table 15.

When the concept was first conceived, its main purpose was to put companies into the service of the transformation to a more sustainable economic system and to provide leverage for integrating sustainability considerations into organisations and helping companies to achieve their sustainability ambitions (Rashid et al., 2013; Stubbs and Cocklin, 2008; Wells, 2013). Today, the notion of sustainable business models is increasingly seen as a source of competitive advantage (Nidumolu et al., 2009; Porter and Kramer, 2011). Thus, it could be argued that the sustainable business model concept model might eventually supersede the business model concept much like sustainable competitive advantage has superseded competitive advantage (Grant, 2010).

Table 15: Selected sustainable business model definitions (Geissdoerfer et al., 2018b)

Source	Definition
Stubbs and Cocklin (2008)	A sustainable business model is "a model where sustainability concepts shape the driving force of the firm and its decision making [so that] the dominant neoclassical model of the firm is transformed, rather than supplemented, by social and environmental priorities." (p. 103)
Garetti and Taisch (2012)	Sustainable business models "have a global market perspective, taking into account the development of new industrialised countries as well as the need for more sustainable products and services." (p. 88)

Schaltegger et al. (2012)	Sustainable business models "create customer and social value by integrating social, environmental, and business activities" (p. 112)
Bocken et al. (2013)	"Sustainable business models seek to go beyond delivering economic value and include a consideration of other forms of value for a broader range of stakeholders." (p. 484)
Boons and Lüdeke-Freund (2013)	A sustainable business model is different from a conventional one through four propositions, "1. The value proposition provides measurable ecological and/or social value in concert with economic value […] 2. The supply chain involves suppliers who take responsibility towards their own as well as the focal company's stakeholders […] 3. The customer interface motivates customers to take responsibility for their consumption as well as for the focal company's stakeholders. […] 4. The financial model reflects an appropriate distribution of economic costs and benefits among actors involved in the business model and accounts for the company's ecological and social impacts" (p. 13)
Wells (2013)	A business model for sustainability "would assists in the achievement of sustainability [by] following major principles […] for sustainability", which Wells defines as 1) resource efficiency, 2) social relevance, 3) localisation and engagement, 4) longevity, 5) ethical sourcing, and 6) work enrichment. (p. 65)
Upward and Jones (2015)	A (strongly) sustainable business model "is the definition by which an enterprise determines the appropriate inputs, resource flows, and value decisions and its role in ecosystems, [in a way that] sustainability measures [which] are those indicators that assess the outputs and effects of business model decisions […] might be claimed as successfully sustainable." (p. 98)
Abdelkafi and Tauscher (2016)	Sustainable business models, "incorporate sustainability as an integral part of the company's value proposition and value creation logic. As such, [Business models for Sustainability] provide value to the customer and to the natural environment and/or society." (p. 75)
Geissdoerfer et al. (2016)	"we define a sustainable business model as a simplified representation of the elements, the interrelation between these elements, and the interactions with its stakeholders that an organisational unit uses to create, deliver, capture, and exchange sustainable value for, and in collaboration with, a broad range of stakeholders." (p. 1219)
Evans et al. (2017)	Sustainable business models are described with five propositions, "1. Sustainable value incorporates economic, social and environmental benefits conceptualised as value forms. 2. Sustainable business models require a system of sustainable value flows among multiple stakeholders including the natural environment and society as primary stakeholders. 3. Sustainable business models require a value network with a new purpose, design and governance. 4. Sustainable business models require a systemic consideration of stakeholder interests and responsibilities for mutual value creation. 5.Internalizing externalities through product-service systems enables innovation towards sustainable business models." (p. 5ff)

The definitions in the literature have in common that they see sustainable business models as a modification of the conventional business model concept, with certain characteristics and goals added to it; and, they either 1) incorporate concepts, principles, or goals that aim at sustainability; or 2) integrate sustainability into their value proposition, value creation and delivery activities, and/or value capture mechanisms.

The literature describes different subcategories, archetypes, or generic strategies for sustainable business models, like product-service systems, base of the pyramid, or circular business models (Bocken et al., 2014). These

types have additional characteristics. For example, circular business models[1] are not only creating sustainable value, employing pro-active multi-stakeholder management, and have a long-term perspective, but also close, slow, intensify, dematerialise, and narrow resource loops (Bocken et al, 2016; Geissdoerfer et al., 2018a), as illustrated in Figure 15.

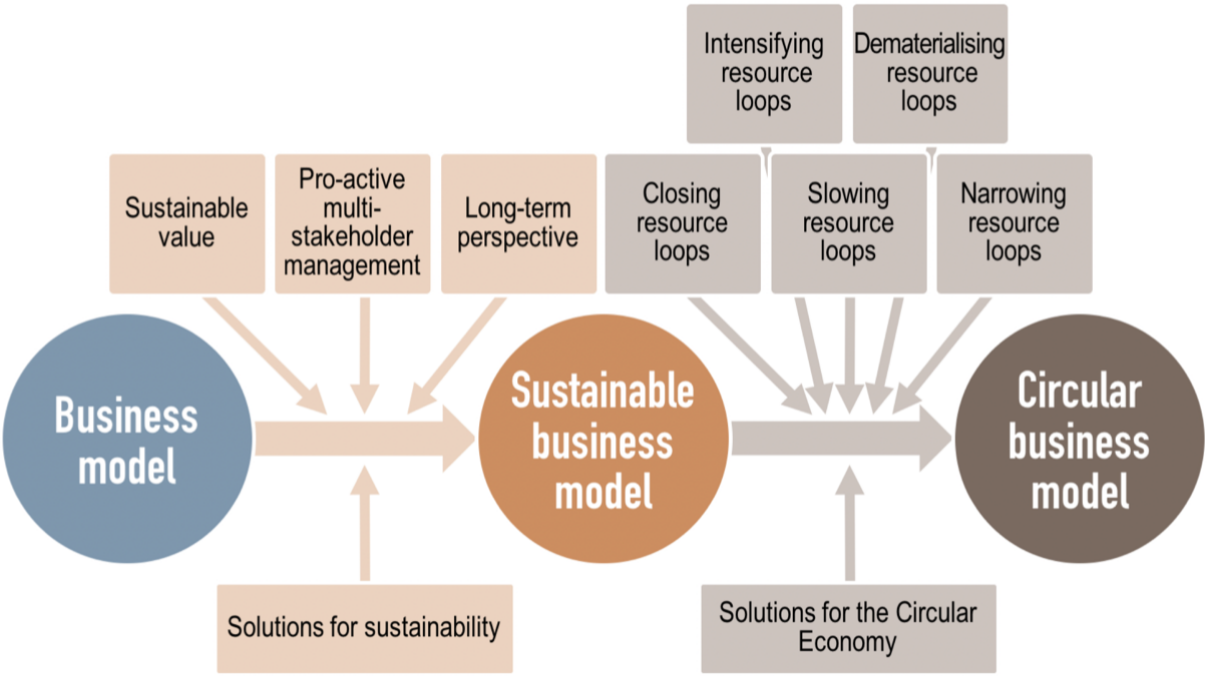


Figure 15: The SBM concept and its subcategories, for example, circular business models (Geissdoerfer et al., 2018a)

However, because of potential trade-offs between these additional characteristics and the characteristics that qualify a sustainable business model, there may be cases that represent only the sub-category without being a sustainable business model as illustrated in Figure 16. This could, for

[1] Circular business models are only used as one example for a subcategory of sustainable business models in this context. This thesis does not otherwise have a particular focus on Circular Economy aspects or otherwise consciously discriminate sustainable business model subcategories.

example, be caused by efficiency gains of a new technology that exceed the environmental benefits of closing the loop for an old technology, or negative consequences of going circular for the working conditions of employees (Geissdoerfer et al., 2017a).

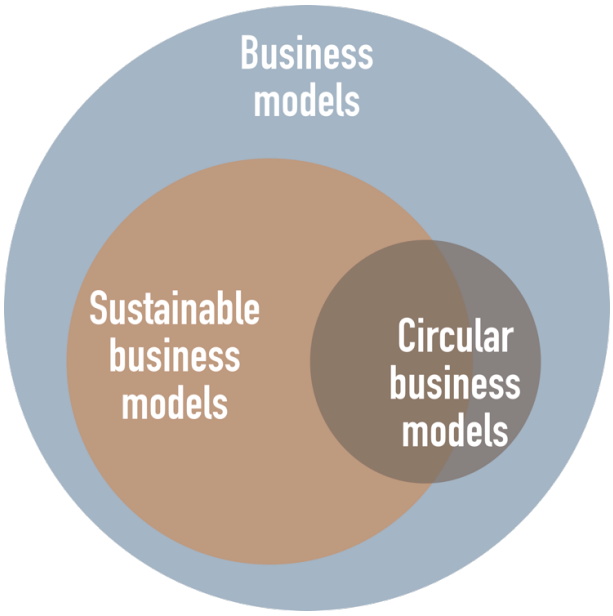


Figure 16: Imperfect overlap of SBM concept and its subcategories, for example, circular business models (Geissdoerfer et al., 2018b)

Sustainable business model working definition

Based on this analysis, I define sustainable business models as *business models that incorporate pro-active multi-stakeholder management, the creation of monetary and non-monetary value for a broad range of stakeholders, and hold a long-term perspective.*

The most prevalent framework underlying the different conceptualisation is the value proposition, value creation and delivery, and value capture structure of Richardson (2008), which I included in this working definition. In different

modifications, it is used by most authors in my sample. While some of these modifications have accounted for the multi-stakeholder nature of sustainable business models in two of the elements, the focus on customer and monetary value of the value capture element endured. Since sustainable business model innovation focuses on stakeholder benefit and stakeholder value rather than solely on customer benefit or shareholder value the existing definition seems inadequate. I therefore propose the following definition: *value capture describes how part of the value generated for a stakeholder can be transformed into value useful for the organisation*. The value is useful for the organisation, if it helps the organisation to achieve its purpose. Examples of useful value thus could be profit, strategic fit, and employee motivation.

3.4 Business model innovation

Business model innovation is a stream in the work on business models, and some authors of the latter assume it to be an implicit part of their conceptualisation. Schallmo (2013) and Foss and Saebi (2017) provided an extensive literature review on the topic, which was updated and complemented for this research. A resulting overview of different business model innovation definitions is provided in Table 16.

The concept is investigated to understand and facilitate the analysis and planning of transformations from one business model to another (Schallmo, 2013). The capability for frequent and successful business model innovation can increase an organisation’s resilience to changes in its environment and constitute a sustainable competitive advantage (Mitchell and Coles, 2003).

Table 16: Selected business model innovation definitions (Geissdoerfer et al., 2018b)

Source	Definition
Mitchell and Coles (2004)	"By business model innovation, we mean business model replacements that provide product or service offerings to customers and end users that were not previously available. We also refer to the process of developing these novel replacements as business model innovation." (p. 17)
Labbé and Mazet (2005)	A business model innovation changes one or more dimensions of a business model (which are perceived by the authors as product-market combination, the architecture of the value creation, and the revenue model) so that a novel configuration of the elements is created and implemented. (pp. 897 f.)
Osterwalder and Pigneur (2005)	"Specifying a set of business model elements and building blocks, as well as their relationships to one another […] a business model designer […] can experiment with these blocks and create completely new business models, limited only by imagination and the pieces supplied." (p. 24)
Chesbrough (2007)	Business model innovation is to "advance [the] business model […] from very basic (and not very valuable) models to far more advanced (and more valuable) models." (p.15)
Lindgardt and Reeves (2009)	"Innovation becomes BMI [business model innovation] when two or more elements of a business model are reinvented to deliver value in a new way. […] BMI can provide companies a way to break out of intense competition, under which product or process innovations are easily imitated". (p. 2)
Romero and Molina (2009)	"business models as definers of the value creation priorities in an organisation should be continuously reviewed in response to actual and possible changes in the perceived market conditions and evolve the enterprise strategy as the business environment and customers' needs change." (p. 3)
Chesbrough (2010)	Business model innovation "[1] Articulates the value proposition (i.e., the value created for users by an offering based on technology); [2] Identifies a market segment and specify the revenue generation mechanism (i.e., users to whom technology is useful and for what purpose); [3] Defines the structure of the value chain required to create and distribute the offering and complementary assets needed to support position in the chain; [4] Details the revenue mechanism(s) by which the firm will be paid for the offering; [5] Estimates the cost structure and profit potential (given value proposition and value chain structure); [7] Describes the position of the firm within the value network linking suppliers and customers (incl. identifying potential complementors and competitors); and [8] Formulates the competitive strategy by which the innovating firm will gain and hold advantage over rivals." (p. 355, citing Chesbrough and Rosenbloom, 2002)
Johnson (2010)	"[Seizing the white space] calls for the ability to innovate something more core than the core, to innovate the very theory of the business itself. I call that process business model innovation." (p. 13) "business model innovation is an iterative journey" (p. 114)
Geissdoerfer et al. (2016)	"Business model innovation describes either a process of transformation from one business model to another within incumbent companies or after mergers and acquisitions, or the creation of entirely new business models in start-ups." (p. 1220)

These definitions refer to business model innovation as a change in the configuration of either the entire business model or individual elements of it, either as a reaction to opportunities or challenges in the organisation's environment or as a vehicle for diversification and innovation. Consequently, the concept's main fields of application have been in corporate diversification (Ansoff, 1957) and business venturing and start-up contexts. Based on the

described business model innovation examples, four generic configurations of business model innovation can be distinguished. These comprise start-ups, business model transformation, business model diversification, and business model acquisition (Figure 17).

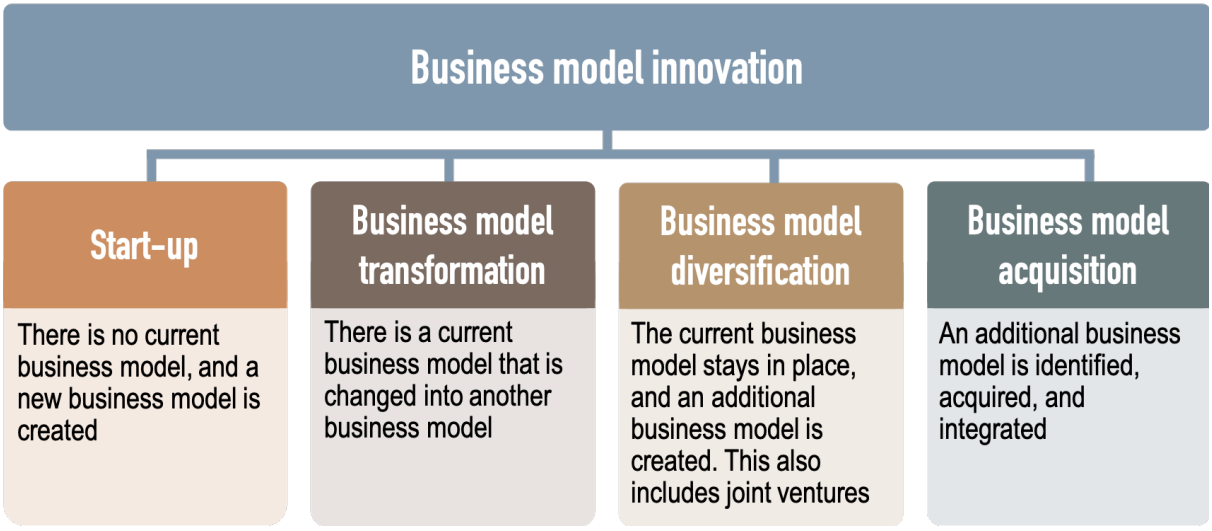


Figure 17: Types of business model innovation, developed from Geissdoerfer et al. (2018b)

The differentiation between other forms of innovation and diversification is not clearly defined by the reviewed publications. For example, Lindtgardt and Reeves (2009) define that at least two business model elements have to change for an innovation to qualify as a business model innovation. However, the thresholds for changes in a company's activities to qualify as a change in a business model element remain unclear, for instance, when a product innovation constitutes a new value proposition. Thus, it remains conceptually underexplored under what circumstances, for example, product innovation, service innovation, or changes in the supply chain qualify as a business model innovation.

Business model innovation working definition

Based on this analysis, I define business model innovation as *the conceptualisation and implementation of new business models. This can comprise the development of entirely new business models, the diversification into additional business models, the acquisition of new business models, or the transformation from one business model to another. The transformation can affect the entire business model or individual or a combination of its value proposition, value creation and deliver, and value capture elements, the interrelations between the elements, and the value network.*

3.5 Sustainable business model innovation

As a subset in the sustainable business model field, research in sustainable business model innovation, sometimes called business model innovation for sustainability in the literature, has started relatively recently, and there seems to be no comprehensive review of the literature yet. Therefore, this review was conducted, and an overview of different definitions is presented in Table 17.

Table 17: Selected sustainable business model innovation definitions (Geissdoerfer et al., 2018b)

Source	Definition
Boons and Lüdeke-Freund (2013)	Sustainable business model innovation is understood as the adaption of the business model to overcome barriers within the company and its environment to market sustainable process, product, or service innovations. (p. 13)
Loorbach and Wijsman (2013)	Sustainable business model innovation describes businesses' "searching for ways to deal with unpredictable […] wider societal changes and sustainability issues." (p. 20)
Bocken et al. (2014)	"Business model innovations for sustainability are defined as: Innovations that create significant positive and/or significantly reduced negative impacts for the environment and/or society, through changes in the way the organisation and its value-network create, deliver value and capture value (i.e. create economic value) or change their value propositions." (p. 44)

Geissdoerfer et al. (2016)	"Sustainable business model innovation processes specifically aim at incorporating sustainable value and a pro-active management of a broad range of stakeholders into the business model." (p.1220)
Roome and Louche (2016)	Sustainable business model innovation describes the "processes through which […] new business models are developed by businesses and their managers […] how companies revise and transform their business model in order to contribute to sustainable development." (p. 12)
Schaltegger et al. (2016)	Sustainable business model innovation describes the creation of "modified and completely new business models [that] can help develop integrative and competitive solutions by either radically reducing negative and/or creating positive external effects for the natural environment and society" (p. 3)
Yang et al. (2016)	"Sustainable business model innovation can be more easily achieved by identifying the value uncaptured in current business models, and then turning this new understanding of the current business into value opportunities that can lead to new business models with higher sustainable value." (p. 2)

These definitions combine a business model innovation element with sustainability considerations. Similar to the understanding of conventional business model innovation scholars, business model innovation is seen as a process of business model exploration, adjustment, improvement, redesign, revision, creation, development, adoption, and transformation. The process qualifies as a sustainable business model innovation when it aims at: 1) sustainable development or positive, respectively reduced, negative impacts for the environment, society, and the long-term prosperity of the organisation and its stakeholders or 2) adopting solutions or characteristics that foster sustainability in its value proposition, creation, and capture elements or its value-network.

Analogous to the discussion of conventional business model innovation in Section 3.3, there are four types of sustainable business model innovation: (1) sustainable start-ups: a new organisation with a sustainable business model is created; (2) sustainable business model transformation: the current business model is changed, resulting in a sustainable business model; (3) sustainable business model diversification: without major changes in the existing business models of the organisation, and additional, sustainable business model is established; 4) Sustainable business model acquisition: an additional, sustainable business model is identified, acquired, and integrated into the organisation.

Based on the discussion in Section 3.2, these four innovations are expected to aim at implementing certain sustainable business model types and strategies. The types include circular business model innovation (Bocken et al. 2016), social enterprises (Defourny and Nyssens, 2010) bottom-of the pyramid businesses (Prahalad, 2009), and product-service systems (Pigosso and McAloone, 2016; Tukker, 2004). The strategies were reviewed by Bocken et al. (2014) and recently updated by Ritala et al. (2018). They have synthesised nine generic sustainable business model strategies, they call "archetypes". The strategies comprise: (1) maximise material and energy efficiency; (2) closing resource loops; (3) substitute with renewables and natural processes; (4) deliver functionality rather than ownership; (5) adopt a stewardship role; (6) encourage sufficiency; (7) repurpose for society or the environment; (8) inclusive value creation; and (9) develop sustainable scale up solutions.

Sustainable business model innovation therefore aims at (1) characteristics of a sustainable business model–sustainable value creation, proactive multi-stakeholder management, and a long-term perspective. (2) four types of innovation–sustainable start-ups, sustainable business model transformation, sustainable business model diversification, sustainable business model acquisition. (3) creating a sustainable business model type – circular business models, social enterprises, bottom of the pyramid solutions, or product-service systems. (4) the implementation of one or more sustainable business model strategies. An overview of sustainable business model innovation types, business model types and strategies is provided in Table 18.

Table 18: Overview of SBMI types, SBM types and SBM strategies (Geissdoerfer et al., 2018b)

	Examples	Description
Sustainable business model innovation types	1) Sustainable start-ups:	A new organisation with a sustainable business model is created
	2) Sustainable business model transformation	The current business model is changed, resulting in a sustainable business model
	3) Sustainable business model diversification	Without major changes in the existing business models of the organisation, and additional, sustainable business model is established
	4) Sustainable business model acquisition	An additional, sustainable business model is identified, acquired, and integrated into the organisation
Sustainable business model types	1) Circular business models	Business models that are closing, slowing, intensifying, dematerialising, or narrowing resource loops
	2) Social enterprises	Business models that aim at social impact by generating profits from economic activity or reinvesting them entirely
	3) Bottom of the pyramid solutions	Business models that aim at customers at the bottom of the income pyramid
	4) Product-service systems	Business models that integrate products and services into customer offerings that provide a product, a functionality, or a result
Sustainable business model strategies	1) Maximise material and energy efficiency	Aims at less material and energy input through more efficient processes
	2) Closing resource loops	Aims at closing resource loops through reuse, remanufacturing, and recycling
	3) Substitute with renewables and natural processes	Aims at replacing non-renewable resources with renewable ones and artificial processes with ones that mimic or use processes in nature
	4) Deliver functionality rather than ownership	Aims at providing the user with the functionality she requires without her owning the product that delivers the service
	5) Adopt a stewardship role	Aims at protecting natural systems by introducing a gatekeeper that controls access or incentivises certain behaviours
	6) Encourage sufficiency	Aims at providing information and incentives that encourage less consumption
	7) Repurpose for society or the environment	Aims at utilising organisational resources and capabilities to create societal or environmental benefits
	8) Inclusive value creation	Aims at delivering value to formerly unattended stakeholders or including them into the value creation process
	9) Develop sustainable scale up solutions	Aims at scaling sustainable solutions and technologies

Sustainable business model innovation working definition

Based on this, I define sustainable business model innovation as *the conceptualisation and implementation of sustainable business models. This comprises the development of entirely new business models, the adaption of an existing ones, and the transformation from an existing business model to another*.

3.6 Confirmation of research gap

The literature review confirmed the research gap. In the investigated literature, several tools and processes have been identified that facilitate the design of business models and assist innovative endeavours.

There are several tools and processes that facilitate conventional business model innovation, for example by Gassmann et al. (2014), Osterwalder and Pigneur (2010), and Ries (2011). While this indicates that the literature for conventional business model innovation tools and processes is relatively mature, a review by Foss and Saebi (2017) indicates that there might be insufficient grounding in empirical evidence in the literature.

The development of tools that aim at using business model innovation as a leverage to help companies to meet their sustainability ambitions is a relatively recent phenomenon. Sustainable business model innovation tools were, for example, developed by Bocken et al. (2013); Evans et al. (2014), Geissdoerfer et al. (2016), Joyce and Paquin (2016), Lüdeke-Freund et al. (2018), Upward and Jones (2015), and Yang et al. (2017b).

These approaches are focusing on single phases of sustainable business model innovation, with the exception of the sustainable business model process of Evans et al. (2014) and Girotra and Netessine (2013), which combine different tools into a more comprehensive process.

Evans et al. (2014) combines different tools into a prescriptive process that provides some guidance to practitioners towards conceptualising a sustainable business model, but without the intend to provide a descriptive framework for the entire process. The research group also published the process in Rana et al. (2013) and Holgado et al. (2013), and it was developed based on a literature and a practice review with either two (Rana et al., 2013) or six (Holgado et al., 2013) cases.

Girotra and Netessine (2013) provide a purely conceptual approach ("sample design", "brief outline", p. 543), a prescriptive process that the authors use in executive and graduate management education. The paper is based on a very small body of literature and seems unaware of the rest of the sustainable business model innovation literature. From the description of the authors it is not clear how the process was derived or on what basis.

Both approaches seem very basic compared to the literature on processes for conventional business models and only cover aspects that concern the earlier phases of the process.

There are also adjacent approaches by Prendeville and Bocken (2017) and Roome and Louche (2016) that also provide a process framework. However, the scope of these approaches is different with Prendeville and Bocken (2017) comparing the conventional business model innovation with the service design process under the assumption that servitisation leads to better sustainability performance and Roome and Louche (2016), who discuss organisational transformation in the context of two cases that have a sustainability focus.

This literature offers only little guidance through most of the sustainable business model innovation process. This indicates that the research questions are not sufficiently addressed in the literature, which confirms the research gap.

4. Conceptual framework

This chapter presents the sustainable business model innovation process steps, key activities, and challenges found in the literature and synthesises them into a theoretical framework. This framework version 0 is the basis for the empirical investigations to answer the research questions. These investigations are presented in the following chapter, Chapter 4.

As the bibliometric analysis in Section 2.2 illustrates, the literature on business model innovation is relatively mature, while, as outlined in the previous section (3.6), the discussion on the sustainable business model innovation process is still nascent, and only two non-mature process approaches by Evans et al. (2014) and Girotra and Netessine (2013) were identified.

While these frameworks are in a relative early state of conceptualisation, their approach to build a sustainable business model innovation process on conventional business model innovation concepts and sustainable business model innovation focused tools is promising, because of the more advanced literature in these areas.

Following this approach, in this research, it is assumed that a combination of the conventional business model innovation literature with that on sustainable business model innovation tools will provide a viable theoretical framework to serve as a basis to address the research gap. This approach is illustrated in Figure 18.

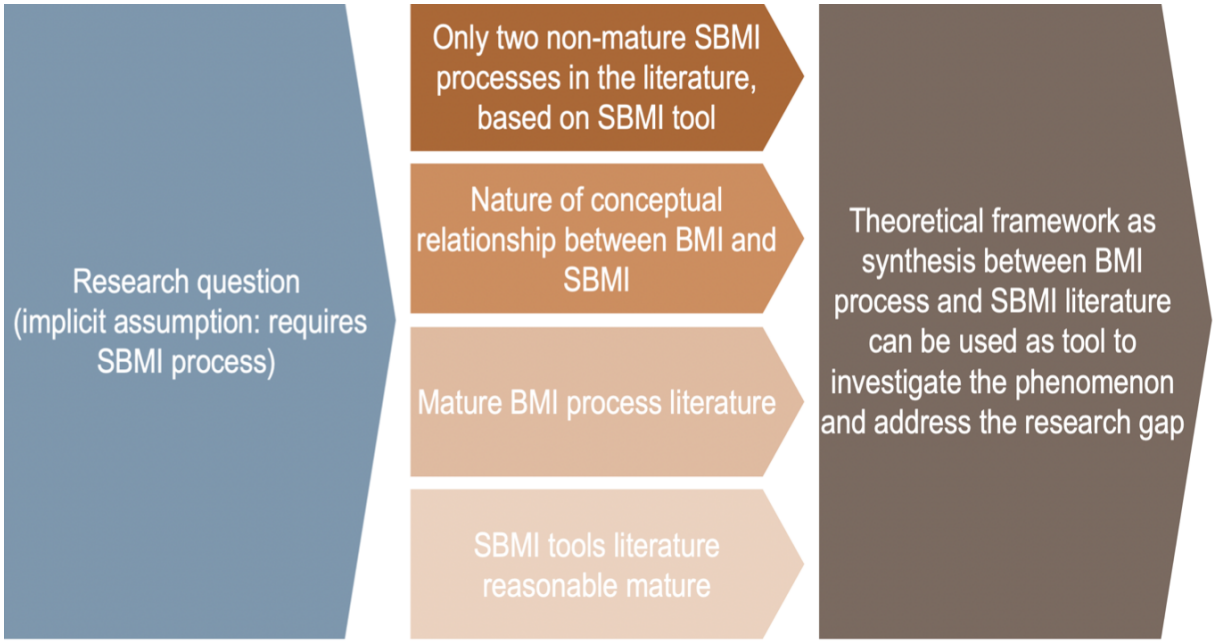


Figure 18: Development of theoretical framework version 0 from the literature

The following subsections discuss process (1) steps, (2) activities, and (3) challenges in the reviewed literature, before a theoretical framework, framework version 0 is synthesised.

4.1 Steps

There is a broad range of literature on business model innovation process steps, including process oriented reviews by Frankenberger et al. (2013), Schallmo (2013), Zott and Amit (2015), Foss and Saebi (2017), and Wirtz (2018). A selection of process steps found in the literature is illustrated in Table 19.

Table 19: Examples for business model innovation processes

Publication	Process steps					
Mitchell and Coles (2004)	Understand and apply current business model	Vision development	Development and test of potential buisness models	Implementation of new business model		
Chesbrough (2007)	Analyse current business model	Business model experiments	Implementation			
Johnson (2010)	Value proposition design	Revenue mechanism design	Analysis of key resources and processes	Incubation	Acceleration	Transition
Osterwalder and Pigneur (2010)	Mobilise	Understand	Design	Implement	Manage	
Teece (2010)	Market segmentation	Value proposition development	Revenue mechanism development	Development of barriers to imitation		
Frankenberger et al. (2013)	Initiation	Ideation	Integration	Implementation		
Schallmo (2013)	Ideation	Vision development	Conceptualisation of business model elements	Detailed design of business model elements	Implementation	Adaption and expansion
Zott and Amit (2015)	Observe	Synthesise	Generate	Refine	Implement	
Wirtz and Daiser (2018)	Analysis	Ideation	Feasibility	Prototyping	Decision-making	Implementation	Sustainability

Comparing the different conceptualisations, the steps of most processes can be attributed to three broad phases: (1) an ideation or conceptualisation phase, in which certain elements, especially the value proposition are ideated or roughly conceptualised e.g. (e.g. Johnson, 2010; Osterwalder and Pigneur, 2010; Teece, 2010) or the current business model or customers are analysed (e.g. Amit and Zott, 2012; Chesbrough, 2007; Mitchell and Coles, 2004); (2) a detail design and experimentation phase, in which different aspects or elements of the business model conceptualisation are researched and defined in detail (Frankenberger et al., 2013; Schallmo, 2013; Wirtz and Daiser, 2018) and key assumptions or hypotheses are tested (e.g. Mitchell and Coles, 2004; Osterwalder and Pigneur, 2010); and (3) an implementation phase, in which the conceptualisation are implemented (e.g. Frankenberger

et al., 2013; Mitchell and Coles, 2004; Zott and Amit, 2013) and adapted and/or expanded (Osterwalder and Pigneur, 2010; Schallmo, 2013; Wirtz and Daiser, 2018).

While most processes contain some form of prototyping and experimentation and piloting there seems to be considerable ambiguity in the activities and scope that the terms comprise. To increase conceptual clarity, I therefore use the terms prototyping, experimentation, and piloting following the terminological conventions of the adjacent fields with established definitions, respectively Design Thinking (Plattner et al., 2011) for prototyping, Lean Startup (Ries, 2011) for experimentation, and project management (Turner, 2005) for piloting.

Based on this analysis, the following eight steps can be synthesised:

1. **Ideation:** The vision and value proposition of the business model is ideated.
2. **Concept design:** All elements and the interactions between the elements are defined.
3. **Prototyping:** A physical object of the concept is built for communication and rough testing.
4. **Experimentation:** Key assumptions and hypotheses are tested.
5. **Detailed design:** Each element is analysed and defined in detail.
6. **Piloting:** The new business model is introduced in parts of the target market, analysed, and improved.
7. **Launch:** The new business model is implemented in the entire target market.
8. **Adjustment and diversification:** The business model is adapted and extended to react to changes and opportunities in its environment.

4.2 Key activities

As outlined in the previous section this research combines conventional business model innovation process approaches with sustainable business model innovation tools to address the research questions. Therefore, this chapter first discusses activities outlined in the conventional business model innovation literature before it illustrates business model innovation tools with an explicit focus on organisational sustainability performance.

Authors that do explicitly describe activities include: Frankenberger et al. (2013), Osterwalder and Pigneur (2010), Schallmo (2013), and Wirtz and Daiser (2018).

Osterwalder and Pigneur (2010) describe the following nine activities along their business model innovation process: (1) assemble all the elements for successful business model design; (2) create awareness of the need for a new business model, describe the motivation behind the project, and establish a common language to describe, design, [...] analyse and discuss business models; (3) [...] immerse in relevant knowledge [about] customers, technology, and [the] environment; (4) collect information, interview experts, study potential customers, and identify [their] needs and problems; (5) transform the information and ideas from the previous phase into business model prototypes that can be (6) explored and tested; (7) [...] select the most satisfactory business model design; (8) Implement the selected business model design; and (9) set up the management structures to continuously monitor, evaluate, and adapt or transform [the] business model.

Frankenberger et al. (2013) mention 15 activities: (1) Understanding stakeholder needs, (2) monitoring stakeholder moves; (3) identifying relevant changes in the ecosystem and their driver; (4) creating an appropriate organisational setting for ideation; (5) identifying approaches and tools to create business model ideas (6) ideation of business model ideas; (7) detailing 'who', 'why', 'what', and 'how', of the business model; (8) creating

alignment and consistency between them; (9) involving partners early and ensuring their support; (10) identifying and agreeing on required changes to their business model; (11) convincing the organisation of the business model change; (12) ensuring resource commitments of key decision makers; (13) pilots, trials, or prototypes; (14) converting learnings into business model adjustments; and (15) managing the roll-out.

Schallmo (2013) includes 15 activities: (1) ideate and describe business model ideas; (2) evaluate the ideas; (3) integrate the ideas; (4) analyse customer needs and technological and general trends; (5) formulate a business model vision; (6) benchmark business models in literature and the real world; (7) develop business model prototypes; (8) evaluate the prototypes; (9) detail all elements of the business model; (10) develop metrics; (11) implementation planning; (12) implementation; (13) monitoring; (14) adjustments; and (15) diversification.

Wirtz and Daiser (2018) describe 29 activities: (1) analysis of the current business model; (2) analysis of products/services; (3) analysis of target group/customers; (4) analysis of market/competition; (5) determination of the business model innovation mission; (6) generation of customer insights; (7) development of customer scenarios; (8) visual/networked thinking and storytelling; (9) assumptions about the business environment; (10) analysis of interdependencies; (11) analysis of potential internal or external business model alignment; (12) analysis of different business model design alternatives; (13) creation of different design alternatives; (14) development of several detailed concepts; (15) refinement of the components/partial models; (16) evaluation of each design alternative; (17) selection of final design; (18) final harmonization of the components; (19) realisation and testing; (20) development of implementation plan; (21) communication and team set up; (22) step-by-step realisation; (23) implementation completion; (24) monitoring and controlling; (25) potential adaptions; (26) sustained growth through organisation-wide learning; (27) creation of isolation

mechanisms towards competition; (28) securing long-term competitive advantage; and (29) transition.

Some authors additionally list business model innovation tools, with a high degree of overlap to the activities described by the authors, like Osterwalder and Pigneur (2010), who list the following tools:

Business Model Canvas, Storytelling, Business Model Patterns, Customer Insights, Visual Thinking, Scenarios, Business Model Environment, Evaluating Business Models, Ideation, Prototyping, Business Model Perspective on Blue Ocean Strategy, Managing Multiple Business Models.

As this example illustrates, there is a high degree of interrelatedness of tools and activities and overlapping use in the literature. Explicit definitions or disambiguations as provided by Shehabuddeen et al. (2000) seem not to be widely considered in the reviewed literature. Therefore, both concepts are not listed separately in the following, unless otherwise indicated.

Table 20 provides an overview of tools explicitly aimed at organisational sustainability performance that were identified in this review. The outcome of this research and some its earlier stages, as published in Geissdoerfer et al. (2017b) also constitute a tool to plan the sustainable business model innovation process and could therefore also be included.

Table 20: Overview of reviewed SBMI tools

Scope	Tool	Description	Source
Ideation	Value Mapping Tool	The Value Mapping Tool maps realised and unrealised sustainable value for different stakeholder groups as a basis to ideate additional value opportunities for each group.	Bocken et al. (2013)
	Value Ideation	The value proposition design tool develops a sustainable value proposition by analysing how stakeholder problems can be solved and needs satisfied in the particular organisational and ecosystem context. It integrates Design Thinking techniques to improve the quality of the generated ideas and considers a broad range of strategic objectives and stakeholders.	Geissdoerfer et al. (2016)
	Sustainable Value Analysis Tool	The Sustainable Value Analysis Tool maps realised and unrealised sustainable value for different product life cycle phases as a basis to ideate additional value opportunities.	Yang et al. (2017b)
Modified business model canvas	Triple-Layered Business Model Canvas	The Triple-Layered Business Model Canvas adds two frameworks to Osterwalder and Pigneur's (2010) Business Model Canvas that replace the customer focus of the original with "the environment" and "society" as stakeholders intended to cover the three dimensions of sustainability.	Joyce and Paquin (2016)
	Flourishing Business Canvas	The Flourishing Business Model Canvas adds some fields to Osterwalder and Pigneur's (2010) Business Model Canvas framework that are to a certain extent linked to the three dimensions of sustainability.	Upward and Jones (2015)
Templates/ patterns	Sustainable Business Model Archetypes	The Business Model Archetypes is a collection of different sustainable business model strategies. An organisation can combine them as a starting point for ideation or to compare own ideas.	Bocken et al. (2014)
	Sustainable Business Model Pattern Taxonomy	The Business Model Archetypes is a collection of different sustainable business model patterns. These can be used or combined as a starting point for ideation or to compare own ideas.	Lüdeke-Freund et al. (2018)

Besides this process planning, the reviewed tools can be broadly categorised into three types of tools: (1) ideation tools, (2) modified business model canvases, and (3) sustainable business model templates or patterns.

Tools like the Value Mapping Tool, Value Ideation, and the Sustainable Value Analysis Tool aim at ideating a sustainable value proposition. This explicitly (Value Ideation) or implicitly (Value Mapping Tool and Sustainable Value Analysis Tool) follows the rationale that in order to deliver a sustainable value proposition, the whole business model has to adapt. Therefore, the value proposition is seen as a key leverage to integrate sustainability considerations into the conceptualisation of the entire business model

without having to explicitly ideate or design sustainable solutions for every element of the business model.

Tools like the Triple-Layered Business Model Canvas and the Flourishing Business Canvas are adaptions of the Business Model Canvas of Osterwalder et al. (2010). The canvas is extended by additional fields (Flourishing) or copies of the framework (Triple-layered) that add business model elements for "the environment" and "society" to cover all three sustainability dimensions. While inheriting the canvas' conceptual flaws of being at the same time complex and not comprehensive, the authors add complexity while building on a flawed understanding of sustainability, for example by implicitly assuming that economic sustainability is already covered by the original canvas elements, which are not designed to do so by Osterwalder and Pigneur (2010).

The most cited article on sustainable business model innovation in this review is by Bocken et al. (2014). The authors propose generic strategies that can be combined to form a sustainable business model. Despite being intended as a classification for sustainable business models, these archetypes are hardly ever employed in this way. Instead subcategories like circular business models, social enterprises, or product-service systems are used, which combine different archetypical strategies. There is, however, no systematic review of these subcategories that could be listed here as a tool.

Both classification systems (business model types and business model strategies) provide valuable templates for sustainable business model innovation. Following the success of the archetypes, Lüdeke-Freund et al. (2018) developed a similar approach with 45 patterns, the Sustainable Business Model Pattern Taxonomy. These sustainable business strategies, templates, or patterns can be used either as a starting point to ideate a sustainable business model by adapting and combining them, or to compare a conceptualisation with them to identify gaps and potential additions.

4.3 Key challenges

There seems to be a three-fold problem in sustainable business model innovation: 1) many business model innovation meetings and workshops are conducted, but the ideas are not followed up, 2) even promising sustainable business model concepts are not implemented, and 3) most implemented business models, especially in the start-up context, fail in the market. This is caused by different challenges, some of which were identified in a literature review by Evans et al. (2017). These challenges are presented in Table 21.

Table 21: Challenges for innovation towards SBMs (Evans et al., 2017)

Challenges	Description	Authors
Triple Bottom Line	The co-creation of profits, social and environmental benefits and the balance among them are challenging for moving towards sustainable business models.	(Hart et al., 2003; Schaltegger et al., 2012; Stubbs and Cocklin, 2008)
Mind-set	The business rules, guidelines, behavioural norms and performance metrics prevail the mind-set of firms and inhibit the introduction of new business models.	(Boons and Lüdeke-Freund, 2013; Johnson et al., 2008; Yu and Hang, 2010)
Resources	Reluctance to allocate resources to business model innovation and reconfigure resources and processes for new business models.	(Björkdahl and Holmén, 2013; Chesbrough, 2010; C Zott et al., 2011)
Technology innovation	Integrating technology innovation, e.g. clean technology, with business model innovation is multidimensional and complex.	(Hart et al., 2003; Yu and Hang, 2010; Zott et al., 2011)
External relations	Engaging in extensive interaction with external stakeholders and business environment requires extra efforts.	(Boons and Lüdeke-Freund, 2013; Stubbs and Cocklin, 2008; Vladimirova, 2012)
Methods and tools	Existing business modelling methods and tools, e.g. Osterwalder and Pigneur (2010) and Johnson et al. (2008), are few and rarely sustainability driven.	(Björkdahl and Holmén, 2013; Girotra and Netessine, 2013; Yang et al., 2014)

These challenges are confirmed by a range of authors in the business model innovation, strategic management, and change management literature.

Chesbrough (2010) remarks that business model innovation often does not take place because the organisation cannot identify the appropriate business model for new technologies or solutions. Other authors, like Christensen

(1997) and Christensen and Raynor (2003), see the problem further down the line in conflicts with the current business model and organisational logic that prevent implementation. These scholars see the difficulties that disruptive technology pose for firms not in the identification of the appropriate business model to exploit it, but in the inertia to change the current business model. This inertia is caused by often higher gross margins of the incumbent technology in the crucial early phases, and the consequent misallocation of resources. Similarly, according to Amit and Zott (2001), novelty, lock-in complementarities and efficiency are inherent aspects of business model innovation that require changes in the current configuration of assets. This causes conflicts with the managers of these assets who will consequently resist the innovation process.

This is reinforced by Prahalad and Bettis (1986) and Bettis and Prahalad (1995)'s concept of dominant logic that describes how organisations assess, select, and interpret information in often chaotic and uncertain environments. It can thus prevent companies from utilising value creation opportunities that are different from their current business model and its logic.

Similarly, the change management field refers to organisational inertia as a reason why change efforts fail (Hughes, 2011). This inertia is caused by different barriers to organisational change, like insufficient top management involvement, job security concerns, power struggles, and agency problems (Burnes, 1996; Kegan and Lahey, 2001; Kotter, 2007) that also apply to business model innovation as a particularly comprehensive and complex change effort (Table 22).

Table 22: Change management stages, actions, and pitfalls (Kotter, 2006)

Stage	Actions needed	Challenges
Establish a sense of urgency	Examine market and competitive realities for potential crises and untapped opportunities. Convince at least 75% of your managers that the status quo is more dangerous than the unknown.	Underestimating the difficulty of driving people from their comfort zones Becoming paralyzed by risks
Form a powerful guiding coalition	Assemble a group with shared commitment and enough power to lead the change effort. Encourage them to work as a team outside the normal hierarchy.	No prior experience in teamwork at the top Relegating team leadership to an HR, quality, or strategic-planning executive rather than a senior line manager
Create a vision	Create a vision to direct the change effort. Develop strategies for realizing that vision.	Presenting a vision that's too complicated or vague to be communicated in five minutes
Communicate the vision	Use every vehicle possible to communicate the new vision and strategies for achieving it. Teach new behaviours by the example of the guiding coalition.	Undercommunicating the vision Behaving in ways antithetical to the vision
Empower others to act on the vision	Remove or alter systems or structures undermining the vision. Encourage risk taking and non-traditional ideas, activities, and actions.	Failing to remove powerful individuals who resist the change effort
Plan for and create short-term wins	Define and engineer visible performance improvements. Recognize and reward employees contributing to those improvements.	Leaving short-term successes up to chance Failing to score successes early enough (12-24 months into the change effort)
Consolidate improvements and Produce more change	Use increased credibility from early wins to change systems, structures, and policies undermining the vision. Hire, promote, and develop employees who can implement the vision. Reinvigorate the change process with new projects and change agents.	Declaring victory too soon—with the first performance improvement Allowing resistors to convince "troops" that the war has been won
Institutionalise new approaches	Articulate connections between new behaviours and corporate success. Create leadership development and succession plans consistent with the new approach.	Not creating new social norms and shared values consistent with changes Promoting people into leadership positions who don't personify the new approach

4.4 Synthesis

This section presents a synthesis of the previous three sections into one coherent framework, framework version 0. For layout reasons, the framework is provided in a table format in Table 23, for the version used in the focus groups of the next research step, please refer to Appendix B.

Table 23: Framework version 0 as table

Step	Activities	Challenges
1. Ideation	▪ Value Mapping Tool ▪ Value Ideation ▪ Create awareness of the need for a new business model ▪ Understanding stakeholder needs ▪ Monitoring stakeholder moves ▪ Identifying relevant changes in the ecosystem and their driver ▪ Creating an appropriate organisational setting for ideation ▪ Identifying approaches and tools to create business model ideas ▪ Ideation of business model ideas ▪ Ideate and describe business model ideas ▪ Evaluate the ideas ▪ Business Model Patterns ▪ Ideation	▪ Underestimating the difficulty of driving people from their comfort zones ▪ Presenting a vision that's too complicated or vague to be communicated in five minutes ▪ No prior experience in teamwork at the top ▪ Methods and tools
2. Concept design	▪ Sustainable Business Model Archetypes ▪ Sustainable Business Model Pattern Taxonomy ▪ Flourishing Business Canvas ▪ Triple-Layered Business Model Canvas ▪ assemble all the elements for successful business model design; ▪ Immerse in relevant knowledge about customers, technology, and the environment ▪ Collect information, interview experts, study potential customers ▪ Detailing 'who', 'why', 'what', and 'how', of the business model ▪ Creating alignment and consistency between them ▪ Integrate the ideas ▪ Analyse customer needs and technological and general trends ▪ Formulate a business model vision ▪ Benchmark business models in literature and the real world ▪ Analysis of the current business model ▪ Analysis of products/services ▪ Analysis of target group/customers ▪ Analysis of market/competition ▪ Determination of the business model innovation mission ▪ Generation of customer insights ▪ Development of customer scenarios ▪ Assumptions about the business environment ▪ Creation of different design alternatives ▪ Business Model Canvas ▪ Storytelling ▪ Customer Insights ▪ Visual Thinking	▪ Scenarios ▪ Organisation cannot identify the appropriate business model for new technologies or solution ▪ Relegating team leadership to an HR, quality, or strategic-planning executive rather than a senior line manager ▪ Undercommunicating the vision ▪ Technology innovation ▪ Insufficient top management involvement
3. Prototyping	▪ Transform the information and ideas into business model prototypes ▪ Sustainable Business Model Pattern Taxonomy	

	▪ Select the most satisfactory business model design ▪ Prototypes ▪ Develop business model prototypes ▪ Evaluate the prototypes ▪ Visual/networked thinking and storytelling ▪ Prototyping	
4. Experimentation	▪ Trials ▪ Explore and test the prototypes	
5. Detail design	▪ Involving partners early and ensuring their support ▪ Realisation and testing ▪ Convincing the organisation of the business model change ▪ Ensuring resource commitments of key decision makers ▪ Detail all elements of the business model ▪ Develop metrics ▪ Analysis of interdependencies ▪ Analysis of potential internal or external business model alignment ▪ Analysis of different business model design alternatives ▪ Development of several detailed concepts ▪ Refinement of the components/partial models ▪ Evaluation of each design alternative ▪ Selection of final design ▪ Final harmonization of the components ▪ Evaluating Business Models ▪ Business Model Environment ▪ Business Model Perspective on Blue Ocean Strategy	▪ Conflicts with the current business model and Organisational logic that prevent implementation ▪ Novelty ▪ Lock-in complementarities and efficiency ▪ Conflicts with the managers of assets who resist the innovation process ▪ Dominant logic how organisations assess, select, and interpret information in chaotic and uncertain environments ▪ Becoming paralyzed by risks ▪ Behaving in ways antithetical to the vision ▪ Job security concerns ▪ Power struggles ▪ Agency problems ▪ Triple Bottom Line ▪ Mind-set
6. Piloting	▪ Pilots ▪ Identifying and agreeing on required changes to their business model	
7. Launch	▪ Implement the selected business model design ▪ Implementation planning ▪ Implementation ▪ Development of implementation plan ▪ Communication and team set up ▪ Step-by-step realisation ▪ Implementation completion ▪ Managing the business model roll-out ▪ Converting learnings into business model adjustments	▪ Higher gross margins of the incumbent technology in the crucial early phases ▪ Misallocation of resources ▪ Required changes in the current configuration of assets ▪ Failing to remove powerful individuals who resist the change effort ▪ Leaving short-term successes up to chance ▪ Failing to score successes early enough (12-24 months into the change effort) ▪ Not creating new social norms and shared values consistent with changes ▪ Promoting people into leadership positions who don't personify the new approach ▪ External relations
8. Adjustment and diversification	▪ Set up the management structures to continuously monitor, evaluate, and adapt or ▪ Monitoring ▪ Adjustments ▪ Diversification ▪ Monitoring and controlling ▪ Potential adaptions	▪ Declaring victory too soon—with the first performance improvement ▪ Allowing resistors to convince "troops" that the war has been won

- Sustained growth through organisation-wide learning
- Creation of isolation mechanisms towards competition
- Securing long-term competitive advantage
- Transition
- Managing Multiple Business Models

The framework assigns the activities presented in Section 4.2 and the challenges discussed in Section 4.3 to the steps synthesised in Section 4.1. Since these sections are an overview rather than a comprehensive list of all items mentioned by all publications on the topic, this framework provides a theoretical basis for the empirical investigation to follow, rather than a comprehensive framework in itself.

Sustainability focused elements can only be found in the activities and challenges of this framework. This is expected, because of the nature of the relationship between conventional and sustainability focused business model innovation and the gaps in the sustainable business model innovation toolkit, discussed at the beginning of this chapter. There is no framework in the literature that has modified the steps to include sustainability with the exception of Rana et al. (2013). This paper, however, equates tools with steps, which poses a range of conceptual issues. For example, if all tools identified in this review would be equated with steps, this would lead to a process with a considerably higher number of steps than any of the reviewed while still omitting important aspects of the process that are not tool-based.

The sustainable business model innovation activities identified are only covering aspects in the first two steps of the process, which hints at both the immaturity of existing approaches as well as the necessity for a comprehensive process framework. Thus, it indicates a research need in this area and seems to further confirm the research gap.

A clear-cut assignment of activities and challenges seems difficult purely on contextual information in the literature, because of severe differences

between authors. As far as these differences are based on evidence, this can hint at an iterative nature of the process. However, this can also confirm an insufficient grounding in evidence, as outlined in Section 3.6.

Challenges in the literature often affect the entire process or prevent it from being initiated. However, for the hypothetical nature of this preliminary framework the challenges were assigned to different phases. To a lesser extent, this also applies to the activities. While these were clearly assigned to steps by most authors, the assignments varied between authors and tools were assigned to several steps at once. This can indicate activities performed during or repeated at several steps.

There are few activities and no challenges for prototyping, experimentation, and piloting, while the importance of these steps is stressed by most authors who include these elements, e.g. Osterwalder and Pigneur (2010) or Frankenberger et al. (2013). This hints at a particular research need and gap concerning the three concepts. This is compounded by the conceptual ambiguity and undifferentiated use of the three notions across different authors. For example, Frankenberger et al. (2013) seem to equate all three concepts to a certain extend and Osterwalder and Pigneur (2010) call their filled-in Business Model Canvas tool a prototype.

5. Three-stage analysis

As discussed in Section 2.1, the empirical part of this research is based on the theoretical framework version three developed in the last section (0) of the previous chapter and is structured in three phases according to the research tool employed.

This chapter describes the data gathered on the sustainable business model innovation process framework for each of the employed research tools: (1) focus groups in Section 5.1; (2) company interviews in Section 5.2; and (3) participation in the business model innovation process in Section 5.3, before concluding this chapter in Section 5.4.

5.1 Process in focus groups (Framework version 1)

As described in Section 2.3, two focus groups were conducted in conference rooms at the Institute for Manufacturing in Cambridge. The first group (F1) was especially invited for this research and consisted of five management consultants. The second group (F2) was part of an industry consortium and consisted of five participants from four non-competing multinationals from different industries. The first focus group was facilitated by the author and his supervisor and lasted four hours, the second was facilitated by the author alone and lasted two hours.

Both groups' discussions were based on slightly adapted versions of the framework poster, illustrated in Appendix B and documented through participant sticky notes, audio recordings, and field notes. As in the subsequent steps, the data was coded and consolidated along three lines: (1) steps, (2) activities, and (3) challenges of the business model innovation

process. Aspects about implementation and sustainability were also considered and are referred to where appropriate.

This section presents (1) the process steps, (2) key activities, and (3) challenges identified in the two focus group sessions, before it provides (4) a synthesis, leading to framework version 1 as an input for the second research step, based on qualitative interviews, whose results are illustrated in the following section.

5.1.1 Process steps

As illustrated in Table 24, the eight steps of framework version 0 can be confirmed and refined, and an additional pre-step, '0. Why BM innovation?' is added.

Table 24: Steps identified in focus groups

#	Name	Comparison framework v0	Description	Mentioned by
0	Why BM innovation?	Added	A common understanding of the purpose and value of the business model innovation activities is established, and the business model innovation process is planned	F1, F2
1	Ideation	Confirmed	Ideas are generated, prioritised, and selected. A value proposition is formulated.	F1, F2
2	Concept Design	Confirmed	A business model concept comprising the value proposition, value creation and delivery, and the value capture elements of the business model is defined.	F1, F2
3	Prototyping	Confirmed	The business model concept is prototyped to find conceptual gaps, establish a common understanding, and communicate it to other stakeholders.	F1, F2
4	Experimenting	Confirmed	Key assumptions and success factors are tested with experiments.	F1, F2
5	Detail design	Confirmed	The different elements of the concept are defined and analysed in detail.	F1, F2
6	Piloting	Confirmed	The new business model is introduced and analysed in parts of the target market.	F1, F2
7	Launch	Confirmed	The new business model is launched in the target market.	F1, F2
8	Adjustment & diversification	Confirmed	The business model is continuously analysed and adapted to changes in organisational strategy and environment and new business models are developed, where adequate.	F1, F2

This pre-step was added because the rationale for business model innovation seemed not to be clearly established (F1), requiring to foster awareness for what it is and why it is necessary (F2) at the beginning or before the business model innovation process. While products that fail are expected and R&D departments will not be closed, high necessary failure rates of business model innovation departments might lead to abandoning these activities and closing these departments (F1).

There was also a discussion around the rationale for consolidating steps with particular high degrees of iteration, especially concept design and prototyping as well as detail design and experimenting. This discussion was brought up by F1 and discussed with F2. As outlined in the next section, Section 5.2, the subsequent qualitative interviews backed this hypothesis.

5.1.2 Key activities

The activities identified for the different steps in the focus groups are illustrated in Table 25. Please note that, potentially due to the naming of step 0 as a question, the items listed by participants of F2 for step 0 have a purpose rather than an activities scope.

Table 25: Activities identified in the focus groups

Step	Associated activities	Comments	Mentioned
0. Why BM innovation?	▪ Discuss why business model rather than e.g. product innovation		F1
	▪ Agree purpose		F1
	▪ Assessment questionnaire		F1
	▪ Scenario planning		F1
	▪ Align KPIs		F1
	▪ Ongoing customer interaction	Describes purpose	F2
	▪ Align with customer needs	Describes purpose	F2
	▪ Increase revenues	Describes purpose	F2
	▪ Beat competition	Describes purpose	F2
	▪ Identify new opportunity	Describes purpose	F2
	▪ Lower customer CAPEX	Describes purpose	F2
	▪ Develop to other type of business	Describes purpose	F2
	▪ Reduce cost/remove middle man	Describes purpose	F2
	▪ Explore new ways of working	Describes purpose	F2
	▪ Feedback	Describes purpose	F2
	▪ Increase customer intimacy	Describes purpose	F2

1. Ideation	▪ Stakeholder definition	F1
	▪ Value mapping/ ideation, including customer gains and pains identification	F1
	▪ Sustainable value analysis	F1
	▪ Benchmarking with competitors and start-ups	F1
	▪ Sponsor/management buy-in	F2
	▪ Story boards	F2
	▪ Customer role play	F2
	▪ Deep dive ethnography/empathy with users	F2
	▪ Value stream mapping	F2
	▪ Customer engagement/interviews	F2
	▪ Field representatives' feedback	F2
	▪ Analysis of macro and market trends	F2
	▪ Brainstorming	F2
	▪ What if scenarios	F2
	▪ Related worlds/analogies	F2
	▪ Competitor analysis	F2
	▪ Workshops/value capture feedback	F2
	▪ Value proposition canvas	F2
	▪ Value identification/STIM	F2
	▪ Value stream mapping	F2
	▪ 9 Box Thinking	F2
	▪ TRIZ	F2
	▪ Brainstorm metrics	
2. Concept Design	▪ Integration of ideas	F1
	▪ Discussion of technological & general trends	F1
	▪ Market test/ feedback of potential customers	F1
	▪ Definition of value creation, delivery, and capture system/ business model (BM) elements/dimensions	F1
	▪ Stakeholder clarification	F1
	▪ Business plan	F1
	▪ Market analysis	F2
	▪ Scenario mapping	F2
	▪ Materials/ skills to develop	F2
	▪ Select customers for trials	F2
	▪ Design reviews	F2
	▪ IP review/strategy	F2
	▪ Define format/how to create experience	F2
	▪ Link to here and now	F2
	▪ Stimulate imagination	F2
	▪ Communicate internally	F2
	▪ Obtain customer feedback	F2
	▪ Business model canvas	F2
3. Prototyping	▪ Benchmarking within industry	F1
	▪ Benchmarking with generic BM concepts	F1
	▪ Prototype building	F1
	▪ Prototype evaluation and selection	F1
	▪ Modelling and simulation	F1
	▪ Develop material and skills	F2
	▪ Lego serious play	F2
	▪ Design thinking	F2
	▪ Benchmarking	F2
	▪ Agile engineering practises	F2
	▪ Role play	F2
	▪ Design reviews	F2
	▪ Customer prototype feedback discussions	F2
4. Experimenting	▪ Identification & isolation of key variables to test	F1
	▪ Set metrics, timeframe & simple goals	F1
	▪ Design of experiment	F1
	▪ Execution of experiment	F1
	▪ Analysis and lessons learned	F1
	▪ Find right people/ expertise	F1
	▪ Trial implementation	F2
	▪ Mini pilot/test group	F2
	▪ Validate key assumptions	F2
	▪ Trial with key customers and business areas	F2
	▪ Data collection	F2
	▪ 50/50 Model Experiment	F2
	▪ Beta collaboration and seeding units	F2

	▪ Marketing experiments	F2
	▪ Simulation	F2
	▪ Lean Startup	F2
5. Detail design	▪ Detailed definition of all elements	F1
	▪ Initial business case (+iterations)	F1
	▪ Analytics	F1
	▪ Scale test	F1
	▪ Gaining funding for pilot	F1
	▪ Go back or proceed	F1
	▪ Risk and mitigation measure identification	F1
	▪ Product/market fit	F1
	▪ Contract writing	F2
	▪ Customer feedback	F2
	▪ Classical market research	F2
6. Piloting	▪ Planning of pilot	F1
	▪ Implementation	F1
	▪ Analysis	F1
	▪ Adjustments	F1
	▪ Documentation and communication	F1
	▪ Identification of failure modes	F1
	▪ Pricing	F1
	▪ Customer invoices	F1
	▪ Measuring success	F1
	▪ Selling	F1
	▪ Setting up scale cycles	F1
	▪ Identify market segments	F2
	▪ Validate in sub-market	F2
	▪ Convert one customer group	F2
	▪ Test cases	F2
	▪ Whole operations ready	F2
	▪ User awareness and training	F2
	▪ Collect feedback and improve	F2
	▪ Customer interviews	F2
	▪ Pilot tests	F2
7. Launch	▪ Realisation planning	F1
	▪ Implementation	F1
	▪ Divest for speed	F1
	▪ Launch metrics success/ growth	F1
	▪ Update internal support systems, management accounts, recruiting, etc.	F1 F1
	▪ Sales force education	F1
	▪ Business scale/change management	F1
	▪ Marketing programme	F1
	▪ Coordination and (re-)contracting with supply chain partners	F1
	▪ Internal communication	F2
	▪ Employee engagement/ enthusiasm	F2
	▪ Follow-up/ expanding pilot offer	F2
	▪ Scale up	F2
	▪ Onboard key customers	F2
	▪ Set up business systems	F2
	▪ Scale down other activities/ practices	F2
	▪ Commercialisation	F2
	▪ Marketing material generation	F2
	▪ Prepare company capabilities	F2
	▪ Train staff	F2
	▪ Hiring and promotion	F2
	▪ Agree new KPIs	F2
	▪ Stage gates	F2
	▪ Roadmapping	F2
	▪ Lean Manufacturing	F2
	▪ Lean startup	F2
	▪ Project management	F2
	▪ Business case	F2
	▪ Benchmark	
8. Adjustment and diversification	▪ Monitoring	F1
	▪ Reflection	F1
	▪ Adjustment	F1
	▪ Scale-up	F1
	▪ Diversification	F1

▪ Iteration of the business model innovation process	F1
▪ Adaption of talent development model	F1
▪ Lessons learned/ Knowledge management	F1
▪ Learning	F2
▪ Feedback, regular reviews and discussions	F2
▪ Localise to different customer groups/geographies	F2
▪ Establish modus operandi and standard operation procedures/policies	F2
▪ Benchmark	F2
▪ Customer review/feedback	F2
▪ Market analysis	F2
▪ Value capture matrix	F2
▪ Foresight activities	

Compared to the literature, some additional activities were identified for the added step, which was not included in the literature. Also, a considerable number of activities could be identified for prototyping, experimenting, and piloting, where the reviewed literature is quite restricted. This reflects the emphasis that the focus group participants put on the importance of the three concepts. There are also considerably more items listed for the launch phase. This also reflects that this step was seen as particularly challenging by both focus groups.

Business model innovation and other management tools were also mentioned by the participants. The ambiguity between activities and tools that was identified in the literature review, also became apparent in the behaviour of both focus groups' participants.

Of the sustainable business model innovation tools, only Value Mapping and the Value Ideation tools were mentioned. Overall, sustainability considerations are not informing most of the activities listed and participants seemed mostly concerned with making the process work in the first place, especially for the launch phase.

5.1.3 Key challenges

The challenges identified by the focus groups are listed in Table 26 for each step of the process. As in the last two sections (5.1.1 and 5.1.2) additional items were added for step 0, 'Why business model innovation?'.

Table 26: Key challenges identified in the focus groups

Step	Associated challenges	Mentioned by
0. Why BM innovation?	▪ Puts demands to the top management as opposed to product development	F1
	▪ Even expected/desirable early failures can lead to abortion of BM innovation activities	F1
	▪ Managerial complacency	F1
	▪ Inexperience/lack of access to experts	F1
	▪ Too much other stuff going on	F1
	▪ Budgeting	F1
	▪ Organisational delegation/ accountability	F1
	▪ High uncertainty of success	F1
	▪ Inability to smell that the deck is burning	F1
	▪ Predicting demand	F2
	▪ Funding/investments	F2
	▪ Metrics	F2
	▪ Access to data	F2
	▪ Customer responses/readiness	F2
	▪ New/different practices	F2
	▪ Structural incumbency	F2
	▪ Setting targets	F2
	▪ Mind set and people involved	F2
	▪ Making the transition	F2
	▪ Customer acceptance to change	F2
	▪ Pricing	F2
	▪ Driving change internally	F2
	▪ Business parameter enlargement	F2
	▪ Implementing new model without disruption	F2
	▪ Relationship with current customers, supply chain, partners	F2
	▪ Design capabilities for new market	F2
	▪ Steering committee	F2
1. Ideation	▪ Failed identification of opportunities	F1
	▪ Failed identification of important stakeholder	F1
	▪ Failure to integrate top management from the beginning	F1
	▪ Lack of ambition/ innovativeness	F1
	▪ Quantity & quality of ideas	F1
	▪ Assessment and evaluation of ideas	F1
	▪ Diverse & conflicting opinions & expertise	F1
	▪ Identification of influencers & opponents	F1
	▪ Deciphering user feedback	F2
	▪ Too many opinions	F2
	▪ Selling the vision to users/resistance	F2
	▪ Getting people together	F2
	▪ Access to customers/end users	F2
	▪ Identifying stakeholders	F2
	▪ Thinking outside routine	F2
	▪ Constrained thinking/ embedded in current model	F2
	▪ Assuming what your customers' needs	F2
	▪ Company capabilities	F2
	▪ Unknown unknowns	F2
2. Concept design	▪ Insufficient mutual understanding	F1
	▪ Insufficient understanding of the boundaries of the company's capabilities to innovate	F1
	▪ Communication failures	F1
	▪ Falling in love with an idea	F1
	▪ Business case/ expectation management	F1
	▪ Customer identification	F1
	▪ Too narrow consultation/view on market potential	F1
	▪ Lack of customer/ user engagement	F1
	▪ Managing customer/supplier expectations	F2
	▪ Dedicating resources	F2
	▪ Concept validation	F2
	▪ Understanding stakeholders	F2
	▪ Internal alignment	F2
	▪ Managing supply chain changes	F2
	▪ Unknown unknowns	F2
	▪ Internal communication	F2
	▪ Criteria for success	F2

3. Prototyping	▪ Internal marketing, especially to decision makers	F1
	▪ Key people leave the business	F1
	▪ Investment	F1
	▪ Selecting the right concepts	F1
	▪ Who to demonstrate concept to?	F2
	▪ Involve right people	F2
	▪ Capturing feedback	F2
4. Experimenting	▪ Suboptimisation	F1
	▪ Some items are hard to test/part-develop	F1
	▪ No experiments	F1
	▪ Methodological issues/ biases	F1
	▪ Capabilities/skills/expertise to conduct experiments	F1
	▪ Multi-organisation/ collaboration issues	F1
	▪ Define interactions/goals	F1
	▪ Identify metrics for success	F2
	▪ Complex interactions and trade-offs	F2
	▪ Learning/feedback capturing	F2
	▪ Access to skills/resources to make MVP	F2
5. Detail design	▪ Missing information/ insufficient documentation	F1
	▪ Poor understanding of risk of decision makers	F1
	▪ System level change would be required for implementation	F1
	▪ Large corporate thinking vs start-up mind-set	F1
	▪ Compromising on ideas that actors have fallen in love with	F1
	▪ Ownership, keeping up momentum	F1
	▪ Realisation that numbers are smaller than expected	F1
	▪ Too narrow expertise	F1
	▪ Easy to fall back into comfort zone	F1
	▪ Finance	F2
	▪ Keeping momentum	F2
	▪ Non-obvious/unexpected value capture	F2
	▪ Setting KPIs	F2
6. Piloting	▪ No pilots	F1
	▪ Unrealistic setting	F1
	▪ Too much effort	F1
	▪ Ability to learn	F1
	▪ Protect minority culture	F1
	▪ Clash between existing and required organisational systems	F1
	▪ Brand safe space to pivot/ management of reputational risks	F1
	▪ Late discovery of issues/ delays/ late consultation	F1
	▪ Getting/ keeping/ growing customers right	F1
	▪ Pilot partnerships	F1
	▪ Clarity about success criteria	F1
	▪ Set up work to facilitate pilot activities	F2
	▪ Unplanned scenarios or use cases	F2
	▪ Critical mass	F2
	▪ Managing change	F2
	▪ Set up internal infrastructure e.g. services	F2
	▪ Market infrastructure	F2
	▪ Security/IP	F2
7. Launch	▪ Insufficient information about failure modes	F1
	▪ Insufficient funding	F1
	▪ Inadequate time-frame/ expectations	F1
	▪ Communication issues	F1
	▪ Keep analysing	F1
	▪ Keeping the media (City) on side	F1
	▪ Risk of fast followers	F1
	▪ Loss of customers	F1
	▪ Attempts to satisfy 100% of current customers	F1
	▪ Changes in top management	F1
	▪ Low ROI	F1
	▪ Need to be risk free	F1
	▪ The problem we started to solve has changed	F1
	▪ Brand risk	F1
	▪ Dismantling of the old business model	F1
	▪ Timescale for "launch" is too long	F1
	▪ Inability to manage change/ bring organisation along	F1
	▪ Setting targets	F2
	▪ Accountability	F2
	▪ Timing	F2

	▪ Finance change	F2
	▪ Have the right support and infrastructure	F2
	▪ IT	F2
	▪ Tracking success	F2
	▪ Learning/continuous improvement	F2
	▪ Company behaviours	F2
	▪ Customers interacting with new offer	F2
	▪ Brand issues	F2
8. Adjustment & diversification	▪ Premature, too late or too little adjustment	F1
	▪ Inadequate diversification (agent motivations, missing core competencies, no ownership advantage, …)	F1 F1
	▪ Unexpected adjustment wins business case	F1
	▪ Organisational debt	F1
	▪ Transition from minority culture to majority culture	F1
	▪ Feedback channels back to design	F2
	▪ Sustaining KPIs	F2
	▪ Centralisation vs decentralisation	F2
	▪ Willingness to adjust	F2
	▪ Timing	F2

Considerably more challenges were listed than were identified in the literature for framework version 0. This is especially true for prototyping, experimenting, and piloting, where no items were included in the initial framework. Participants stressed the importance of the three concepts, but also that they have little experience in these areas in their respective companies.

Furthermore, considerably more challenges are listed in the launch phase, which is the step with the most challenges associated to it. This also reflects that it was seen as a particularly challenging step by both focus groups.

Sustainability considerations are not explicitly mentioned. However, many challenges are applicable to sustainability focused activities as well. For example, getting people together (F2) is a challenge for integrating the right stakeholders into the Value Mapping process and the outcomes can be devalued by a failure to integrate the top management from the beginning (F1).

5.1.4 Synthesis

This section presents a synthesis of the previous three sections into one coherent framework, framework version 1. This framework is presented in Table 27.

Table 27: Framework version 1 as table

Step	Activities	Challenges
0. Why BM innovation?	▪ Discuss why business model rather than e.g. product innovation ▪ Agree purpose ▪ Assessment questionnaire ▪ Scenario planning ▪ Align KPIs ▪ Ongoing customer interaction ▪ Align with customer needs ▪ Increase revenues ▪ Beat competition ▪ Identify new opportunity ▪ Lower customer CAPEX ▪ Develop to other type of business ▪ Reduce cost/remove middle man ▪ Explore new ways of working ▪ Feedback ▪ Increase customer intimacy	▪ Puts demands to the top management as opposed to product development ▪ Even expected/desirable early failures can lead to abortion of BM innovation activities ▪ Managerial complacency ▪ Inexperience/lack of access to experts ▪ Too much other stuff going on ▪ Budgeting ▪ Organisational delegation/ accountability ▪ High uncertainty of success ▪ Inability to smell that the deck is burning ▪ Predicting demand ▪ Funding/investments ▪ Metrics ▪ Access to data ▪ Customer responses/readiness ▪ New/different practices ▪ Structural incumbency ▪ Setting targets ▪ Mind set and people involved ▪ Making the transition ▪ Customer acceptance to change ▪ Pricing ▪ Driving change internally ▪ Business parameter enlargement ▪ Implementing new model without disruption ▪ Relationship with current customers, supply chain, partners ▪ Design capabilities for new market ▪ Steering committee
1. Ideation	▪ Stakeholder definition ▪ Value mapping/ ideation, including customer gains and pains identification ▪ Sustainable value analysis ▪ Benchmarking with competitors and start-ups ▪ Sponsor/management buy-in ▪ Story boards ▪ Customer role play ▪ Deep dive ethnography/empathy with users ▪ Value stream mapping ▪ Customer engagement/interviews ▪ Field representatives' feedback	▪ Failed identification of opportunities ▪ Failed identification of important stakeholder ▪ Failure to integrate top management from the beginning ▪ Lack of ambition/ innovativeness ▪ Quantity & quality of ideas ▪ Assessment and evaluation of ideas ▪ Diverse & conflicting opinions & expertise ▪ Identification of influencers & opponents ▪ Deciphering user feedback ▪ Too many opinions ▪ Selling the vision to users/resistance

	▪ Analysis of macro and market trends	▪ Getting people together
	▪ Brainstorming	▪ Access to customers/end users
	▪ What if scenarios	▪ Identifying stakeholders
	▪ Related worlds/analogies	▪ Thinking outside routine
	▪ Competitor analysis	▪ Constrained thinking/ embedded in current model
	▪ Workshops/value capture feedback	▪ Assuming what your customers' needs
	▪ Value proposition canvas	▪ Company capabilities
	▪ Value identification/STIM	▪ Unknown unknowns
	▪ Value stream mapping	
	▪ 9 Box Thinking	
	▪ TRIZ	
	▪ Brainstorm metrics	
2. Concept design	▪ Analyse customer needs and technological and general trends	▪ Insufficient mutual understanding
	▪ Integration of ideas	▪ Insufficient understanding of the boundaries of the company's capabilities to innovate
	▪ Discussion of technological & general trends	▪ Communication failures
	▪ Market test/ feedback of potential customers	▪ Falling in love with an idea
	▪ Definition of value creation, delivery, and capture system/ business model (BM) elements/dimensions	▪ Business case/ expectation management ▪ Customer identification ▪ Too narrow consultation/view on market potential
	▪ Stakeholder clarification	
	▪ Business plan	▪ Lack of customer/ user engagement
	▪ Market analysis	▪ Managing customer/supplier expectations
	▪ Scenario mapping	▪ Dedicating resources
	▪ Materials/ skills to develop	▪ Concept validation
	▪ Select customers for trials	▪ Understanding stakeholders
	▪ Design reviews	▪ Internal alignment
	▪ IP review/strategy	▪ Managing supply chain changes
	▪ Define format/how to create experience	▪ Unknown unknowns
	▪ Link to here and now	
	▪ Stimulate imagination	
	▪ Communicate internally	
	▪ Obtain customer feedback	
	▪ Business model canvas	
3. Prototyping	▪ Benchmarking within industry	▪ Internal marketing, especially to decision makers
	▪ Benchmarking with generic BM concepts	▪ Key people leave the business
	▪ Prototype building	▪ Investment
	▪ Prototype evaluation and selection	▪ Selecting the right concepts
	▪ Modelling and simulation	▪ Who to demonstrate concept to?
	▪ Develop material and skills	▪ Involve right people
	▪ Lego serious play	▪ Capturing feedback
	▪ Design thinking	
	▪ Benchmarking	
	▪ Agile engineering practises	
	▪ Role play	
	▪ Design reviews	
	▪ Customer prototype feedback discussions	
4. Experimentation	▪ Identification & isolation of key variables to test	▪ Suboptimisation
	▪ Set metrics, timeframe & simple goals	▪ Some items are hard to test/part-develop
	▪ Design of experiment	▪ No experiments
	▪ Execution of experiment	▪ Methodological issues/ biases
	▪ Analysis and lessons learned	▪ Capabilities/skills/expertise to conduct experiments
	▪ Find right people/ expertise	▪ Multi-organisation/ collaboration issues
	▪ Trial implementation	▪ Define interactions/goals
	▪ Mini pilot/test group	▪ Identify metrics for success
	▪ Validate key assumptions	▪ Complex interactions and trade-offs
	▪ Trial with key customers and business areas	▪ Learning/feedback capturing

	▪ Data collection ▪ 50/50 Model Experiment ▪ Beta collaboration and seeding units ▪ Marketing experiments ▪ Simulation ▪ Lean Startup	▪ Access to skills/resources to make MVP
5. Detail design	▪ Detailed definition of all elements ▪ Initial business case (+iterations) ▪ Analytics ▪ Scale test ▪ Gaining funding for pilot ▪ Go back or proceed ▪ Risk and mitigation measure identification ▪ Product/market fit ▪ Contract writing ▪ Customer feedback ▪ Classical market research	▪ Missing information/ insufficient documentation ▪ Poor understanding of risk of decision makers ▪ System level change would be required for implementation ▪ Large corporate thinking vs start-up mind-set ▪ Compromising on ideas that actors have fallen in love with ▪ Ownership, keeping up momentum ▪ Realisation that numbers are smaller than expected ▪ Too narrow expertise ▪ Easy to fall back into comfort zone ▪ Finance ▪ Keeping momentum ▪ Non-obvious/unexpected value capture ▪ Setting KPIs
6. Piloting	▪ Planning of pilot ▪ Implementation ▪ Analysis ▪ Adjustments ▪ Documentation and communication ▪ Identification of failure modes ▪ Pricing ▪ Customer invoices ▪ Measuring success ▪ Selling ▪ Setting up scale cycles ▪ Identify market segments ▪ Validate in sub-market ▪ Convert one customer group ▪ Test cases ▪ Whole operations ready ▪ User awareness and training ▪ Collect feedback and improve ▪ Customer interviews ▪ Pilot tests	▪ No pilots ▪ Unrealistic setting ▪ Too much effort ▪ Ability to learn ▪ Protect minority culture ▪ Clash between existing and required organisational systems ▪ Brand safe space to pivot/ management of reputational risks ▪ Late discovery of issues/ delays/ late consultation ▪ Getting/ keeping/ growing customers right ▪ Pilot partnerships ▪ Clarity about success criteria ▪ Set up work to facilitate pilot activities ▪ Unplanned scenarios or use cases ▪ Critical mass ▪ Managing change ▪ Set up internal infrastructure e.g. services ▪ Market infrastructure ▪ Security/IP
7. Launch	▪ Realisation planning ▪ Implementation ▪ Divest for speed ▪ Launch metrics success/ growth ▪ Update internal support systems, management accounts, recruiting, etc. ▪ Sales force education ▪ Business scale/change management ▪ Marketing programme ▪ Coordination and (re-)contracting with supply chain partners ▪ Internal communication ▪ Employee engagement/ enthusiasm ▪ Follow-up/ expanding pilot offer ▪ Scale up ▪ Onboard key customers ▪ Set up business systems ▪ Scale down other activities/ practices ▪ Commercialisation	▪ Insufficient information about failure modes ▪ Insufficient funding ▪ Inadequate time-frame/ expectations ▪ Communication issues ▪ Keep analysing ▪ Keeping the media (City) on side ▪ Inability to manage change/ bring organisation along ▪ Risk of fast followers ▪ Loss of customers ▪ Attempts to satisfy 100% of current customers ▪ Changes in top management ▪ Low ROI ▪ Need to be risk free ▪ The problem we started to solve has changed ▪ Brand risk ▪ Dismantling of the old business model ▪ Timescale for "launch" is too long ▪ Setting targets ▪ Accountability

	▪ Marketing material generation ▪ Prepare company capabilities ▪ Train staff ▪ Hiring and promotion ▪ Agree new KPIs ▪ Stage gates ▪ Roadmapping ▪ Lean Manufacturing ▪ Lean startup ▪ Project management ▪ Business case ▪ Benchmark	▪ Timing ▪ Finance change ▪ Have the right support and infrastructure ▪ IT ▪ Tracking success ▪ Learning/continuous improvement ▪ Company behaviours ▪ Customers interacting with new offer ▪ Brand issues
8. Adjustment and diversification	▪ Monitoring ▪ Reflection ▪ Adjustment ▪ Scale-up ▪ Diversification ▪ Iteration of the BMI process ▪ Adaption of talent development model ▪ Lessons learned/ Knowledge management ▪ Learning ▪ Feedback, regular reviews and discussions ▪ Localise to different customer groups/geographies ▪ Establish modus operandi and standard operation ▪ procedures/policies ▪ Benchmark ▪ Customer review/feedback ▪ Market analysis ▪ Value capture matrix ▪ Foresight activities	▪ Premature, too late or too little adjustment ▪ Inadequate diversification (agent motivations, missing core competencies, no ownership advantage, … ▪ Unexpected adjustment wins business case ▪ Organisational debt ▪ Transition from minority culture to majority culture ▪ Feedback channels back to design ▪ Sustaining KPIs ▪ Centralisation vs decentralisation ▪ Willingness to adjust ▪ Timing

Analogous to framework version 0 and all subsequent versions, this framework assigns the activities presented in Section 5.1.2 and the challenges discussed in Section 5.1.3 to the steps synthesised in Section 5.1.1. Besides providing an overview of the results of the conducted focus groups, this framework provides an input for the subsequent research method, qualitative interviews, in Section 5.2.

The focus groups confirmed the steps identified in the literature, although the participants asked to add a pre-step to determine the purpose and scope of the organisation's business model innovation activities and create awareness with key stakeholders.

Analogous to the conceptual framework, framework version 0, sustainability focused elements can only be found in the activities and challenges rather

than the steps. This is expected, because of the nature of the relationship between conventional and sustainability focused business model innovation and the gaps in the sustainable business model innovation toolkit, as outlined in Section 4.4.

As in the literature, the sustainable business model innovation activities identified are only covering aspects in the first two steps of the process. As in the literature, the participants focused on tools that aim at integrating sustainability into the business model innovation process.

The assignment of activities and challenges to steps did not seem to be particularly difficult for the focus group participants, although there was some discussion among the participants. Participants also mentioned that some activities and challenges can be assigned to several steps at once. The discussions also emphasised that process iterations play an important role not captured in the linear nature of process in the literature.

Compared to the literature, the number of activities and challenges for prototyping, experimentation, and piloting was quite significant. In fact, it was comparable to most other steps. This confirms the importance of this steps for practitioners and points at a conceptual underdevelopment in the literature. While each participant seemed to be able to distinguish the three concepts to a degree that allowed them to assign activities and challenges to them, the discussion revealed different understandings between the participants. This hints at conceptual ambiguity in the industrial practice.

Furthermore, estimated durations for each phase and standardised milestones between steps seemed desirable information for participants.

5.2 Process in qualitative interviews (Framework version 2)

As described in Section 2.4, 61 interviews were conducted with 24 organisations. All of the interviewees were involved or had an overview of the

business model innovation activities of the case company. This included top management representatives, senior figures in innovation and business development, heads of business model innovation and corporate strategy departments, and business model innovation project teams. This, for example, included a CEO, two CTO, a Head of Business Development, and several Partners at consultancies.

The case companies are all large corporations or subsidiaries from a range of different industries, including automotive, oil and gas, high-tech, and aerospace. The interviews were conducted in five different countries on three continents: Spain, China, UK, Germany, Netherlands, and USA. The interviews were conducted in person where possible or over phone or videoconferencing software like Cisco WebEx or Microsoft Skype where not.

The cases included in this research range from ideal cases for this research, like C13–which has a dedicated business model department exclusively concerned with business model innovation–to C5–where, while there was evidence of business model innovation activity, it was not formalised. An overview of all cases is provided in Table 10 in Section 2.4

Altogether around 63 hours of interviews were conducted. While every interview lasted at least one hour, some lasted three or more, sometimes interrupted by events like lunch breaks or company tours. Most interviews were conducted with one person at a time, but some interviews were conducted with two (C2, C22, C24), three (C14, C15) or more (C1, C9) interviewees at once. Colleagues who acted as translators or fixers were present during the interviews with C1, C2, C3, C4, C6, C7, and C16, and one interview, with C5, was conducted by the author's supervisor.

All interviews were based on slightly adapted versions of the interview guide, illustrated in Appendix D and documented through audio recordings and field notes. As in the previous step, the data was coded and consolidated along three lines: (1) steps, (2) activities, and (3) challenges of the business model

innovation process. Aspects about implementation and sustainability were also considered and are referred to where appropriate.

Different from the previous step, attribution of activities to steps and the revision of steps turned out to be iterative process. Due to the questions asked, the interviewees were less explicit about steps than activities and mostly did not attribute them consistently. For example, from different activities pointing towards piloting, piloting was deducted to be a step in the process; from activities being associated to this step and pointing towards a blurred line between scaling up pilots and launching the products or services, it was then inferred that the piloting and the launch step might be consolidated.

This section presents (1) the process steps, (2) key activities, and (3) challenges identified in the qualitative interviews, before it provides (4) a synthesis, leading to framework version 2 as an input for the third research step, based on participatory action research, whose results are illustrated in the following section

5.2.1 Steps

As illustrated in Table 28, based on the data gathered in the qualitative interviews, the eight steps of framework version 1 can be confirmed and refined. As a result of this refinement, the process is consolidated into five steps, again with one pre-step.

Table 28: Steps identified in the qualitative interviews

Number	Number in framework v1	Name	Description	Case examples
0	0	Motivation & Setup	A common understanding of the purpose and value of the business model innovation activities is established, and the business model innovation process is planned	C1, C3-23
1	1	Preparation & Ideation	A team is formed. Ideas are generated, prioritised, and selected. A value proposition is formulated.	C1-6, C9, C11-13, C15-24
2	2,3	Concept Design & Prototyping	A business model concept comprising the value proposition, value creation and delivery, and the value capture elements of the business model is defined and prototyped.	C1-6, C9-11, C13, C17-22, C24
3	4, 5	Detail Design & Experimenting	The different elements of the concept are defined and analysed in detail and key assumptions are tested.	C2, C4-11, C13, C14, C16-24
4	6, 7	Piloting & Launch	The new business model is introduced and analysed in parts of the target market. The new business model is launched, or the pilot is scaled to the entire target market.	C1-6, C9-12, C15, C17-22
5	8	Adjustment & Diversification	The business model is continuously analysed and adapted to changes in organisational strategy and environment and new business models are developed, where adequate.	C1, C3, C5, C6, C9, C10, C13, C17, C21, C22

The data indicates that the process is better described in five steps to capture the iterative and repetitive nature of process. The pre-step from the focus groups is retained.

The data confirms the steps identified in the literature and the pre-step added after the focus groups. The considerable organisational setup considerations and preparation activities conducted by the case organisations suggests that this should be reflected more explicitly in the process, so ‘setup’ was added to the pre-step and ‘preparation’ was added as a step. The data also suggest a high level of interdependency between preparation and ideation, conceptualisation and prototyping, detail design and prototyping, piloting and launch, and adjustment and diversification respectively. Therefore, these steps were consolidated. There are also interdependencies between the other steps, but these seem somewhat less pronounced.

5.2.2 Key activities

The activities identified in the qualitative interviews are illustrated in Table 29. Unlike in the previous steps, the items were consolidated due to the considerably higher number of data points, as illustrated in Section 2.4.

Table 29: Activities identified in the qualitative interviews

Step	Activity	Case examples	Sustainab. focus
0. Motivation & Setup	▪ Fostering entrepreneurship culture/mindset in the organisation	C1, C2, C9, C11, C16, C19, C22	
	▪ Surviving	C1, C7, C9	
	▪ Little space for innovation in core business	C1, C7	
	▪ Employee motivation and development	C1, C9, C19, C22	x
	▪ Opening to local/start-up ecosystem	C1, C19, C21, C22, C23	
	▪ Digitalisation/digital transformation	C9, C11, C12, C13, C15, C16 C17, C18, C19, C20, C21, C22, C23	
	▪ Servitisation	C3, C5, C9, C11, C13, C15, C16, C20, C21, C22, C23	
	▪ Personalisation	C17	
	▪ Becoming more lean/agile	C1, C9, C11, C19, C22	
	▪ Translating unspecific ideas into business	C1, C13, C20, C22	
	▪ Profit, revenues, costs	C1, C5, C7, C14, C18, C20, C22	(x)
	▪ Customer benefit, loyalty	C17, C18, C23	
	▪ Strategic goals/synergies	C8, C13	
	▪ Sustainability as part of the self-perception of the organisation	C8, C9, C10, C13, C17, C22	x
	▪ Sustainability as explicit part of the corporate strategy	C1, C9, C10, C13, C16, C17, C18, C22, C23	x
	▪ Aim at specific sustainability strategy like resource consumption, being climate neutral, being a good neighbour …	C3, C4, C6, C10, C17, C18, C22	x
	▪ BMI to implement/leverage sustainable technology	C3, C5, C6, C10, C16, C21, C22	x
	▪ Change the organisational/ industry ecosystem/supply chain/infrastructure for circular operations	C18	x
	▪ Change user mentality/behaviour	C8, C18	x
	▪ No-go areas like defence, tobacco, etc.	C13	x
	▪ Business units as internal clients	C1	
	▪ Workshop and process facilitators from BMID/DTO	C1, C13, C17, C19, C22	
	▪ External consultants and facilitators are hired on demand	C1, C9, C10, C17, C18, C22	
	▪ Mentoring through budget holders/sponsors/TM/c-suite	C1, C13, C22	
	▪ Dedicated funding for BMID	C13, C17, C18, C23	
	▪ Three support activities/parts of BMID team: business analysis, design & marketing, engineering and technical implementation	C13, C20	(x)
	▪ Process guidelines/elements from academia, using/curating existing standard tools	C1, C11, C12, C15, C16, C17	

	▪ BMID provide working spaces away from Bus/companies, links to the local start-up ecosystem, and their network	C19	
	▪ BMID organised as central service/staff department directly under c-suite/foundation/headquarters, sometimes adjunct to strategy department	C13, C20	
	▪ Coordination organic growth, M&A, joint venture	C13	x
1. Preparation & Ideation	▪ Internal call/competition/campaign	C1, C13, C22	
	▪ Communication and selection event	C1, C19, C22	
	▪ Pre-ideation/ideas from BU/external clients/scout/employees	C1, C2, C3, C4, C6, C9, C12, C13, C15, C17, C18, C19, C20, C22, C23	
	▪ Application/proposal form/template	C1, C13, C22	
	▪ Pitch to top management	C2, C9, C13, C18, C19, C21, C22, C23	
	▪ Prioritisation process/portfolio planning/translation of strategy	C1, C2, C9, C24	
	▪ Top management decision/idea selection	C1, C2, C9, C24	
	▪ Development of good ideas not adequate for the programme at other BU's/multigenerational plans/determine whether somebody else can do it better	C1, C13, C20, C22	
	▪ Team formation/selection through BU/external client, sometimes advised through BMID	C1, C2, C11, C12, C13, C15, C19, C20	
	▪ Hire/recruit team/support staff	C6, C17, C18, C20, C21	
	▪ Self-forming teams	C1, C13, C22	
	▪ Identification of opportunities/portfolio gaps/new business areas	C2, C5, C9, C13, C19, C21, C22	
	▪ Visit/bring in internal clients/customer/clients/other stakeholders/proxies for stakeholders, external team mates	C5, C11, C18, C21, C22	x
	▪ Value mapping	C5	x
	▪ Set sustainability targets	C9	x
	▪ Sustainability ideation workshop	C17, C18	
	▪ (Post-) ideation to expand initial ideas	C2, C5, C11, C12, C13, C15, C16, C17, C18, C19, C20, C21	
	▪ Awareness building, endgame scenarios with c-suite	C19	
	▪ Initiation, kick-off meeting, building initial momentum with team	C9, C19, C20	
	▪ Customer needs/demands/pain points identification	C11, C13, C21, C20, C22	
	▪ Find sponsor/executive level buy-in/partners/funding	C2, C4, C13, C20, C22, C24,	
2. Concept-ualisation & Prototyping	▪ Incubation phase/programme: transition from idea to concept	C1, C2, C4, C13, C24	
	▪ Proposal/business plan/case development/solution description	C2, C4, C9, C13, C21, C22	
	▪ Design Thinking process	C11, C21, C20	
	▪ Problem definition/challenge description	C2, C22	
	▪ Concept/prototype presentation/pitch to top management/investors committee	C2, C3, C4, C5, C6, C9, C13, C18, C22	
	▪ Prototype building/development and testing	C2, C6, C11, C17, C18, C19, C20, C22	
	▪ Business model canvas	C2, C5, C19, C21	
	▪ Collaboration with academia/teams who do similar work	C10, C20 C21	
	▪ Face time with top management/mentors	C1, C6, C22	
	▪ Interview and observe customers/internal clients/workarounds and do workshops	C9, C11, C17, C20, C21	
	▪ Describe customer experience/develop customer journey/tell story	C20, C21	
	▪ Sell ideas internally	C18, C21	
3. Detail design & Experiment-ation	▪ Market research	C6, C8, C9, C10, C11, C13, C14, C16, C17, C18, C21, C24	
	▪ Top management/internal client reviews/milestones with clearly defined deliverables	C2, C7, C13, C22, C20	

	▪ Product/service/platform/MVP development/sprints/co-creation	C2, C4, C6, C9, C10, C11, C13, C17, C18, C20, C21, C22	
	▪ Project planning/management/break down, prioritise and assign tasks	C2, C6, C9	
	▪ Acceleration phase/programme: transition from concept to start-up	C6, C24	
	▪ Experiments/test with clients/end users/A-B-testing	C4, C11, C17, C18, C19, C20	
	▪ Business case/check-list/spreadsheet tools/due diligence process	C5, C9, C21, C22, C24, C20, C21	
	▪ Define partnerships/supply chain networks/production planning	C4, C5, C9, C18, C21	
	▪ Internal and external consultants/legal, commercial and financial advice	C5, C9, C20, C21, C22, C24	
	▪ Financial planning/feasibility studies	C5, C9, C21	
	▪ Digital simulation of business models	C22	
	▪ Definition of spin-off configuration	C22	
	▪ Benchmarking	C9, C17, C23	
4. Piloting & Launch	▪ Spin-off of projects as (semi-) independent start-ups/subsidiaries owned by founders and parent organisation	C1, C22	
	▪ Hand over to business units/internal clients/hand-off period	C2, C11, C12, C15, C19, C20, C21	
	▪ Run it within the BMID as a project	C4, C9, C17, C21	
	▪ Pilot	C2, C3, C6, C11, C17, C18, C19, C20, C21	
	▪ Contracting/negotiating/outsourcing to internal or external suppliers/implementation/production planning/framework agreements	C4, C5, C6, C9, C10, C18	
	▪ Lean Startup	C2, C11, C21	
	▪ Scale from pilot	C3, C6, C17, C18, C21	
	▪ Pre-launch advertisement	C4, C18	
	▪ Answer customer questions/establish aftersales service	C4, C6	
	▪ Re-join the corporate PLM process/address sustainability parameters	C22	x
5. Adjustment & Diversification	▪ Analysis of customer feedback/product optimisation and customisation	C6, C17, C21	
	▪ Customer feedback and requirements pool management	C6	
	▪ Pivot and expand products/services	C3, C10	
	▪ Develop platform/databases/add new layers to products/services	C5, C6, C21	
	▪ Diversify into similar applications	C6, C21	
	▪ Add services to products	C1	
	▪ Portfolio management	C9	
	▪ Improve BMI process based on learnings	C9, C13, C21, C22	

x – Applies; (x) – Partly applies, e.g. based on specific focus of the activity in each case

This and the consolidation of steps as described in the previous section (4.2.1) led to a lower overall number of activities being listed than for the focus groups.

Unlike for the previous research methods, the number of activities is decreasing from step to step. This could indicate a lack of experience and knowledge with later phases of the process, for example due to the novelty of the programme or high failure rates between the steps. But it could also

be due to the research method, as the process was described sequentially, so participant concentration might have declined towards the later stages or the interview had to be sped up due to time constraints.

The importance of prototyping, experimenting, and piloting were again stressed by the participants, although ambiguity remained on the scope, differences, and application of the three concepts, as in the focus groups.

The launch phase was again seen as particularly challenging by many participants (e.g. C1, C2, and C9). Some participants did not clearly divide between pilot and launch but rather scaled the pilot until the target market was covered (e.g. C8, C17, and C21).

Tools were also mentioned and the ambiguity between activities and tools was again apparent in the interviews. Some companies (e.g. C2, C11, and C20) followed standardised processes that prescribed certain tools at certain phases, either curated by the business model innovation department (e.g. C1, C20, ad C22) or based on input by external consultancies (e.g. C2 and C9).

Sustainability considerations played a considerable role in the motivation of the business model innovation activities (e.g. C1, C9, and C22). Activities with an explicit sustainability focus were mainly mentioned in the first step of the process, the preparation and ideation step (e.g. C5, C9, and C21) with a focus on stakeholder management (e.g. C5, C21, C22). Of the sustainable business model innovation tools, only Value Mapping was mentioned by C5.

5.2.3 Key challenges

The challenges mentioned in the qualitative interviews are illustrated in Table 30. As with the activities, the items were consolidated due to the considerably higher number of data points resulting from the qualitative interviews compared to the focus groups and the participatory action research.

Table 30: Challenges identified in the qualitative interviews

Step	Challenges	Case examples	Sustain-ability focus
0. Motivation & Setup	▪ Team works only part-time on project, keep line position	C1, C2, C13, C19, C20, C22, C24	
	▪ Reputation risk	C1, C3, C4, C18	(x)
	▪ Legal and regulatory risk perception, complexity, privacy and data protection issues, legal barriers	C1, C9, C13, C18	
	▪ Measuring success factors/intangible effects like culture difficult, appropriate KPIs	C1, C18, C21, C22	
	▪ No consistent process/toolkit or lack of implementation	C9, C19, C21, C22	
	▪ Stakeholder management	C1, C4, C9, C19, C20	
	▪ Resource and capability silos/cross-BU collaboration	C4, C9, C13, C16, C19, C20, C21, C22	(x)
	▪ Focus on operational efficiency	C1, C7, C19	
	▪ Digitalisation/Digital Transformation	C9, C16, C17, C18, C19, C20, C22, C23	
	▪ Awareness, sensibilisation	C1, C9, C19	
	▪ Entrenched/legacy process, mindsets, and culture, rigid hierarchies	C1, C7, C9, C17, C19, C20, C22	
	▪ Internal marketing to TM and BUs	C1, C9, C19, C20, C21	
	▪ Shelter from administrative tasks, line job/manager demands, focus on project	C1, C19, C20, C22	
	▪ Ownership, identification with project/team	C19, C21	
	▪ Openness, use of skills and ideas from external teams/partners	C13, C21, C22	
	▪ Active resistance/objectors within organisation	C1, C17, C22	
	▪ Small sustainability department, responsible for many projects	C22	x
	▪ No coordination with other BMI processes, like M&A	C22	
	▪ Most successful projects B2B, B2C difficult	C20, C22	
	▪ Issues with acceptance and reintegration of young/junior employees	C21, C22	(x)
	▪ Challenges with entrepreneurially empowered employees in old positions	C22	
	▪ Translation of organisational strategy into projects/portfolio management	C9, C19, C20, C22	x
	▪ Limited influence on supply chain and ecosystem to improve product life cycle performance	C18	x
	▪ Unintended consequences/unexpected user behaviour	C18	
	▪ Keeping up momentum	C18	
	▪ Internal accounting/charging Bus/Budget	C2, C13, C20	
	▪ Complexity, amount of details	C17	
1. Preparation & Ideation	▪ Hard to recruit talent or get good members from BU	C1, C2, C7	
	▪ Composition of teams/low diversity in background, gender, etc.	C1, C2, C20	
	▪ Availability/time commitment of team members/other stakeholders	C2	
	▪ Prioritisation of ideas	C9, C13, C18, C21	
	▪ Ideas from personal networks of top management bypass prioritisation	C9, C22	
	▪ Create buy-in/reputation with BUs	C18, C22	
	▪ Technology push rather than customer pain point focus	C21, C22	
	▪ Key stakeholders mainly interested in profitability	C18	x
	▪ More money than ideas	C22	
2. Concept-ualisation & Prototyping	▪ Volatility in workload over programme	C1	
	▪ Capabilities/culture rather than customer focus	C4, C9	
	▪ Functional silos/no cross-functional innovation	C9, C13, C19	

	▪ Access to appropriate test customers/no adequate customer problem verification	C19	
	▪ Multi-generational plan for good ideas without concrete customers/business case	C19, C20, C22	
	▪ Identify sustainable technology	C22	x
3. Detail design & Experimentation	▪ Regulation, health and safety, complexity of requirements	C1, C3, C13, C18	
	▪ Evaluation of demand/impact in revenues	C9, C18	
	▪ Internal partners/Bus require extensive documentation not appropriate for the process	C9	
	▪ Collaboration with BUs, post-prioritisation through internal partners/capacity constraints	C3, C9, C13, C18, C20	
	▪ New internal business models necessary to smoothen BMID's cross-functional operations	C9	
	▪ Digital/IT skills gap	C9, C18	
	▪ Development/selection of the optimal product or services	C4, C9	
	▪ Platform development	C9, C21	
	▪ Little confidence in spreadsheets/letters of intent from customers	C21, C22	
4. Piloting & Launch	▪ Different people required for running than for founding a company	C1	
	▪ Seed funding/getting budget	C9, C10	
	▪ Plan every detail and then leave it rather than launch quickly and adapt later	C9	
	▪ Small margins, tough competition/similar offers, dependence on grants	C3, C4, C10, C17	
	▪ Reintegration of business into BU	C9, C19	
	▪ Reintegration of team into line position	C19	
	▪ Scaling the pilot	C21	
	▪ Brand recognition for new customer segments	C3	
	▪ Reaction times to customer feedback	C3	
	▪ Right timing of BMID pulling out	C20	
5. Adjustment & Diversification	▪ Scaling, growth	C10, C21	
	▪ Unclear motivation for growth	C10, C21	
	▪ No portfolio management	C21, C22	
	▪ Lessons learned, improving BMI process	C9, C21	

x – Applies; (x) – Partly applies

This and the consolidation of steps, which is described in previous section (4.2.1), led to less challenges being listed than for the focus groups. There are considerably more challenges listed for phase 0 than for any other step. This is mainly due to many challenges affecting several steps or the entire process at once. Challenges that affect the entire process or aspects of its setup were all listed under step 0; while, analogue to the activities, challenges that affect several steps are associated to the step assumed to be most or most frequently impacted, as judged by the author or, if unclear, also listed under step 0

The importance of prototyping, experimenting, and piloting was again stressed by the participants, although ambiguity remained on the scope, differences, and application of the three concepts. The launch phase was

again seen as particularly challenging by many participants (e.g. C1, C2, and C9)

As mentioned in the previous section, some participants did not clearly divide between pilot and launch phase but rather scaled the pilot until the target market was covered, which leads to challenges affecting both phases at once (e.g. C8, C17, and C21).

Unlike in the focus groups, challenges were mentioned in the explicit context of sustainability considerations. For example, the insufficient size of the sustainability department (C22), the problems of translating strategic goals like sustainability into the business model process (e.g. C9, C19, and C20), or difficulties to identify appropriate sustainable technology (C22).

However, compared to the overall number of challenges mentioned these challenges only played a minor role, potentially for similar reasons as with the focus groups who were mainly preoccupied with more general implementation issues (Section 5.1.3).

5.2.4 Synthesis

This section presents a synthesis of the previous three sections into one framework, framework version 2. This framework is presented in Table 31.

Table 31: Framework version 2 as table

Step	Activity	Challenges
0. Motivation & Setup	▪ Surviving ▪ Little space for innovation in core business ▪ Employee motivation and development ▪ Opening to local/start-up ecosystem ▪ Digitalisation/digital transformation ▪ Servitisation ▪ Personalisation ▪ Becoming more lean/agile ▪ Translating unspecific ideas into business ▪ Profit, revenues, costs ▪ Customer benefit, loyalty	▪ Team works only part-time on project, keep line position ▪ Reputation risk ▪ Legal and regulatory risk perception, complexity, privacy and data protection issues, legal barriers ▪ Measuring success factors/intangible effects like culture difficult, appropriate KPIs ▪ No consistent process/toolkit or lack of implementation

	▪ Strategic goals/synergies ▪ Sustainability as part of the self-perception of the organisation ▪ Sustainability as explicit part of the corporate strategy ▪ Aim at specific sustainability strategy like resource consumption, being climate neutral, being a good neighbour … ▪ BMI to implement/leverage sustainable technology ▪ Change the organisational/ industry ecosystem/supply chain/infrastructure for circular operations ▪ Change user mentality/behaviour ▪ No-go areas like defence, tobacco, etc. ▪ Business units as internal clients ▪ Workshop and process facilitators from BMID/DTO ▪ External consultants and facilitators are hired on demand ▪ Mentoring through budget holders/sponsors/TM/c-suite ▪ Dedicated funding for BMID ▪ Three support activities/parts of BMID team: business analysis, design & marketing, engineering and technical implementation ▪ Process guidelines/elements from academia, using/curating existing standard tools ▪ BMID provide working spaces away from Bus/companies, links to the local start-up ecosystem, and their network ▪ BMID organised as central service/staff department directly under c-suite/foundation/headquarters, sometimes adjunct to strategy department ▪ Coordination organic growth, M&A, joint venture	▪ Stakeholder management ▪ Resource and capability silos/cross-BU collaboration ▪ Focus on operational efficiency ▪ Digitalisation/Digital Transformation ▪ Awareness, sensibilisation ▪ Entrenched/legacy process, mindsets, and culture, rigid hierarchies ▪ Internal marketing to TM and BUs ▪ Shelter from administrative tasks, line job/manager demands, focus on project ▪ Ownership, identification with project/team ▪ Openness, use of skills and ideas from external teams/partners ▪ Active resistance/objectors within organisation ▪ Small sustainability department, responsible for many projects ▪ No coordination with other BMI processes, like M&A ▪ Most successful projects B2B, B2C difficult ▪ Issues with acceptance and reintegration of young/junior employees ▪ Translation of organisational strategy into projects/portfolio management ▪ Limited influence on supply chain and ecosystem to improve product life cycle performance ▪ Unintended consequences/unexpected user behaviour ▪ Keeping up momentum ▪ Internal accounting/charging Bus/Budget ▪ Complexity, amount of details
1. Preparation & Ideation	▪ Internal call/competition/campaign ▪ Communication and selection event ▪ Pre-ideation/ideas from BU/external clients/scout/employees ▪ Application/proposal form/template ▪ Pitch to top management ▪ Prioritisation process/portfolio planning/translation of strategy ▪ Top management decision/idea selection ▪ Development of good ideas not adequate for the programme at other BU's/multigenerational plans/determine whether somebody else can do it better ▪ Team formation/selection through BU/external client, sometimes advised through BMID ▪ Hire/recruit team/support staff ▪ Self-forming teams ▪ Identification of opportunities/portfolio gaps/new business areas ▪ Visit/bring in internal clients/customer/clients/other stakeholders/proxies for stakeholders, external team mates ▪ Value mapping ▪ Set sustainability targets ▪ Sustainability ideation workshop ▪ (Post-) ideation to expand initial ideas ▪ Awareness building, endgame scenarios with c-suite	▪ Hard to recruit talent or get good members from BU ▪ Composition of teams/low diversity in background, gender, etc. ▪ Availability/time commitment of team members/other stakeholders ▪ Prioritisation of ideas ▪ Ideas from personal networks of top management bypass prioritisation ▪ Create buy-in/reputation with BUs ▪ Technology push rather than customer pain point focus ▪ Key stakeholders mainly interested in profitability ▪ More money than ideas

	▪ Initiation, kick-off meeting, building initial momentum with team ▪ Customer needs/demands/pain points identification ▪ Find sponsor/executive level buy-in/partners/funding	
2. Concept-ualisation & Prototyping	▪ Incubation phase/programme: transition from idea to concept ▪ Proposal/business plan/case development/solution description ▪ Design Thinking process ▪ Problem definition/challenge description ▪ Concept/prototype presentation/pitch to top management/investors committee ▪ Prototype building/development and testing ▪ Business model canvas ▪ Collaboration with academia/teams who do similar work ▪ Face time with top management/mentors ▪ Interview and observe customers/internal clients/workarounds and do workshops ▪ Describe customer experience/develop customer journey/tell story ▪ Sell ideas internally	▪ Volatility in workload over programme ▪ Capabilities/culture rather than customer focus ▪ Functional silos/no cross-functional innovation ▪ Access to appropriate test customers/no adequate customer problem verification ▪ Multi-generational plan for good ideas without concrete customers/business case ▪ Identify sustainable technology
3. Detail design & Experiment-ation	▪ Market research ▪ Top management/internal client reviews/milestones with clearly defined deliverables ▪ Product/service/platform/MVP development/sprints/co-creation ▪ Project planning/management/break down, prioritise and assign tasks ▪ Acceleration phase/programme: transition from concept to start-up ▪ Experiments/test with clients/end users/A-B-testing ▪ Business case/check-list/spreadsheet tools/due diligence process ▪ Define partnerships/supply chain networks/production planning ▪ Internal and external consultants/legal, commercial and financial advice ▪ Financial planning/feasibility studies ▪ Digital simulation of business models ▪ Definition of spin-off configuration ▪ Benchmarking	▪ Regulation, health and safety, complexity of requirements ▪ Evaluation of demand/impact in revenues ▪ Internal partners/Bus require extensive documentation not appropriate for the process ▪ Collaboration with BUs, post-prioritisation through internal partners/capacity constraints ▪ New internal business models necessary to smoothen BMID's cross-functional operations ▪ Digital/IT skills gap ▪ Development/selection of the optimal product or services ▪ Platform development ▪ Little confidence in spreadsheets/letters of intent from customers
4. Piloting & Launch	▪ Spin-off of projects as (semi-) independent start-ups/subsidiaries owned by founders and parent organisation ▪ Hand over to business units/internal clients/hand-off period ▪ Run it within the BMID as a project ▪ Pilot ▪ Contracting/negotiating/outsourcing to internal or external suppliers/implementation/production planning/framework agreements ▪ Lean Startup ▪ Scale from pilot ▪ Pre-launch advertisement ▪ Answer customer questions/establish aftersales service ▪ Re-join the corporate PLM process/address sustainability parameters	▪ Different people required for running than for founding a company ▪ Seed funding/getting budget ▪ Plan every detail and then leave it rather than launch quickly and adapt later ▪ Small margins, tough competition/similar offers, dependence on grants ▪ Reintegration of business into BU ▪ Reintegration of team into line position ▪ Scaling the pilot ▪ Brand recognition for new customer segments ▪ Reaction times to customer feedback ▪ Right timing of BMID pulling out
5. Adjustment & Diversification	▪ Analysis of customer feedback/product optimisation and customisation ▪ Customer feedback and requirements pool management ▪ Pivot and expand products/services ▪ Develop platform/databases/add new layers to products/services ▪ Diversify into similar applications ▪ Add services to products	▪ Scaling, growth ▪ Unclear motivation for growth ▪ No portfolio management ▪ Lessons learned, improving BMI process

Analogous to the previous framework versions, this framework assigns the activities presented in Section 5.2.2 and the challenges discussed in Section 5.2.3 to the steps illustrated in Section 5.2.1. Besides providing an overview of the results of the conducted focus groups, this framework provides an input for the subsequent research method, participatory action research, in Section 5.3.

The steps identified in the literature and the pre-step added after the focus groups were confirmed. The considerable preparation activities conducted by the case organisations suggests that preparation should be added as an additional step. Also, the interview data suggest a high level of interdependency between the steps. This seems particularly pronounced between preparation and ideation, conceptualisation and prototyping, detail design and prototyping, piloting and launch, and adjustment and diversification respectively. To reflect these interdependencies, the steps were consolidated into a five-step process, retaining the pre-step.

Analogous to the previous findings, sustainability focused elements can only be found in the activities and challenges rather than the steps. The additional pre-step in the scope of the interview, enabled the identification of sustainability focused elements in the setup and motivation of the case organisations. As in the literature, the sustainable business model innovation activities identified are mainly covering aspects in the first two steps of the process.

Where not made explicit by the interview participant or the context of the conversation, the assignment of activities and challenges to steps was conducted by the researcher in an iterative process. The data suggests that some activities and challenges can be assigned to several steps at once. It also confirms that process iterations play an important role in which steps are

repeated or omitted. The data on the last step, adjustment and diversification, and the organisational setup of some of the business model innovation departments in the sample suggest that the process, or at least some of its steps, might be repeated, leading to a potentially circular process.

As in the focus groups, the number of activities and challenges for prototyping, experimentation, and piloting was considerably higher than in the literature. This again confirms the importance of this steps for practitioners and a conceptual underdevelopment in the literature. and gap concerning the three concepts. The data suggests that despite the significance for the interviewed practitioners, prototyping, experimentation, and piloting was not used in a systematic way by most case organisations. There seems to be considerable ambiguity of what each concept implies and how they differ from each other.

Some case companies employed milestones or gates to determine durations for each phase, for example by C1, C2, and C20. This confirms the findings of the focus groups that approximate time frames for and standardised milestones between steps might be desirable information for practitioners. While it remains unclear from the data, how the length of these time frames was initially determined, there seemed to be flexibility in applying them to the business model innovation projects and, for example, C20 reported to reflect on learnings from the process and adapt their framework accordingly.

5.3 Process as team participant (Framework version 3)

As described in Section 2.5, two different cases were investigated using the participatory action research method: (1) Favalley, a Cambridge based social start-up that was co-founded by the researcher and three other PhD students from Cambridge; and (2) a business model innovation programme by a consortium of six non-competing multinationals and a management consultancy.

Favalley was initially founded to compete in the Hult Price competition. A $1M startup competition that is organised by the Hult business school chain. I was asked by the other three co-founders to advise them on their business model. After a value proposition and concept design workshop, the researcher was asked to join the endeavour as a co-founder.

The main conceptual work was performed in preparation for the Hult Price competition for which a complete set of material was created, including a business plan, a presentation, a pitch, a video, and a website. While the concept was further refined after the event, the focus of the work shifted to outreach activities, grant applications, and finding partners.

The researcher was initially asked to join the team as a business architect. However, the small team size and the initial time pressure made a more task-oriented organisation more practical. As a result, the team members fulfilled different task depending on the priorities of the different phases of the process. Often smaller sub-teams would form based on the skills and availability of the four co-founders.

For the business model innovation programme each multinational provided a different scope for a business model innovation project and a team of five was assigned to it. The researcher participated in one of the six teams. The scope of the different teams varied from very specific scenarios, for which some previous work had already been done to very broad challenges that the company wanted to explore. All topics were linked to digital transformation as an overarching topic for the programme.

The team of the researcher worked for an airline and was tasked to develop a business model for an improved door to door travel experience. The programme consisted of an advertisement campaign, a recruitment process, including several weekends with assessment centres, several weekends with workshops and networking events, and a final presentation with top managers, external guests, and the press. The business model innovation

process was structured in workshops on key topics, like problem definition, customer journey development, etc. and the phases in between the workshops, during which most of the actual work was performed by the teams.

Several roles were recruited for the teams, including business architects, experience designers, data scientist, and engineer/programmer. The researcher was recruited as a business architect. Due to the short duration and the small team, the team members fulfilled several functions, only loosely related to their assigned role but rather determined by the tasks at hand. The candidates were selected for their potential to fulfil the assigned roles and consisted of a range of different backgrounds, working for a range of corporations, start-ups, and research institutes, but also included some students, like the researcher.

This section presents (1) the process steps, (2) key activities, and (3) challenges identified during the participatory action research, before it provides (4) a synthesis, leading to framework version 1 as an input for the second research step, based on qualitative interviews, whose results are illustrated in the following section.

5.3.1 Process steps

As illustrated in Table 32, based on the participatory action research, the first two steps of framework version 2 and its pre-step can be confirmed.

Table 32: Steps identified in the participatory action research

Name	Confirmed from v2	Case	Events
0. Motivation & Setup	confirmed	Favalley	The impulse for Favalley was the Hult Price Competition. Since the scope of the competition were start-ups, a new business model was required as a competition entry.
		BMI programme	The programme was set up as a joint business model innovation programme by six non-competing multinationals and one major management consultancy and was supported by facilitators from these organisations. The programme consisted of a competition to recruit six teams, one per organisation, an assessment centre, three weekends with workshops, and a final presentation and award ceremony with press and external guests at which representatives of the organisations' top management evaluated the resulting concepts and prototypes.
1. Preparation & Ideation	confirmed	Favalley	The team organised a one-week workshop, using an adapted version of the Value Ideation workshop (Geissdoerfer et al., 2016), which included using the Value Mapping Tool (Bocken et al., 2013) to ideate a value proposition. The results were documented in an excel sheet and the sticky notes transferred to the next step.
		BMI programme	The teams were selected by an online competition, where individual applicants had to provide solutions to a range of tasks. These solutions were evaluated by the organisations and the winners were invited to a comprehensive assessment centre. The candidates selected in the assessment centre were selected into six teams by the organisations, one for each. Each team was provided with a challenge from their organisation to address in the process. Several workshops were provided by professional external facilitators, based on Design Thinking (Plattner et al., 2011) and Lean Start-up (Ries, 2011) ideation. The focus was on identifying a problem or need that is of significant importance to a viable customer group, for which they will be willing to pay, and which we can reasonably assume to solve better than existing and potential competitors.
2. Concept design & Prototyping	confirmed	Favalley	The team organised a one-week workshop, using an adapted version of the Value Ideation workshop (Geissdoerfer et al., 2016), which included using the Business Model Canvas tool (Osterwalder and Pigneur, 2010). After having transferred the value proposition from the previous step, all other elements were ideated. The resulting concept was prototyped and discussed with available stakeholders. Research concerning the market and existing solutions was conducted and the canvas and prototype was adapted accordingly. Finally, all results were transferred into a business plan, which was continuously improved.
		BMI programme	Several workshops were provided by professional external facilitators, mainly based on Design Thinking (Plattner et al., 2011) and Lean Start-up (Ries, 2011). A slight adaption of the Business Model Canvas tool (Osterwalder and Pigneur, 2010) was used, called Lean Canvas (See Appendix H). The different elements were assigned to different sub-teams, who did further research. The results were transferred into a presentation and a website (Geissdoerfer et al., 2018c).
3. Detail design & Experimenting	Partly confirmed	Favalley	The team conducted further research to design a platform solution, applied for and received grants, partnered with several NGOs and advisors, and volunteers joined the team. Project partners in India were identified and a local manager was appointed to carry out operations on the ground.
		BMI programme	Has not reached this stage yet.

4. Piloting & Launch	Step not reached	Both processes have not reached this stage yet.
5. Adjustment & Diversification	Step not reached	Both processes have not reached this stage yet.

Step 3, Detail design & Experimenting, can also partly be confirmed but was not reached in the business model innovation programme and not completed with Favalley. All other steps are neither confirmed nor rejected, since they were not reached and therefore not investigated with this research method.

5.3.2 Key activities

The activities identified for both cases in the participatory action research are listed in Table 33 for each step of the business model innovation process. Due to the BMI programme ended after the final presentation of the concept and Favalley has not reached the piloting phase at the conclusion of this research, the process was only observed until the second step with the BMI programme, and the third step with Favalley.

Table 33: Activities identified in the participatory action research

Name	Name	Associated activities
0.Motivation & Setup	Favalley	▪ Participating in start-up competition ▪ Improving the lives of vulnerable youths in slums ▪ Workshop week ▪ Regular meetings ▪ Competitions and pitches
	BMI programme	▪ Open Innovation with external teams and ideas ▪ Digital transformation challenges ▪ Recruitment of digital talent ▪ Business model innovation programme coordinated by management consultancy ▪ Scope and workshop facilitation provided by consortium of OEMs ▪ Workshop weekends and final presentation
1.Preparation & Ideation	Favalley	▪ Team formation ▪ First discussions ▪ Coming up with joint vision/rough framework in discussions ▪ Value Mapping/Value Ideation ▪ Documentation of results
	BMI programme	▪ Identification of industry partners ▪ Competition organisation ▪ Advertisement

		▪ Assessment centre ▪ Task/requirements/problem statement from industry partner ▪ Workshop on problem identification and formulation ▪ Ideation of rough customer journey with pen on poster ▪ Brainstorming of customer needs and problems for each item of the journey with sticky notes ▪ Documentation of results
2. Concept design & Prototyping	Favalley	▪ Transfer of Value Mapping results to value proposition field on Business Model Canvas ▪ Brainstorming of remaining elements to deliver value proposition ▪ Building prototype of concept with handicraft materials and stationery ▪ Prototype discussion within the team ▪ Prototype discussion with available stakeholders ▪ Research concerning the market and existing solutions ▪ Continuous adaption of canvas and prototype ▪ Transfer of results into a business plan ▪ Continuous research, discussions, and adaption of concept and business plan ▪ Development of website and marketing materials
	BMI programme	▪ Workshops on Design Thinking and Lean Start-up ▪ Ideating business model elements with Lean Canvas ▪ Further research on canvas elements in sub-teams ▪ Development of presentation ▪ Development of website and marketing materials
3. Detail design & Experimenting	Favalley	▪ Further research to design a platform solution ▪ Grant application ▪ Networking ▪ Finding partners ▪ Recruiting staff/volunteers
	BMI programme	▪ Has not reached this stage yet
4. Piloting & Launch	Step not reached	
6. Adjustment & diversification	Step not reached	

This is not the only reason for fewer activities listed as in the previous steps – it also due to differences in the research method. The participatory action research was conducted with only two in-depth cases not 24 aggregated ones. Also, the activities were not discussed on an abstract level that can include possible activities and tools for several whole business model innovation programmes, but it is only reported what was actually done in the one specific project team in which the researcher was embedded.

During the business model innovation programme, the facilitators stressed the importance of prototyping and experimentation, although no clear distinction was made between experimentation and piloting. The facilitators referred to Design Thinking for their prototyping concept and Lean Startup for their experimentation activities. Piloting was not explicitly mentioned, but

some of the experimentation activities indicated aspects of piloting, like launching the product in a specific part of the target market, adjusting the product according to user feedback and scaling it to other customer segments. The pilot phase was not reached in either of the cases and, consequently, there was no explicit facilitation for this step.

While no adequate prototyping could be done on the business model concept because it was not integrated into the workshops, some prototypes on different aspects of the business model and the offered platform were developed for the final presentation and a website that accompanied it.

Due to the conceptualisation of the facilitation around the Design Thinking and Lean Startup concepts, a broad range of tools associated with these two notions were used in the process. This included for example, customer journeys and the Lean Business Model Canvas (Appendix H). Favalley also used a range of tools. The Value Ideation concept was adapted, and a Business Model Canvas was used between the Value Mapping and the prototyping activities of the concept. No differentiation between tools and activities was made.

The use of sustainable business model innovation tools reflects Favalley's main motivation, which based on social sustainability considerations. The business model innovation programme was not explicitly focused on sustainability performance and none of the activities specifically focused on sustainability considerations.

5.3.3 Key challenges

The challenges identified for both cases in the participatory action research are listed in Table 34 for each of the business model innovation process steps. Analogue to the activities in the previous section (5.3.2), the BMI programme ended after the final presentation of the concept and Favalley has not reached the piloting phase at the conclusion of this research, the process

was only observed until the second step with the BMI programme, and the third step with Favalley.

Table 34: Challenges identified in the participatory action research

Name	Name	Associated challenges
0. Motivation & Setup	Favalley	▪ Creating common understanding ▪ Commitments and roles
	BMI programme	▪ Getting resources ▪ Convincing industry partners ▪ Little face time ▪ Geographically dispersed team
1. Preparation & Ideation	Favalley	▪ Creating common understanding ▪ Effective documentation ▪ Timely access to meaningful stakeholders
	BMI programme	▪ Time constraints in workshop format ▪ Creating common understanding
2. Concept design & prototyping	Favalley	▪ Effective documentation ▪ Time constraints through competition deadlines
	BMI programme	▪ Negotiating joint conceptualisations in phases without face time ▪ No adequate prototyping
3. Detail design & Experimenting	Favalley	▪ Time constraints/other obligations ▪ Keeping up momentum ▪ Principal-agent problems
	BMI programme	▪ No clear plans/commitments for after the event from the industry partners
4. Piloting & Launch	Step not reached	
5. Adjustment & diversification	Step not reached	

This led to fewer challenges listed compared to the previous steps. This is emphasised by differences in the research method, as discussed in the previous section, because only two in-depth cases instead 24 aggregated ones were investigated and those were lived through in detail instead of being discussed on an abstract level. Therefore, it is only reported what was actually observed by the researcher, while interviewees also reported potential or planned activities and tools for more than one project.

A particular challenge not reported before arose in the business model innovation programme. Because the team was geographically dispersed in

San Francisco, Hong Kong, Berlin, and Hamburg, it was only able to physically meet and collaborate during the workshop sessions. These sessions offered only limited time besides the facilitation and networking activities, so that most collaboration had to be done over long distances

Despite a strong reliance on communication tools like teleconference software (Skype, Google Hangout, Webex), joint cloud drives (Google Drive), and collaborative project management software (Slack), the lack of facetime impeded coordination and collaborative decision making, as well as joint activities like conceptual prototyping. This led to lengthy discussions, negotiations, and misunderstandings on joint conceptualisations. Which, in turn, impeded all other activities that required basic conceptual agreement, like market research and prototyping, which had knock-on effects that led to considerable time constraints towards the end of the project.

A new challenge also appeared around principal-agent problems. Since all four co-founders also pursued an academic degree and other projects, there was considerable potential for conflicts of interests. This became a challenge, when one of the co-founders used a trip with potential partners and government sponsors to collect data for their PhD research.

The importance of prototyping, experimenting, and piloting was stressed by the facilitators of the business model innovation programme. However, the length of the programme left limited space to engage in activities beyond prototyping. Besides the previously mentioned delays in conceptual agreement, these prototypes did not pose particular challenges for the team.

5.3.4 Synthesis

This section presents a synthesis of the previous three sections into one framework, framework version 3, illustrated in Table 35.

Table 35: Framework version 3 as table

Step	Activities	Challenges
0. Motivation & Setup	▪ Participating in start-up competition ▪ Improving the lives of vulnerable youths in slums ▪ Workshop week ▪ Regular meetings ▪ Competitions and pitches ▪ Open Innovation with external teams and ideas ▪ Digital transformation challenges ▪ Recruitment of digital talent ▪ Business model innovation programme coordinated by management consultancy ▪ Scope and workshop facilitation provided by consortium of OEMs ▪ Workshop weekends and final presentation	▪ Creating common understanding ▪ Commitments and roles ▪ Getting resources ▪ Convincing industry partners ▪ Little face time ▪ Geographically dispersed team
1. Preparation & Ideation	▪ Team formation ▪ First discussions ▪ Coming up with joint vision/rough framework in discussions	▪ Creating common understanding ▪ Effective documentation ▪ Timely access to meaningful stakeholders ▪ Time constraints in workshop format
	▪ Value Mapping/Value Ideation ▪ Documentation of results ▪ Identification of industry partners ▪ Competition organisation ▪ Advertisement ▪ Assessment centre ▪ Task/requirements/problem statement from industry partner ▪ Workshop on problem identification and formulation ▪ Ideation of rough customer journey with pen on poster ▪ Brainstorming of customer needs and problems for each item of the journey with sticky notes ▪ Documentation of results	▪ Creating common understanding
2. Conceptualisation & Prototyping	▪ Transfer of Value Mapping results to value proposition field on Business Model Canvas	▪ Effective documentation ▪ Time constraints through competition deadlines
	▪ Brainstorming of remaining elements to deliver value proposition ▪ Building prototype of concept with handicraft materials and stationery ▪ Prototype discussion within the team ▪ Prototype discussion with available stakeholders ▪ Research concerning the market and existing solutions ▪ Continuous adaption of canvas and prototype ▪ Transfer of results into a business plan ▪ Continuous research, discussions, and adaption of concept and business plan ▪ Development of website and marketing materials ▪ Workshops on Design Thinking and Lean Start-up ▪ Ideating business model elements with Lean Canvas ▪ Further research on canvas elements in sub-teams ▪ Development of presentation ▪ Development of website and marketing materials	▪ Negotiating joint conceptualisations in phases without face time ▪ No adequate prototyping
3. Detail design & Experimentation	▪ Further research to design a platform solution ▪ Grant application ▪ Networking ▪ Finding partners ▪ Recruiting staff/volunteers	▪ Time constraints/other obligations ▪ Keeping up momentum ▪ Principal-agent problems ▪ No clear plans/commitments for after the event from the industry partners
4. Piloting & Launch	▪ Has not reached this stage yet	▪ Has not reached this stage yet

5. Adjustment & Diversification	▪ Has not reached this stage yet	▪ Has not reached this stage yet

Analogue to the previous framework versions, this framework assigns the activities presented in Section 5.3.2 and the challenges discussed in Section 5.3.3 to the steps illustrated in Section 5.3.1.

The steps identified in the literature, the pre-step added after the focus groups, and the preparation step and the consolidation into five following from the findings of the qualitative interview were confirmed for the process steps covered. However, this research method did not cover the last two steps of the process. These are neither confirmed nor rejected, since they were not reached and therefore not investigated with this method.

In both cases, the researcher experienced a high level of interdependency between the steps, especially between preparation and ideation, conceptualisation and prototyping, detail design and prototyping, piloting and launch, and adjustment and diversification. The research also confirms that the process is highly iterative. Because the process was not completed, no information can be given on the circularity of the process.

Sustainability focused elements can again only be found in the activities and challenges rather than the steps. As a social startup, sustainability is the central motivation for Favalley, and the team used an adapted version of the Value Ideation concept, which also includes the Value Mapping Tool.

The second case, the business model innovation programme was not explicitly focused on sustainability performance. It was based on workshops based on Design Thinking and Lean Startup. A range of tools associated with these concepts were used in the process. No differentiation between tools and activities was made.

During the second case, the business model innovation programme, a range of workshops focused on prototyping and experimentation, based on the Design Thinking and Lean Startup concept. Some of the presented experimentation activities indicated aspects associated with piloting by other authors. Since the pilot phase was not reached in either of the cases there was no explicit facilitation for this step.

The time frame of the steps was largely determined by external events. For Favalley, the largest milestone was the Hult Price competition, with smaller milestones emerging in the form of, for example, grant application deadlines, pitches, or meetings with important partners. This was even more pronounced for the business model innovation programme, where all activities were focused on the final presentation of the concept on a date that was already fixed when the programme started.

5.4 Conclusions (Framework version 4)

This section presents a synthesis of all previous framework versions by combining framework version 0 from the literature review, presented in Section 4.4, version 1 from the focus groups, illustrated in Section 5.1.4, version 2 from the qualitative interviews, shown in Section 5.2.4, and version 3 from the participatory action research, discussed in Section 5.3.4. The resulting framework is provided in Table 36.

Table 36: Framework version 4 as table

Step	Activity	Challenges
0. Motivation & Setup	▪ Discuss why business model rather than e.g. product innovation ▪ Agree purpose ▪ Assessment questionnaire ▪ Scenario planning ▪ Align KPIs ▪ Ongoing customer interaction ▪ Align with customer needs ▪ Increase revenues ▪ Beat competition ▪ Identify new opportunity ▪ Lower customer CAPEX ▪ Develop to other type of business ▪ Reduce cost/remove middle man ▪ Explore new ways of working ▪ Feedback ▪ Increase customer intimacy ▪ Fostering entrepreneurship culture/mindset in the organisation ▪ Surviving ▪ Little space for innovation in core business ▪ Employee motivation and development ▪ Opening to local/start-up ecosystem ▪ Digitalisation/digital transformation ▪ Servitisation ▪ Personalisation ▪ Becoming more lean/agile ▪ Translating unspecific ideas into business ▪ Profit, revenues, costs ▪ Customer benefit, loyalty ▪ Strategic goals/synergies ▪ Sustainability as part of the self-perception of the organisation ▪ Sustainability as explicit part of the corporate strategy ▪ Aim at specific sustainability strategy like resource consumption, being climate neutral, being a good neighbour … ▪ BMI to implement/leverage sustainable technology ▪ Change the organisational/ industry ecosystem/supply chain/infrastructure for circular operations ▪ Change user mentality/behaviour ▪ No-go areas like defence, tobacco, etc. ▪ Business units as internal clients ▪ Workshop and process facilitators from BMID/DTO ▪ External consultants and facilitators are hired on demand ▪ Mentoring through budget holders/sponsors/TM/c-suite ▪ Dedicated funding for BMID ▪ Three support activities/parts of BMID team: business analysis, design & marketing, engineering and technical implementation ▪ Process guidelines/elements from academia, using/curating existing standard tools ▪ BMID provide working spaces away from Bus/companies, links to the local start-up ecosystem, and their network ▪ BMID organised as central service/staff department directly under c-suite/foundation/headquarters, sometimes adjunct to strategy department ▪ Coordination organic growth, M&A, joint venture ▪ Participating in start-up competition	▪ Puts demands to the top management as opposed to product development ▪ Even expected/desirable early failures can lead to abortion of BM innovation activities ▪ Managerial complacency ▪ Inexperience/lack of access to experts ▪ Too much other stuff going on ▪ Budgeting ▪ Organisational delegation/ accountability ▪ High uncertainty of success ▪ Inability to smell that the deck is burning ▪ Predicting demand ▪ Funding/investments ▪ Metrics ▪ Access to data ▪ Customer responses/readiness ▪ New/different practices ▪ Structural incumbency ▪ Setting targets ▪ Mind set and people involved ▪ Making the transition ▪ Customer acceptance to change ▪ Pricing ▪ Driving change internally ▪ Business parameter enlargement ▪ Implementing new model without disruption ▪ Relationship with current customers, supply chain, partners ▪ Design capabilities for new market ▪ Steering committee ▪ Team works only part-time on project, keep line position ▪ Reputation risk ▪ Legal and regulatory risk perception, complexity, privacy and data protection issues, legal barriers ▪ Measuring success factors/intangible effects like culture difficult, appropriate KPIs ▪ No consistent process/toolkit or lack of implementation ▪ Stakeholder management ▪ Resource and capability silos/cross-BU collaboration ▪ Focus on operational efficiency ▪ Digitalisation/Digital Transformation ▪ Awareness, sensibilisation ▪ Entrenched/legacy process, mindsets, and culture, rigid hierarchies ▪ Internal marketing to TM and BUs ▪ Shelter from administrative tasks, line job/manager demands, focus on project ▪ Ownership, identification with project/team ▪ Openness, use of skills and ideas from external teams/partners

	▪ Improving the lives of vulnerable youths in slums ▪ Workshop week ▪ Regular meetings ▪ Competitions and pitches ▪ Open Innovation with external teams and ideas ▪ Digital transformation challenges ▪ Recruitment of digital talent ▪ Business model innovation programme coordinated by management consultancy ▪ Scope and workshop facilitation provided by consortium of OEMs ▪ Workshop weekends and final presentation	▪ Active resistance/objectors within organisation ▪ Small sustainability department, responsible for many projects ▪ No coordination with other BMI processes, like M&A ▪ Most successful projects B2B, B2C difficult ▪ Issues with acceptance and reintegration of young/junior employees ▪ Translation of organisational strategy into projects/portfolio management ▪ Limited influence on supply chain and ecosystem to improve product life cycle performance ▪ Unintended consequences/unexpected user behaviour ▪ Keeping up momentum ▪ Internal accounting/charging Bus/Budget ▪ Complexity, amount of details ▪ Creating common understanding ▪ Commitments and roles ▪ Getting resources ▪ Convincing industry partners ▪ Little face time ▪ Geographically dispersed team
1. Preparation & Ideation	▪ Value Mapping Tool ▪ Value Ideation ▪ Create awareness of the need for a new business model ▪ Understanding stakeholder needs ▪ Monitoring stakeholder moves ▪ Identifying relevant changes in the ecosystem and their driver ▪ Creating an appropriate organisational setting for ideation ▪ Identifying approaches and tools to create business model ideas ▪ Ideation of business model ideas ▪ Ideate and describe business model ideas ▪ Evaluate the ideas ▪ Business Model Patterns ▪ Ideation ▪ Stakeholder definition ▪ Value mapping/ ideation, including customer gains and pains identification ▪ Sustainable value analysis ▪ Benchmarking with competitors and start-ups ▪ Sponsor/management buy-in ▪ Story boards ▪ Customer role play ▪ Deep dive ethnography/empathy with users ▪ Value stream mapping ▪ Customer engagement/interviews ▪ Field representatives' feedback ▪ Analysis of macro and market trends ▪ Brainstorming ▪ What if scenarios ▪ Related worlds/analogies ▪ Competitor analysis ▪ Workshops/value capture feedback ▪ Value proposition canvas ▪ Value identification/STIM ▪ Value stream mapping ▪ 9 Box Thinking ▪ TRIZ	▪ Underestimating the difficulty of driving people from their comfort zones ▪ Presenting a vision that's too complicated or vague to be communicated in five minutes ▪ No prior experience in teamwork at the top ▪ Methods and tools ▪ Failed identification of opportunities ▪ Failed identification of important stakeholder ▪ Failure to integrate top management from the beginning ▪ Lack of ambition/ innovativeness ▪ Quantity & quality of ideas ▪ Assessment and evaluation of ideas ▪ Diverse & conflicting opinions & expertise ▪ Identification of influencers & opponents ▪ Deciphering user feedback ▪ Too many opinions ▪ Selling the vision to users/resistance ▪ Getting people together ▪ Access to customers/end users ▪ Identifying stakeholders ▪ Thinking outside routine ▪ Constrained thinking/ embedded in current model ▪ Assuming what your customers' needs ▪ Company capabilities ▪ Unknown unknowns ▪ Hard to recruit talent or get good members from BU ▪ Composition of teams/low diversity in background, gender, etc. ▪ Availability/time commitment of team members/other stakeholders

	▪ Brainstorm metrics ▪ Internal call/competition/campaign ▪ Communication and selection event ▪ Pre-ideation/ideas from BU/external clients/scout/employees ▪ Application/proposal form/template ▪ Pitch to top management ▪ Prioritisation process/portfolio planning/translation of strategy ▪ Top management decision/idea selection ▪ Development of good ideas not adequate for the programme at other BU's/multigenerational plans/determine whether somebody else can do it better ▪ Team formation/selection through BU/external client, sometimes advised through BMID ▪ Hire/recruit team/support staff ▪ Self-forming teams ▪ Identification of opportunities/portfolio gaps/new business areas ▪ Visit/bring in internal clients/customer/clients/other stakeholders/proxies for stakeholders, external team mates ▪ Value mapping ▪ Set sustainability targets ▪ Sustainability ideation workshop ▪ (Post-) ideation to expand initial ideas ▪ Awareness building, endgame scenarios with c-suite ▪ Initiation, kick-off meeting, building initial momentum with team ▪ Customer needs/demands/pain points identification ▪ Find sponsor/executive level buy-in/partners/funding ▪ Team formation ▪ First discussions ▪ Coming up with joint vision/rough framework in discussions ▪ Value Mapping/Value Ideation ▪ Documentation of results ▪ Identification of industry partners ▪ Competition organisation ▪ Advertisement ▪ Assessment centre ▪ Task/requirements/problem statement from industry partner ▪ Workshop on problem identification and formulation ▪ Ideation of rough customer journey with pen on poster ▪ Brainstorming of customer needs and problems for each item of the journey with sticky notes ▪ Documentation of results	▪ Prioritisation of ideas ▪ Ideas from personal networks of top management bypass prioritisation ▪ Create buy-in/reputation with BUs ▪ Technology push rather than customer pain point focus ▪ Key stakeholders mainly interested in profitability ▪ More money than ideas ▪ Creating common understanding ▪ Effective documentation ▪ Timely access to meaningful stakeholders ▪ Time constraints in workshop format ▪ Creating common understanding
2. Conceptualisation & Prototyping	▪ Sustainable Business Model Archetypes ▪ Sustainable Business Model Pattern Taxonomy ▪ Flourishing Business Canvas ▪ Triple-Layered Business Model Canvas ▪ Assemble all the elements for successful business model design; ▪ Immerse in relevant knowledge about customers, technology, and the environment ▪ Collect information, interview experts, study potential customers ▪ Detailing 'who', 'why', 'what', and 'how', of the business model ▪ Creating alignment and consistency between them ▪ Integrate the ideas ▪ Analyse customer needs and technological and general trends ▪ Formulate a business model vision ▪ Benchmark business models in literature and the real world	▪ Underestimating the difficulty of driving people from their comfort zones ▪ Presenting a vision that's too complicated or vague to be communicated in five minutes ▪ No prior experience in teamwork at the top ▪ Methods and tools ▪ Scenarios ▪ Organisation cannot identify the appropriate business model for new technologies or solution ▪ Relegating team leadership to an HR, quality, or strategic-planning executive rather than a senior line manager ▪ Undercommunicating the vision ▪ Technology innovation

	▪ Analysis of the current business model ▪ Analysis of products/services ▪ Analysis of target group/customers ▪ Analysis of market/competition ▪ Determination of the business model innovation mission ▪ Generation of customer insights ▪ Development of customer scenarios ▪ Assumptions about the business environment ▪ Creation of different design alternatives ▪ Business Model Canvas ▪ Storytelling ▪ Customer Insights ▪ Visual Thinking ▪ Transform the information and ideas into business model prototypes ▪ Sustainable Business Model Pattern Taxonomy ▪ Select the most satisfactory business model design ▪ Prototypes ▪ Develop business model prototypes ▪ Evaluate the prototypes ▪ Visual/networked thinking and storytelling ▪ Prototyping ▪ Analyse customer needs and technological and general trends ▪ Integration of ideas ▪ Discussion of technological & general trends ▪ Market test/ feedback of potential customers ▪ Definition of value creation, delivery, and capture system/ business model (BM) elements/dimensions ▪ Stakeholder clarification ▪ Business plan ▪ Market analysis ▪ Scenario mapping ▪ Materials/ skills to develop ▪ Select customers for trials ▪ Design reviews ▪ IP review/strategy ▪ Define format/how to create experience ▪ Link to here and now ▪ Stimulate imagination ▪ Communicate internally ▪ Obtain customer feedback ▪ Business model canvas ▪ Benchmarking within industry ▪ Benchmarking with generic BM concepts ▪ Prototype building ▪ Prototype evaluation and selection ▪ Modelling and simulation ▪ Develop material and skills ▪ Lego serious play ▪ Design thinking ▪ Benchmarking ▪ Agile engineering practises ▪ Role play ▪ Design reviews ▪ Customer prototype feedback discussions ▪ Incubation phase/programme: transition from idea to concept ▪ Proposal/business plan/case development/solution description ▪ Design Thinking process ▪ Problem definition/challenge description ▪ Concept/prototype presentation/pitch to top management/investors committee ▪ Prototype building/development and testing ▪ Business model canvas ▪ Collaboration with academia/teams who do similar work	▪ Insufficient top management involvement ▪ Insufficient mutual understanding ▪ Insufficient understanding of the boundaries of the company's capabilities to innovate ▪ Communication failures ▪ Falling in love with an idea ▪ Business case/ expectation management ▪ Customer identification ▪ Too narrow consultation/view on market potential ▪ Lack of customer/ user engagement ▪ Managing customer/supplier expectations ▪ Dedicating resources ▪ Concept validation ▪ Understanding stakeholders ▪ Internal alignment ▪ Managing supply chain changes ▪ Unknown unknowns ▪ Internal communication ▪ Criteria for success ▪ Internal marketing, especially to decision makers ▪ Key people leave the business ▪ Investment ▪ Selecting the right concepts ▪ Who to demonstrate concept to? ▪ Involve right people ▪ Capturing feedback ▪ Volatility in workload over programme ▪ Capabilities/culture rather than customer focus ▪ Functional silos/no cross-functional innovation ▪ Access to appropriate test customers/no adequate customer problem verification ▪ Multi-generational plan for good ideas without concrete customers/business case ▪ Identify sustainable technology ▪ Effective documentation ▪ Time constraints through competition deadlines ▪ Negotiating joint conceptualisations in phases without face time ▪ No adequate prototyping

	▪ Face time with top management/mentors ▪ Interview and observe customers/internal clients/workarounds and do workshops ▪ Describe customer experience/develop customer journey/tell story ▪ Sell ideas internally ▪ Transfer of Value Mapping results to value proposition field on Business Model Canvas ▪ Brainstorming of remaining elements to deliver value proposition ▪ Building prototype of concept with handicraft materials and stationery ▪ Prototype discussion within the team ▪ Prototype discussion with available stakeholders ▪ Research concerning the market and existing solutions ▪ Continuous adaption of canvas and prototype ▪ Transfer of results into a business plan ▪ Continuous research, discussions, and adaption of concept and business plan ▪ Development of website and marketing materials ▪ Workshops on Design Thinking and Lean Start-up ▪ Ideating business model elements with Lean Canvas ▪ Further research on canvas elements in sub-teams ▪ Development of presentation ▪ Development of website and marketing materials	
3. Detail design & Experimentation	▪ Trials ▪ Explore and test the prototypes ▪ Involving partners early and ensuring their support ▪ Realisation and testing ▪ Convincing the organisation of the business model change ▪ Ensuring resource commitments of key decision makers ▪ Detail all elements of the business model ▪ Develop metrics ▪ Analysis of interdependencies ▪ Analysis of potential internal or external business model alignment ▪ Analysis of different business model design alternatives ▪ Development of several detailed concepts ▪ Refinement of the components/partial models ▪ Evaluation of each design alternative ▪ Selection of final design ▪ Final harmonization of the components ▪ Evaluating Business Models ▪ Business Model Environment ▪ Business Model Perspective on Blue Ocean Strategy ▪ Identification & isolation of key variables to test ▪ Set metrics, timeframe & simple goals ▪ Design of experiment ▪ Execution of experiment ▪ Analysis and lessons learned ▪ Find right people/ expertise ▪ Trial implementation ▪ Mini pilot/test group ▪ Validate key assumptions ▪ Trial with key customers and business areas ▪ Data collection ▪ 50/50 Model Experiment ▪ Beta collaboration and seeding units ▪ Marketing experiments ▪ Simulation ▪ Lean Startup ▪ Detailed definition of all elements ▪ Initial business case (+iterations) ▪ Analytics ▪ Scale test	▪ Conflicts with the current business model and Organisational logic that prevent implementation ▪ Novelty ▪ Lock-in complementarities and efficiency ▪ Conflicts with the managers of assets who resist the innovation process ▪ Dominant logic how organisations assess, select, and interpret information in chaotic and uncertain environments ▪ Becoming paralyzed by risks ▪ Behaving in ways antithetical to the vision ▪ Job security concerns ▪ Power struggles ▪ Agency problems ▪ Triple Bottom Line ▪ Mind-set ▪ Suboptimisation ▪ Some items are hard to test/part-develop ▪ No experiments ▪ Methodological issues/ biases ▪ Capabilities/skills/expertise to conduct experiments ▪ Multi-organisation/ collaboration issues ▪ Define interactions/goals ▪ Identify metrics for success ▪ Complex interactions and trade-offs ▪ Learning/feedback capturing ▪ Access to skills/resources to make MVP ▪ Missing information/ insufficient documentation ▪ Poor understanding of risk of decision makers ▪ System level change would be required for implementation ▪ Large corporate thinking vs start-up mind-set

	▪ Gaining funding for pilot ▪ Go back or proceed ▪ Risk and mitigation measure identification ▪ Product/market fit ▪ Contract writing ▪ Customer feedback ▪ Classical market research ▪ Market research ▪ Top management/internal client reviews/milestones with clearly defined deliverables ▪ Product/service/platform/MVP development/sprints/co-creation ▪ Project planning/management/break down, prioritise and assign tasks ▪ Acceleration phase/programme: transition from concept to start-up ▪ Experiments/test with clients/end users/A-B-testing ▪ Business case/check-list/spreadsheet tools/due diligence process ▪ Define partnerships/supply chain networks/production planning ▪ Internal and external consultants/legal, commercial and financial advice ▪ Financial planning/feasibility studies ▪ Digital simulation of business models ▪ Definition of spin-off configuration ▪ Benchmarking ▪ Further research to design a platform solution ▪ Grant application ▪ Networking ▪ Finding partners ▪ Recruiting staff/volunteers	▪ Compromising on ideas that actors have fallen in love with ▪ Ownership, keeping up momentum ▪ Realisation that numbers are smaller than expected ▪ Too narrow expertise ▪ Easy to fall back into comfort zone ▪ Finance ▪ Keeping momentum ▪ Non-obvious/unexpected value capture ▪ Setting KPIs ▪ Regulation, health and safety, complexity of requirements ▪ Evaluation of demand/impact in revenues ▪ Internal partners/Bus require extensive documentation not appropriate for the process ▪ Collaboration with BUs, post-prioritisation through internal partners/capacity constraints ▪ New internal business models necessary to smoothen BMID's cross-functional operations ▪ Digital/IT skills gap ▪ Development/selection of the optimal product or services ▪ Platform development ▪ Little confidence in spreadsheets/letters of intent from customers ▪ Time constraints/other obligations ▪ Keeping up momentum ▪ Principal-agent problems ▪ No clear plans/commitments for after the event from the industry partners
4. Piloting & Launch	▪ Pilots ▪ Identifying and agreeing on required changes to their business model ▪ Implement the selected business model design ▪ Implementation planning ▪ Implementation ▪ Development of implementation plan ▪ Communication and team set up ▪ Step-by-step realisation ▪ Implementation completion ▪ Managing the business model roll-out ▪ Converting learnings into business model adjustments ▪ Planning of pilot ▪ Implementation ▪ Analysis ▪ Adjustments ▪ Documentation and communication ▪ Identification of failure modes ▪ Pricing ▪ Customer invoices ▪ Measuring success ▪ Selling ▪ Setting up scale cycles ▪ Identify market segments ▪ Validate in sub-market ▪ Convert one customer group ▪ Test cases ▪ Whole operations ready ▪ User awareness and training ▪ Collect feedback and improve ▪ Customer interviews	▪ Higher gross margins of the incumbent technology in the crucial early phases ▪ Misallocation of resources ▪ Required changes in the current configuration of assets ▪ Failing to remove powerful individuals who resist the change effort ▪ Leaving short-term successes up to chance ▪ Failing to score successes early enough (12-24 months into the change effort) ▪ Not creating new social norms and shared values consistent with changes ▪ Promoting people into leadership positions who don't personify the new approach ▪ External relations ▪ Insufficient information about failure modes ▪ Insufficient funding ▪ Inadequate time-frame/ expectations ▪ Communication issues ▪ Keep analysing ▪ Keeping the media (City) on side ▪ Risk of fast followers ▪ Loss of customers ▪ Attempts to satisfy 100% of current customers

	▪ Pilot tests ▪ Realisation planning ▪ Implementation ▪ Divest for speed ▪ Launch metrics success/ growth ▪ Update internal support systems, management accounts, recruiting, etc. ▪ Sales force education ▪ Business scale/change management ▪ Marketing programme ▪ Coordination and (re-)contracting with supply chain partners ▪ Internal communication ▪ Employee engagement/ enthusiasm ▪ Follow-up/ expanding pilot offer ▪ Scale up ▪ Onboard key customers ▪ Set up business systems ▪ Scale down other activities/ practices ▪ Commercialisation ▪ Marketing material generation ▪ Prepare company capabilities ▪ Train staff ▪ Hiring and promotion ▪ Agree new KPIs ▪ Stage gates ▪ Roadmapping ▪ Lean Manufacturing ▪ Lean startup ▪ Project management ▪ Business case ▪ Benchmark ▪ Spin-off of projects as (semi-) independent start-ups/subsidiaries owned by founders and parent organisation ▪ Hand over to business units/internal clients/hand-off period ▪ Run it within the BMID as a project ▪ Pilot ▪ Contracting/negotiating/outsourcing to internal or external suppliers/implementation/production planning/framework agreements ▪ Lean Startup ▪ Scale from pilot ▪ Pre-launch advertisement ▪ Answer customer questions/establish aftersales service ▪ Re-join the corporate PLM process/address sustainability parameters ▪ Different people required for running than for founding a company ▪ Seed funding/getting budget ▪ Plan every detail and then leave it rather than launch quickly and adapt later ▪ Small margins, tough competition/similar offers, dependence on grants ▪ Reintegration of business into BU ▪ Reintegration of team into line position ▪ Scaling the pilot ▪ Brand recognition for new customer segments ▪ Reaction times to customer feedback ▪ Right timing of BMID pulling out	▪ Changes in top management ▪ Low ROI ▪ Need to be risk free ▪ The problem we started to solve has changed ▪ Brand risk ▪ Dismantling of the old business model ▪ Timescale for "launch" is too long ▪ Inability to manage change/ bring organisation along ▪ Setting targets ▪ Accountability ▪ Timing ▪ Finance change ▪ Have the right support and infrastructure ▪ IT ▪ Tracking success ▪ Learning/continuous improvement ▪ Company behaviours ▪ Customers interacting with new offer ▪ Brand issues
5. Adjustment & Diversification	▪ Set up the management structures to continuously monitor, evaluate, and adapt ▪ Monitoring ▪ Adjustments ▪ Diversification ▪ Monitoring and controlling ▪ Potential adaptions	▪ Declaring victory too soon—with the first performance improvement ▪ Allowing resistors to convince “troops” that the war has been won ▪ Premature, too late or too little adjustment

	▪ Sustained growth through organisation-wide learning ▪ Creation of isolation mechanisms towards competition ▪ Securing long-term competitive advantage ▪ Transition ▪ Managing Multiple Business Models ▪ Monitoring ▪ Reflection ▪ Adjustment ▪ Scale-up ▪ Diversification ▪ Iteration of the business model innovation process ▪ Adaption of talent development model ▪ Lessons learned/ Knowledge management ▪ Learning ▪ Feedback, regular reviews and discussions ▪ Localise to different customer groups/geographies ▪ Establish modus operandi and standard operation procedures/policies ▪ Benchmark ▪ Customer review/feedback ▪ Market analysis ▪ Value capture matrix ▪ Foresight activities ▪ Analysis of customer feedback/product optimisation and customisation ▪ Customer feedback and requirements pool management ▪ Pivot and expand products/services ▪ Develop platform/databases/add new layers to products/services ▪ Diversify into similar applications ▪ Add services to products ▪ Portfolio management ▪ Improve BMI process based on learnings	▪ Inadequate diversification (agent motivations, missing core competencies, no ownership advantage, …) ▪ Unexpected adjustment wins business case ▪ Organisational debt ▪ Transition from minority culture to majority culture ▪ Feedback channels back to design ▪ Sustaining KPIs ▪ Centralisation vs decentralisation ▪ Willingness to adjust ▪ Timing ▪ Scaling, growth ▪ Unclear motivation for growth ▪ No portfolio management ▪ Lessons learned, improving BMI process

To increase procedural transparency the table is not consolidated. That means that redundancies between the frameworks are not eliminated. For example, if framework version 0 contains the item, “Value Mapping Tool” and framework version 1 the entry, “Value Mapping”, both will be listed.

This framework will be discussed together with the results of this research in the following section, Chapter 6.

6. Discussion

This chapter first discusses key findings of this research in Section 6.1, before it shortly outlines how the findings can be translated into a management tool in Section 6.2. Subsequently, Section 6.3 illustrates some further findings of this research, before Section 6.4 concludes the chapter with a discussion of the research's limitations.

6.1 Discussion of key findings

This section discusses the findings around the sustainable business model innovation process from the last two chapters. This discussion reflects some earlier findings of this research, published in Geissdoerfer et al. (2017b).

Throughout this chapter "data" refers to all collected data in the three empirical research steps, except where specified otherwise.

6.1.1 Process steps

The research has addressed research question 1: *What steps does an organisation undergo when creating sustainable business models?*

All steps from literature were confirmed. None of the empirical data suggests that any step synthesised from the literature in framework version 0 is inadequate or does not manifest itself in the observed activities. Thus, the initially identified steps are supported by the investigated evidence. This was expected because the literature in the business model innovation field, from which the steps were synthesised, is relatively comprehensive and mature, as outlined in Chapter 3.

However, this does not necessarily apply for the whole body of literature on business model innovation, since there are some considerable outliers that were consequently not included in the conceptual framework (version 0). For example, efforts to understand the current business model as prescribed by Mitchell and Coles (2004) are not featured in the data on key activities, presented in Table 25, 29, and 33. This can indicate that the step is not seen as important to practitioners and can be disregarded; but it could also be due to a wrongly held belief that the current business model is already sufficiently understood or a lack of awareness of this activity and the value it would create.

A pre-step was added, and setup and preparation activities were included as extra steps. The pre-step was added based on the data provided in the focus groups, F1 and F2. It aims to provide clarity about the motivations and objectives to engage in business model innovation at the outset of the process and to clarify why business model innovation is the right approach in the specific context. Since the qualitative interviews provided considerable data on organisational setup considerations, presented in Table 27, this was also added to the pre-step. A preparation step was added after the qualitative interview data in Table 29 indicated comprehensive preparation activities that did not fit adequately to any existing step.

Furthermore, steps with high interdependencies were consolidated. The evidence suggests considerable interdependencies between all steps, which seemed particularly pronounced for the following pairs of steps: Preparation and Ideation, Concept Design and Prototyping, Detail Design and Experimenting, Piloting and Launch, Adjustment and Diversification. For example, the pilot was often scaled up from the initially defined part of the market to additional customers until the entire target market was covered. This constitutes a seamless transition from pilot to launch activities. Therefore, the author decided to cluster these pairs of steps together.

These considerations result in a five-step process, illustrated in Figure 19, with a pre-step that can but must not be seen as integral part of the process. While this pre-step was seen as essential by both focus groups, it is not common in the literature, with a few exceptions, like Osterwalder and Pigneur's (2010) Mobilise phase, which shares some characteristics. The step also prompted some information on activities that might not qualify as activities in a narrow sense–for example items describing objectives or the organisational setup. Therefore, this pre-step might or might not be seen as an integral part of the sustainable business model innovation process, depending on the scope of the research or practical application that the framework should inform.

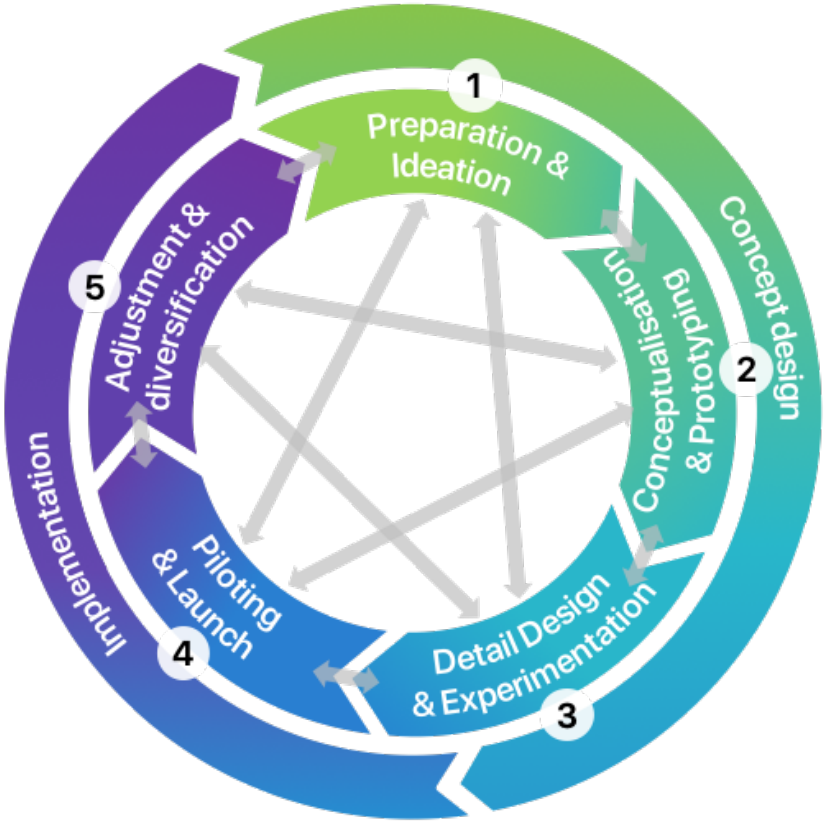


Figure 19: Circular depiction of the SBMI process

6.1.2 Key Activities

The research has also addressed research question 2: *What are the key activities in each of these steps?*

Most activities found in the literature could be confirmed in the empirical data in Table 25, 29, and 33. This only applies to items made sufficiently explicit by the research subjects. For example, if an interviewee reported brainstorming activities but failed to state that the Business Model Canvas was used to guide this brainstorming, the activity would have been included into this study without the tool.

Some activities were not mentioned by any participant. This especially included some tools, like Osterwalder and Pigneur's (2010) Business Model Environment and Business Model Perspective on Blue Ocean Strategy. Similarly, few of the sustainability focused tools in the literature were reported. Only the Value Mapping and the Value Ideation tool were observed to be used in the cases, see Table 25 and 29.

Because of the nature of the data collected, the study design focuses on identifying additional activities rather than being able to refute items from the literature. As discussed, items might simply not have been reported by the participant or on a different level of granularity or companies not included in the sample might hire authors like Osterwalder to facilitate workshops, leading to the adoption of business model innovation activities around the Business Model Environment and Business Model Perspective on Blue Ocean Strategy concepts. For this reason, none of the activities identified in the literature was explicitly refuted and all activities have been transferred to framework version 4 to provide a basis for further investigation as outlined in Section 7.6.

6.1.3 Key Challenges

The research has also addressed research question 3: *What are the key challenges that an organisation faces when creating sustainable business models?*

Some challenges identified in the literature could be confirmed in the empirical data in Table 26, 30, and 34; but a more varied picture than with activities emerged and, overall, less challenges were reported. This could be due to the employed research methods: both in the focus groups and the qualitative interviews, the challenges were generally discussed after the activities, which sometimes lead to less time being available and the concentration of the participants having decreased.

Since most of the observed business model innovation processes were relatively novel for the case organisations, the interviewees might also have been more exposed to the activities than to the challenges of the process, the latter of which becoming more apparent over time. This is also reflected in the business model innovation literature, where activities are considerably more comprehensively featured than challenges.

There are some trends in the data that can point to items that pose particular challenges for organisations engaging in business model innovation activities:

- Team works only part-time on project and keep their line position: This was reported as a key challenge. Members of the business model innovation team were only part-time on the business model activities, while keeping their line responsibilities.

- Resource and capability silos and issues in cross-business unit collaboration: Most business model innovation departments in my sample were reliant on support from other departments. However, it

was reported to be often difficult to get access to these resources and capabilities.

- Digitalisation and Digital Transformation: the digitalisation and digital transformation often motivated the business model innovation activities. However, many of the case organisations reported that this poses a considerable challenge to them.

- Entrenched and legacy processes, mindsets, and culture with rigid hierarchies: Some interviewees reported that their agile business model innovation activities and the entrepreneurial culture this promotes creates conflicts with existing processes, mindsets, organisational culture that leads to friction and inertia.

Few challenges were related to sustainability. A reason for this might be that most of the activities performed are not sustainability related and that the ones which are, are mainly high level or tools that come with facilitation, where less difficulties occur or where the research subjects are less aware of. Another issue might be that the participants were not aware of some sustainability related aspects and therefore remained also unaware of the associated challenges.

Analogue to the activities, the research design is more adept to complement than to refute challenges in the literature. Therefore, the challenges identified in the literature were also transferred to framework version 4 to provide a basis for further investigation as outlined in Section 7.6.

6.1.4 Sustainability focus

The initial conceptual decision to include sustainability focused elements in the activities rather than in the steps, as observed in the two existing approaches on the topic was confirmed by the data. No research subject indicated that there are major steps that focus on sustainability.

There were three types of case companies that pursued pro-active, pragmatic, and punctual focused sustainability strategies. Sustainability considerations could be found in the strategy, vision, and self-conception of the pro-active case organisations. Some of the cases perceived themselves as sustainable organisations that try to perform all of their activities in a sustainable way. Other more pragmatic cases had sustainability considerations as part of their corporate or business strategy and have developed implementation indicators. These indicators they employ in prioritisation (C13) or product lifecycle management (C22) processes to translate their sustainability objectives into the business model innovation activities. Other organisations are more punctual focused and aim at specific sustainability strategies, like resource consumption, being climate neutral, or being a good neighbour, and try to integrate this into their business model innovation activities; for example, by conducting dedicated brainstorming workshops (C17).

Few of the sustainability focused tools in the literature were used. Only Value Mapping (Bocken et al., 2014) and Value Ideation (Geissdoerfer et al., 2016) featured in the sample, in Table 25 and 29. Some case organisations for example integrated external stakeholders or their proxies into the process (e.g. C5, C11, and C18) or used the PLM process to control sustainability parameters (C22). Also, C13 used their idea prioritisation process to integrate sustainability focused elements of their strategy. This suggests that activities that link the corporate or business strategy to the business model activities might be good levers to integrate sustainability. This applies, for example, to the prioritisation and portfolio management activities in the cases (Table 29).

From the evidence in Table 25, 29, and 33, it appears that while sustainability plays an important part in the strategy and/or self-conception of the case organisations, it is not yet adequately reflected in their business model activities.

A reason for this might be that, because of the novelty of the observed business model innovation activities for most case organisations, practitioners are currently focusing on making the process work rather than using it as a tool to achieve strategic goals like sustainability. The researcher also observed that many of the case organisations saw their business model innovation activities first of all as an answer to the challenges of digital transformation (e.g. C21, C22, and C23). As a result, much of the focus of the business model activities is on digitalisation and perceived adjacent topics, like fostering an entrepreneurial culture, rather than on other strategic goals including sustainability related aspects.

6.1.5 Other process considerations

The data indicates that there is a high interdependency between the different steps, especially, but not exclusively between preparation and ideation, conceptualisation and prototyping, detail design and prototyping, piloting and launch, and adjustment and diversification, but also, between the other steps, for example, the end of ideation and beginning of conceptualisation are hard to distinguish in many of the reported processes.

The process also seems to be highly iterative. While in most of the observed cases some form of sequential process was followed, steps were reported to be repeated, omitted or conducted in a different sequence. This means that some projects use less than five steps or skip some activities within the step, while some steps and activities might be done more than once and in a different order.

The process is also potentially circular in nature. Adjustment and diversification activities might require repeating some or all activities, effectively starting the process again in some cases.

Compared to the literature, the data suggests that prototyping, experimentation, and piloting play a central role in industrial practice. The literature about all three concepts seems to be still emergent. This study suggests unclarity and ambiguity of what each concept constitutes and what the differences between them are in both literature and practice

Another recurring topic brought up by the study participants concerns timeframes and milestones. There was some evidence of milestones or gates being used to determine the length of the steps, respectively some of the underlying activities. It was not clear how the length of these time frames was initially determined, but there seemed to be flexibility in applying them. Furthermore, there was evidence that some organisations might use learnings from the process to adapt their milestones and optimise the time frames over time.

6.2 Translation into a management tool

The focus groups, F1 and F2, indicated that the resulting framework of this research could be used as a management tool. This can provide another layer of practitioner support to help organisations to improve their business model innovation activities towards solving the industrial problem underlying this research: the high failure rates of the process. The findings of this research can be translated into two different tools: a map and a brainstorming guide.

Framework version 4 can be translated into a map by transforming the framework into a format that can be used, for example, as a poster and shows all the steps, activities, and challenges identified in this research. This tool can then be used to provide an overview of what activities can generally be expected and what challenges must be addressed. Thus, practitioners engaging in business model innovation can discuss which items apply to their specific context and check their plans for comprehensiveness. In this way, it

can also be used as a checklist along the process. A draft of the tool is illustrated in Appendix I.

The framework can also be translated into a tool to ideate and plan the different phases, identify challenges, and select tools, customised for the specific needs and context of the organisational unit. Therefore, all entries on activities and challenges can be removed from the map tool. Now the tool can be used, for example, as a poster on which participants can attach post-its with items for activities and challenges for each step. These ideas can then be discussed and prioritised. The result can be documented and communicated as an initial plan for the business model innovation process. It can be adapted along the way. By analysing and reflecting the changes, this can also be used for lessons learned to improve the process over time. A draft of the tool is illustrated in Appendix J.

The tools can be combined with feedback forms for the participants with questions on the effectiveness and potential improvement potentials. In this way the tools can be improved until a saturation in the improvement potentials indicates that an effective state is reached, analogue to the approach used to develop the Value Ideation process (Geissdoerfer et al., 2016)

6.3 Other insights

Besides addressing the research questions and providing insights on the steps, activities, and challenges of sustainable business model innovation, the research also provides a range of additional insights, two of which are outlined in this section: (1) organisational setup and (2) success factors. As indicated in Section 2.1, these are of a more exploratory character.

6.3.1 Organisational setup

This section describes insights on how the sustainable business model innovation process is organisationally implemented concerning (1) organisational structures; (2) team formation mechanisms; (3) performance measurement, and (4) incorporation of the new business model towards the end of the process.

Organisational structure

There seem to be three organisational structures in the data: (1) innovation programmes; (2) business model innovation departments; and (3) project teams

1) **Innovation programmes:** Some case organisations, like C13, had innovation programmes in place to develop new business models. These programmes were led by individual regional and functional divisions of the corporation. For example, one innovation programme of C13 was for their automotive division in their Asian region. These programmes allow employees to submit ideas, prioritise the ideas, and form and manage projects to translate them into a business model that is then handed back to the division.

2) **Business model innovation departments:** Also called digital transformation offices in my sample, seem to be a new phenomenon. The cases C1, C13, C17, C20, C21, C22, and C24 featured instances, which existed for around two to five years and the phenomenon is not described in the reviewed literature. In the case organisations, these organisational units were located at a central, strategic position. For example, at C13, the business model innovation department was organised as a central staff department directly below the c-suite, analogue to the strategy department, and at C20, the digital transformation office was set up as a subdivision of the corporate

strategy unit. All of these units in the sample employed a lean organisation that combined incubator, accelerator and internal consulting roles to address digital transformation topics. They serve internal clients or teams formed through internal competitions and application rounds and currently exclusively consist of internal teams from other business units, sometimes, as in C20, combined with staff from the business model innovation department. There is some overlap in scope with other R&D and innovation programmes, with companies like C13 running a multitude of overlapping schemes in different divisions and geographical locations. The business model innovation department differs from these programmes by being placed more centrally and higher in the corporate hierarchy and being explicitly focused on business model innovation.

3) **Project teams:** Some organisations, like C2 and C5, employed project teams for their business model innovation activities. These were either dedicated teams running business-to-business business model innovation projects for external clients, as feature in C5, or, as in C2, formed to develop business around internal ideas, similar to the business model innovation department but with less facilitation and only a handful of internal and external facilitators being part of the process.

There were also cases, like C11, C19, and the business model innovation programme, that feature characteristics of both business model innovation departments and project teams. The cases featured organisational units that act like and share many characteristics of business model innovation departments. However, the teams participating in their business model innovation activities are project teams sent by external clients and returning to that client after the programme.

The data indicates that at least for the project teams and business model innovation departments a top management or even C-level sponsorship

might be required. Most of business model innovation departments in my sample were also founded by that sponsor.

Team formation

The case organisations employed two different ways of forming teams: (1) teams participated with an idea in a competition or (2) separation from idea generation and team formation with teams being formed of employees from the different organisational business units involved. All interviewees also referred to but–with the exception of C22–had not implemented a third possibility: (3) to open the process for external teams.

1) **Self-forming teams:** Teams form around an idea or come up with an idea together, without interference from the business model innovation department. For example, in C1, C13, and C22, the teams form during their line activities and apply together for the business model innovation programme with a joint business idea. There are usually several decision points, where participants can decide to leave the team, especially at the end of the project, where they were asked by C1 and C22 to leave their line positions and work full-time for the spin-out created out of their project.

2) **Separation from idea generation and team formation**: Some organisations, for example C2, C19, and C20, worked with teams formed of employees from the different organisational business units involved. Here, the client of the business model innovation department chooses team members. The business model innovation department can give recommendations for the team composition or ask for specific staff, but the decision lies with the business units. C20, for example, reported that they usually provide recommendations that are often followed but not always, because of resource, staffing, and other considerations of the host department.

3) **External teams:** The business model innovation process can also be opened to external teams. While most of the interviewed companies, including C1, C20, and C21, intend to open their business model innovation activities for external teams to bring in ideas that are new and unconventional to their organisation, only C22 reported to have implemented such a scheme. Analogue to the approach of self-forming teams, a competition for which external teams could apply with solutions for a specific digitalisation challenge was launched, parallel to the internal campaign.

There were also cases, like C20, where staff from the business model innovation department supported and joined teams formed by their internal clients with their own staff in the areas: business analysis/architecture, design and marketing, and engineering/programming.

Measurement

There were three different kind of indicators or decision dimensions used by the case organisations: (1) Indicators commonly used in the context or industry and legacy indicators, (2) indicators specific to the unit of analysis, and (3) purpose-oriented indicators.

1) **Indicators commonly used in the context or discipline:** This refers to commonly used key performance indicators in an industry, functional area, or organisation, like return on investment (ROI), earnings before interests and taxes (EBIT), and market share. For example, C2 used the same growth and profitability indicators, especially Return on Investment (ROI) for the controlling of their new business models than they used for their main operational business unit, oil and gas. Thus, they follow standard accounting and performance measurement practises, found in the literature (see e.g. Parmenter, 2015; Weber and Schäfer, 2016)

2) **Indicators specific to the unit of analysis:** Indicators specific to business model innovation seem still in early stages but emerging in the case organisations. These indicators can be based on key assumptions or bottlenecks for the business model's success relative to an initially initiated baseline. For example, in the business model innovation programme that the researcher joined, it was proposed to estimate the number of users a platform business model needs to be sustainable per time period. From this number, a growth rate was determined that was then translated into milestones. Thus, it was measured whether at point X in time, the necessary number of users Y was reached. This is in line with first conceptualisations in the literature, like the performance measurement system of the Lean Startup concept (Ries, 2011). It was also observed that case organisations used projects reaching certain "survival" points like handover, spin-off, three years in the market etc. as an indicator for their programmes' success. For example, C2 measured how many of their projects reached the pilot phase, where they were handed over to a business unit.

3) **Purpose-oriented indicators:** Some companies voiced objectives that go beyond the performance of the business model innovation projects and the resulting ventures. For example, C1, C2, and C22, stated that one, or in the case of C2 the, major goal of their business model innovation activities is to change the organisational culture to become more entrepreneurial. To measure performance towards this objective, it has to be translated into measurable indicators, for example by using the SMART (Doran, 1981) framework. For entrepreneurial organisational culture, this could be occurrences of expected or desired behaviour, like the number of side-projects that employees are engaged in or the number of applications to entrepreneurship focused competitions.

Business model incorporation

The data indicates two ways of incorporating new business models towards the end of the sustainable business model innovation process. The new venture was either (1) handed over to a business unit or (2) spun out as a subsidiary.

1) **Existing business unit:** Some of the case organisations, like C2, C17, and C20 handed the business model concept to a business unit for implementation. This could be either an internal client, like in C20, or the most appropriate business unit to run the business, like in C2. It can be either run with the existing project team, like in C20 or with staff from the business unit. C20 also had a considerable hands-off period, where the business model innovation department helps the business unit to take over the venture.
2) **Spin-off**: In some cases, for example C1, C22, and C24, the business model was spun-off as a subsidiary. These subsidiaries were majority owned but independent from the parent organisations and used their own brand. The subsidiaries are run by the initial project teams, who leave the parent organisation for this reason and share ownership.
3) **Pure investment:** A research subject in C1 indicated that if the new business model was too different from the core business and the capabilities of their organisation, it would be spun out not as a subsidiary but as a completely independent startup. The parent organisation would invest, but not retain a controlling stake in its ownership or influence its development pro-actively. However, such a case had not yet occurred in C1.
4) **New business unit:** C13 reported of a business model innovation project that was set up as a new business unit within the organisation. While it thus is relatively independent from other business units, it is still firmly embedded within the corporate framework and its processes.

6.3.2 Success factors

This section describes the success factors for the sustainable business model innovation process as reported by interviewees and the participants in the focus groups. This comprises (1) factors that were reported to increase the success of the process; (2) factors that were reported to increase the success of the organisational setup; and (3) reported success factors that do not fit into these two categories.

Factors that can increase success of the process

Prototyping, experimentation, and piloting were perceived as important by the case organisations, see Table 25, 29, and 33. The research subjects reported that this opens the process for real market feedback rather than conventional market research, top management decisions, and other predictive methods that can overestimate demand, wrongly predict customer preferences, and overlook customer segments. This confirms similar considerations in the literature, for example by Ries (2011), Plattner (2011), or Blank (2013).

Iterations and pivoting play an important role. While many processes are described in a largely linear fashion in the literature, for example by Schallmo (2013) or Wirtz and Daiser (2018), the research subjects reported that they repeated or skipped steps in the process. Some case organisations, like C1, also emphasised how important pivoting offerings and customer groups until a viable combination is found is for the success of some of their projects. This confirms the emphasis of iterations found in Design Thinking (Plattner, 2011) and the emphasis on pivoting integral to the Lean Startup concept (Ries, 2011).

In both of the above, the integration of real customers early on in the process was seen as important by many research subjects. This is in line with the co-

design (Prahalad and Ramaswamy, 2004) and Design Thinking (Brown, 2009) concepts.

Factors that can increase success of the organisational setup

Organisational sponsors from the top management team were reported to be advantageous. They can use their political capital to protect the business model innovation activities from objectors within the organisation. Every failure business model innovation project is likely to feed on that capital. As outlined in Section 1.2, the business model innovation process has a very high failure rate. Unlike an R&D department and its product innovation activities, the necessity of business model innovation departments is not established in many organisations, and failure is not sufficiently recognised as a necessary part of the process. Therefore, some participants have reported that their unit faces to be shut down, once the sponsors are not able or willing to support their activities anymore.

Business units seems to kill even successful new business models, because of resistance to change, commitment overlaps, cultural barriers, and inadequate financial controlling. My data indicates that spin-outs are the better solution. They allow a sense of ownership, offer clear accountability, and leave more freedom to pivot. The project can also be implemented as a pure investment for the organisation. While this investigation has fewer data points on this configuration, the existing data points towards less commitment and non-monetary resources from the parent organisation. Last but not least, there was one case, C13, that set up a business model as its own business unit, which might provide the advantages of a subsidiary with more formal ways to acquire corporate resources. However, this might also leave less freedom to pivot and avoid legacy processes and poses a higher risk for reputational damages to the head organisation.

It was repeatedly indicated that opening the business model innovation process for external teams and ideas is expected to be advantageous. The

research subjects expected this to bring in new, more innovative ideas that are less connected to the current activities of the organisation and an outside view. This is in line with Open Innovation theory (Chesbrough, 2003), although the concept's application on the business model innovation process seems underinvestigated in the literature.

Other success factors

Company culture was repeatedly stated as important, with risk aversion and adaption to one or a few legacy business models being stated as counterproductive.

The researcher also noted that all examples that were reported as successful or promising by the research subjects were business-to-business and not business-to-customer. This might indicate that business-to-business projects have a higher success rate for the investigated business model innovation processes. This could be because large business-to-business customers might be better able to understand and express their problems and needs, define the solution space, and make reliable and comprehensive commitments. This solves part of the uncertainty and volatility of customer demand, which is seen as the biggest challenge of business model innovation by a range of authors, like Ries (2011) or Brown (2009).

6.4 Limitations

The strength of this research lies in its strong foundation on a large and relatively mature body of literature and in the large amount of evidence compared to other studies in the reviewed literature. More than 1,500 academic publications and over 63 hours of interviews with 61 representatives of 24 companies were considered in this research. Nevertheless, the research design also has a range of trade-offs.

Qualitative research aims at sense-making and pattern recognition among words to build or refute theory. It is based on non-numerical information and their interpretation, which involve human senses, subjectivity, emotions, and perspectives from both the researcher and their subjects. While this desirably leads to depth and colour that enriches the findings, it would be considered undesirable bias in quantitative research and there is a lack of consensus for assessing the quality and robustness of qualitative research. (Ali and Yusof, 2011; Easterby-Smith et al., 2015; Leung, 2015)

Nevertheless, to provide some indication of the quality of this research, this section discussed the limitations of this research by first reflecting on the research methods employed: the literature review and the three empirical methods, before providing some comments on its validity, reliability, and generalisability.

The literature review

The initial literature review followed common practice to reduce complexity of the initial sample while increasing relevance through cross-reference snowballing. Relevant publications not covered by the database or not fitting the applied search criteria are not included in the initial sample; and since snowballing only addresses publications cited by, and therefore published before, the publications in my sample, papers published after my initial sample collection would have also not been included. This also applies to publications at the margins of the research field that have not been sufficiently cited. The content analysis was conducted in a structured and systematic fashion but involves some levels of subjectivity in defining relevant extracts and the best way of codification.

Empirical research methods

Due to the complexity of the subject and the abstraction level of this study (Creswell, 2014; Easterby-Smith et al., 2015; Yin, 2014) combined with the

resource restrictions and the specific data access issues of working with top management representatives, only 24 cases could be compared in this study.

While this is the most comprehensive approach of its kind compared to the reviewed literature, the sample size does not lead to statistically robust results (Angrist and Pischke, 2008). Therefore, a qualitative approach has been selected for this research (Silverman, 2013) and, for all of these reasons, the findings of this study are necessarily hypothetical in nature.

All information is self-reported by the participants and might be influenced by lack of knowledge or personal biases of the interviewees. Since the interviewees were selected for certain criteria as outlined in Section 2.4, these biases might be systematic. There is also a feedback loop between the theory on which the conceptual framework is built and the investigated practice, since the practitioners inform themselves, are exposed to the theory during education and trainings, and are advised by consultants and academics that use parts of it. (Robson and McCartan, 2015; Silverman, 2013).

While adding considerably to the theory and relatively thin layer of empirical evidence in the field (Foss and Saebi, 2017), the outcome of this research is understood as transparently researched qualitative hypotheses that are yet to be proven quantitatively. Comments on quantitative validation are provided in Section 7.6.

Validity

Validity in qualitative research concerns the appropriateness of the research question to achieve the desired outcome, of the research design and methodological choices to address the question, of the data collection and analysis for the research design, and of the results and conclusions for the sample and context (Leung, 2015).

The research questions of this study are based on a clear research gap that addresses the underlying industrial problem of potential sustainable business model innovation underperformance. Since the research provided valuable insights towards a better understanding and some direction towards addressing this underperformance, the research questions seem appropriate and thus valid. However, there might have been alternative research questions that might have yielded additional or more relevant insights.

Although the research allowed for exploratory elements, it was developed based on existing conventional and sustainable business model innovation theory in order to be able to contribute to the knowledge in the relevant fields. At the same time the theory and the conventions of the respective research fields come with inherent bias that influenced the researcher's choices of scope and methodology. To increase the validity of the research design, a relatively broad sample for the literature review was selected and three different empirical methods were used for triangulation.

As outlined in Section 7.6, the author recommends further investigations into the validity of the findings through additional quantitative and longitudinal research with a larger sample size.

Reliability

Reliability addresses the replicability of the research design and findings; in qualitative research this definition of reliability is epistemologically counter-intuitive and difficult to implement in practice (Leung, 2015). Therefore, reliability is mainly focused on consistency for qualitative research (Carcary, 2009; Grossoehme, 2014; Leung, 2015).

To improve the reliability of this study, the recommendations by Silverman (2013) were followed: (1) refutational analysis and constant data comparison: the different research methods were used sequentially and the results of each were compared to the literature and the findings of the previous method

– however, only the investigation of the process steps was investigated using refutational analysis and the data suggested that there were steps missing rather than not applicable, the nature of the data, the context, and the investigated phenomenon of the activities and challenges were not suitable for refutational analysis, here the analysis concentrated on gap analysis and consolidation of data points; (2) , comprehensive data use inclusive of the deviant case: this study made comprehensive use of rich data, in which every sampled case of sufficient data quality was used ; and (3) use of tables: all findings were presented in tables and an overview of all tables used in the analysis is provided in the Appendix, to increase the transparency of the approach. As for the variability, the research design also included three different empirical research methods to provide some level of triangulation.

Generalisability

The generalisability refers to the transferability of study results to a broader context or theory, that is to instances other than the ones directly investigated (Easterby-Smith et al., 2015; Leung, 2015; Silverman, 2013).

This research followed the advice of Finfgeld-Connett (2010) and took great care in sampling, triangulation, constant comparison, and documentation. The research is firmly based on the business model innovation literature through a comprehensive and thorough review of that field. Most publications in this field are implicitly generic, analogue to the use of this term in the Strategic Management field (Grant, 2010), which mean they apply to a broad range of organisations in a broad range of contexts. This is most pronounced in Osterwalder and Pigneur (2010) and might have its roots in early conceptualisations based on the value chain (e.g. Knyphausen-Aufseß and Meinhardt, 2002), although it does not seem to be sufficiently grounded in evidence (Foss and Saebi, 2017).

Due to the scope and maturity of the literature the results might apply to any company. However, as outlined above, the sample size is small and

constrained to large companies in only some industries. Therefore, the outcome of the empirical parts of this research might not apply to, for example, smaller companies or industries not represented in the sample. Therefore the findings would require a comprehensive validation in a sufficiently large and representative sample of organisations and contexts to statistically legitimate the adoption of the current generalist scope of the business model innovation field (Angrist and Pischke, 2008). Which could also be true for the business model innovation field itself.

7. Conclusion

After providing a short summary of the key findings in Section 7.1, this chapter outlines the contributions to theory of this research in Section 7.2, before illustrating contributions to practice in Section 7.3. Section 7.4 subsequently discusses the implications for research and Section 7.5 for industrial practice. The chapter concludes this dissertation with some recommendations for further research.

7.1 Summary of key findings

This research has reviewed the business model innovation literature and the sustainable business model innovation literature to develop a conceptual framework. This framework was refined with empirical data from three different research methods: focus groups, qualitative interviews, and participatory action research.

To answer the first research question–*What steps does an organisation undergo when creating sustainable business models?*–this research has developed a five-step process framework, with the steps: (1) preparation and ideation, (2) conceptualisation and prototyping, (3) detail design and experimentation, (4) piloting and launch, and (5) adjustment and diversification. A pre-step, motivation and setup, was also identified and might be added to the process, depending on the scope of its application.

This research also addressed the second research question–*What are the key activities in each of these steps?* Key activities were identified from the literature and the collected empirical data. These activities were then associated to the different steps of the process.

The third research question–*What are the key challenges that an organisation faces when creating sustainable business models?*–was addressed by identifying key challenges in theory and complementing them with data from the employed empirical research methods. Analogue to the key activities the challenges were subsequently associated to the process steps.

Together, the findings from the three research questions can be combined into a process framework for sustainable business model innovation, illustrating its steps, activities, and challenges. A suggestion for how this framework could be transferred into a management tool was also provided.

Furthermore, the research generated additional insights on the organisational implementation of the process that was observed in the case organisations. This included findings on the organisational setup and self-reported success factors.

7.2 Contribution to theory

This research addresses a gap in the sustainable business model innovation literature. It investigates the understudied phenomenon of sustainable business model innovation and its challenges. The results of this study contribute to the theory in both its main academic field of sustainable business model innovation as well as the overarching discipline of business model innovation. For the relationship of both concepts as understood in this research, please refer to Section 2.2.

The contributions to theory discussed in this section are exclusively related to the literature reviewed in this research. For details of the literature review process, please refer to Section 2.2. This research provides the most comprehensive literature review on the definition and process of sustainable business model innovation, as well as the adjacent concept of business model innovation, to date. This review is accompanied by the most comprehensive

empirical study identified in the sustainable business model innovation literature. It increases the conceptual clarity of the concepts of: (1) business model, (2) business model innovation, (3) sustainable business model, and (4)sustainable business model innovation as well as the (5) business model innovation and (6)sustainable business model innovation process, and its (7) challenges.

The research has identified five different process steps within sustainable business model innovation: (1) preparation and ideation, (2) concept design and prototyping, (3) detail design and experimenting, (4) piloting and launch, and (5) adjustment and diversification, as well as a pre-step that might be considered a part of the process, depending on the conceptual scope of the context: (0) motivation and setup

This is accompanied by a comprehensive list of underlying key activities and tools that have been assigned to each of the process steps (Table 36 in Section 5.4). This is the most comprehensive listing of business model and sustainable business model innovation activities identified in the literature and is the most grounded in evidence found in the sustainable business model innovation literature.

This leads to a uniquely comprehensive conceptualisation of both the business model innovation process as well as the sustainable business model innovation process to date. It is also the first theoretical framework that describes the entire sustainable business model innovation process in detail and specifically considers its iterative and circular nature on the inter- and intra-step as well as on the process level. The researcher has identified that activities and steps might be repeated, omitted or conducted in a different sequence, and the entire process cycle might be repetitive.

The author argues that the comprehensiveness and the focus on the iterative and circular nature of the process of this research’s output makes it a more adequate descriptive framework for the generic business model innovation

process than is present in the literature. This is because the framework is valid for a greater number of instances of actual processes in practice. For example, the process framework validly describes both new approaches like Lean Startup (e.g. Ries, 2011) and the more planning oriented conventional processes that it claims to replace (e.g. Schallmo, 2013).

This research also identified the key challenges of the business model and sustainable business model innovation process that has been assigned to each of the process steps (Table 36 in Section 5.4). This is the most comprehensive listing of business model and sustainable business model innovation challenges identified in the literature and is the most grounded in evidence in the sustainable business model innovation literature.

Furthermore, the design-implementation gap of sustainable business model innovation was postulated in this research. This conceptualisation can provide an explanation for the high failure rates of business model innovation and sustainable business model innovation activities. These failure rates are recognised in the literature, but the extend of the problem and its causality are underexplored.

Finally, this research adds to the knowledge about the organisational setup of the business model innovation process and sustainable business model innovation process and its success factors. It provides insights concerning (1) organisational structures, (2) team formation mechanisms, (3) performance measurement, (4) incorporation of new business models, (5) success factors for the configuration and implementation of the process, (6) success factors for the organisational setup, and (7) other success factors.

7.3 Contribution to practice

This research provides a comprehensive framework to guide the sustainable business model innovation activities of industrial practitioners. The research provides information on key activities and challenges. This can support practitioners in planning their activities more effectively and anticipate key challenges.

The thesis also proposes the development of a tool that can further support and guide the planning of the business model innovation process. The tool can provide a template for the process, that can be translated into a customised process for different context or used to compare and complement existing processes. It also allows to anticipate key challenges along the process.

The research also provides insights into how practitioners can implement the sustainable and conventional business model innovation process in their organisation. It discusses aspects of its organisational setup and indicates best practises observed in the case organisations. This includes insights on the organisational structure, team formation, performance measurement, and incorporation of successful projects.

7.4 Implications for research

The results of the literature review can increase the conceptual clarity of the sustainable business model innovation and business model innovation field. It provides a conceptual basis to investigate sustainable business model innovation.

This is especially relevant for investigations into the sustainable business model innovation process. The research provides a framework to research the details of each step, activity and challenge.

The conceptualisation of the design-implementation gap can be a basis for comprehensive insights into business model innovation and sustainable business model innovation challenges, and their integration, analogue to other disciplines like change management.

The exploratory findings and process framework can facilitate the engagement into the novel research field of business model innovation implementation. Especially, this research first describes the phenomenon of business model innovation departments or digital transformation offices in the literature.

7.5 Implications for practice

A comprehensive framework and tool to guide sustainable business model innovation processes can facilitate the planning, communication, and implementation of these activities. Building up organisations' sustainable business model innovation capabilities can lead to higher implementation (more attempts) and success rates (more hits per attempt) for these activities.

The information about organisational implementation, including the discussion about success factors and setting the process up organisationally, can help organisations in establishing business model innovation departments and project teams to complement their research and development (R&D) activities and innovation management.

Both can lead to an accelerated development of more and more successful sustainable business models. Thus, the underlying industrial problem of this research–sustainable business model innovation underperformance–is mitigated.

This can not only help organisations to meet their sustainability ambitions, but can also contribute to leveraging the private sector's resources and capabilities to support the transition to a more sustainable economic system.

7.6 Recommendations for further research

This section presents some opportunities for future research that have been identified in this investigation.

First, I would encourage conducting a longitudinal survey to confirm or expand the results of this study. As outlined in Section 6.4 about the limitations of this research, this qualitative study would greatly benefit from a quantitative investigation of sufficient sample size to validate or refute the key findings of this study and complement them with items that were not included in the data of this research. While this research is based on a broad and mature literature basis, the underlying business model innovation and sustainable business model innovation literature would benefit from a more robust empirical basis.

Furthermore, patterns and context dependencies could be investigated. While the literature to which this study contributes assumes applicability to a broad range of different organisations and context, this has not yet been validated empirically. Therefore, I would recommend investigating and compare different activities in different organisational contexts, for example in different industries, company sizes, and ownership forms. Through this comparison patterns and interdependencies can be uncovered and the literature and its practical advice can be better tailored to different organisations and environments.

I would also recommend to investigate each of the identified elements in detail. This would allow to build a comprehensive toolbox for each phase and provide comprehensive guidance of each of the challenges forming the

design-implementation gap. This could be combined with rich case studies to provide in-depth examples for practitioners.

Finally, I would encourage to look into the following areas that currently constitute key research gaps in the investigated field: (1) the link between conceptualisation and implementation, (2) metrics and process controlling, (3) multi-business model portfolio management, (4) the relationship between business model innovation and other forms of innovation, like product and service innovation, and (5) time frames for each phase and milestones between steps.

References

Abdelkafi, N. and Täuscher, K. (2016), "Business Models for Sustainability From a System Dynamics Perspective", *Organization & Environment*, Vol. 29 No. 1, pp. 74–96.

Acero, L. and Savaget, P. (2014), "Plural Understandings of Sociotechnical Progress Within the OECD", *12th Globelics International Conference, 19-31 October 2014, Addis Ababa, Ethiopia*.

Afuah, A. (2004), *Business Models: A Strategic Management Approach*, McGraw-Hill/Irwin, Boston.

Ali, A.M. and Yusof, H. (2011), "Quality in Qualitative Studies: The Case of Validity, Reliability and Generalizability", *Issues In Social And Environmental Accounting*, Vol. 5 No. 1, p. 25.

Amit, R. and Zott, C. (2001), "Value creation in E-business", *Strategic Management Journal*, Vol. 22 No. 6–7, pp. 493–520.

Amit, R. and Zott, C. (2012), "Creating value through business model innovation", *MIT Sloan Management Review*, Vol. 53 No. 3, pp. 41–49.

Andal-Ancion, A., Cartwright, P.A. and Yip, G.S. (2004), "The Digital Transformation of Traditional Business", *MIT Sloan Management Review*, Vol. 45 No. 2, pp. 26–32.

Angrist, J.D. and Pischke, J.-S. (2008), *Mostly Harmless Econometrics: An Empiricist's Companion*, Princeton University Press, Princeton.

Ansoff, I. (1957), "Strategies for Diversification", *Harvard Business Review*, Vol. 35 No. 5, pp. 113–124.

Archer, B. (1981), "A View of the Nature of Design Research", in R. Jacques, J.A.P. (Ed.), *Design: Science: Method*, IPC Business Press, Guilford, pp. 30–47.

Baden-Fuller, C. and Morgan, M. (2010), "Business models as models", *Long Range Planning*, Vol. 43 No. 2, pp. 151–171.

Bayazit, N. (2004), "Investigating Design: A Review of Forty Years of Design Research Nigan", *Design Issues*, Vol. 20 No. 1, pp. 16–29.

Bellis, N. De. (2009), *Bibliometrics and Citation Analysis*, The Scarecrow Press, Lanham.

Berman, S.J. (2012), "Digital transformation: Opportunities to create new business models", *Strategy and Leadership*, Vol. 40 No. 2, pp. 16–24.

Bettis, R.A. and Prahalad, C.K. (1995), "The dominant logic: Retrospective and extension", *Strategic Management Journal*, Vol. 16 No. 1, pp. 5–14.

Bieger, T. and Reinhold, S. (2011), "Das wertbasierte Geschäftsmodell–Ein aktualisierter Strukturierungsansatz", in Bieger, T., zu Knyphausen-Aufseß, D. and Krys, C. (Eds.), *Innovative Geschäftsmodelle*, Springer, Berlin, Heidelberg.

Björkdahl, J. and Holmén, M. (2013), "Editorial: business model innovation - the challenges ahead.", *International Journal of Product Development*, Vol. 18 No. 3, pp. 213–225.

Blank, S. (2013), "Why the Lean Start-Up Changes Everything.", *Harvard Business Review*, Vol. 91 No. 5, pp. 63–72.

Blessing, L.T.M. and Chakrabarti, A. (2009), *DRM, a Design Research Methodology*, Springer, London.

Bloor, M., Frankland, J., Thomas, M. and Robson, K. (2001), *Focus Groups in Social Research*, Sage, London.

Bocken, N.M.P., Short, S., Rana, P. and Evans, S. (2013), "A value mapping tool for sustainable business modelling", edited by Lenssen, Mollie Painter, Aileen Ion, G.*Corporate Governance: The International Journal of Business in Society*, Vol. 13 No. 5, pp. 482–497.

Bocken, N.M.P., Short, S.W., Rana, P. and Evans, S. (2014), "A literature and practice review to develop sustainable business model archetypes", *Journal of Cleaner Production*, Vol. 65, pp. 42–56.

Boons, F. and Lüdeke-Freund, F. (2013), "Business models for sustainable innovation: state-of-the-art and steps towards a research agenda", *Journal of Cleaner Production*, Vol. 45, pp. 9–19.

Bradbury-Huang, H. (2015), *The SAGE Handbook of Action Research*, 3rd ed., Sage, London.

Brown, B.J., Hanson, M.E., Liverman, D.M. and Merideth, R.W. (1987), "Global sustainability: Toward definition", *Environmental Management*, Springer-Verlag, Vol. 11 No. 6, pp. 713–719.

Brown, T. (2009), *Change by Design*, HarperCollins, New York, NY.

Brundtland, G.H. (1987), *Our Common Future: Report of the 1987 World Commission on Environment and Development.*, United Nations, Oslo.

Bryant, A. and Charmaz, K. (2007), *The SAGE Handbook of Grounded Theory*, Sage, London.

Brydon-Miller, M., Greenwood, D. and Maguire, P. (2003), "Why action research?", *Action Research*, Vol. 1 No. 1, pp. 9–28.

Burnes, B. (1996), "No such thing as … a 'one best way' to manage organizational change", *Management Decision*, Vol. 34 No. 10, pp. 11–18.

Carcary, M. (2009), "The research audit trail – Enhancing trustworthiness in qualitative inquiry", *Electronic Journal of Business Research Methods*, Vol. 7, pp. 11–24.

von Carlowitz, H.C. (1713), *Sylvicultura Oeconomica: Hausswirthliche Nachricht Und Naturmäßige Anweisung Zur Wilden Baum-Zucht*, Johann Friedrich Braun, Leipzig.

Casadesus-Masanell, R. and Ricart, J.E. (2010), "From strategy to business models and onto tactics", *Long Range Planning*, Vol. 43 No. 2–3, pp. 195–215.

Casadesus-Masanell, R. and Zhu, F. (2013), "Business Model Innovation and Competitive Imitation: The Case of Sponsor-Based Business Models", *Strategic Management Journal*, Vol. 34 No. 4, pp. 464–482.

Charmaz, K. (2000), "Grounded theory: objectivist and constructivist methods", in Denzin, N.K. and Lincoln, Y.S. (Eds.), *SAGE Handbook of Qualitative Research*, 2nd ed., Sage, Thousand Oaks, pp. 509–535.

Chertow, M.R. (2001), "The IPAT Equation and Its Variants: Changing Views of Technology and Environmental Impact", *Journal of Industrial Ecology*, Vol. 4 No. 4, pp. 13–29.

Chesbrough, H. (2007), "Business model innovation: it's not just about technology anymore", *Strategy & Leadership*, Vol. 35 No. 6, pp. 12–17.

Chesbrough, H. (2010), "Business model innovation: opportunities and barriers", *Long Range Planning*, Vol. 43 No. 2, pp. 354–363.

Chesbrough, H. and Rosenbloom, R. (2002), "The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies", *Industrial and Corporate Change*, Vol. 11 No. 3, p. 529–555.

Chesbrough, H.W. (2003), *Open Innovation: The New Imperative for Creating and Profiting from Technology*, Harvard Business School Press, Brighton.

Chevalier, J.M. and Buckles, D. (2013), *Participatory Action Research : Theory and Methods for Engaged Inquiry*, Routledge, Abington.

Christensen, C. (1997), *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*, Harvard Business School Press, Cambridge.

Christensen, C. and Raynor, M. (2003), *The Innovator's Solution: Creating*

and Sustaining Successful Growth, Harvard Business School Press, Cambridge.

Christensen, C.M. and Overdorf, M. (2000), "Meeting the challenge of disruptive change", *Harvard Business Review*, Vol. 78 No. 2, pp. 66–76.

Clark, W. and Crutzen, P. (2003), "Science for global sustainability: toward a new paradigm", *KSG Work. Pap.*, Vol. 120, pp. 1–28.

Cohen, M.J. (2006), "Ecological modernization and its discontents: The American environmental movement's resistance to an innovation-driven future", *Futures*, Pergamon, Vol. 38 No. 5, pp. 528–547.

Commoner, B. (1971), *The Closing Circle: Nature, Man, and Technology*, [1st ed.]., Knopf, New York.

Corbin, J.M. and Strauss, A.L. (2015), *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*, 4th ed., Sage, London.

Creswell, J.W. (2014), *Research Design*, Internatio., Sage, London.

Daly, H.E. and Townsend, K.N. (1993), *Valuing the Earth: Economics, Ecology, Ethics*, MIT Press, Boston.

Defourny, J. and Nyssens, M. (2010), "Conceptions of Social Enterprise and Social Entrepreneurship in Europe and the United States: Convergences and Divergences", *Journal of Social Entrepreneurship*, Vol. 1 No. 1, pp. 32–53.

Demil, B. and Lecocq, X. (2010), "Business model evolution: in search of dynamic consistency", *Long Range Planning*, Vol. 43, pp. 227–246.

Doganova, L. and Eyquem-Renault, M. (2009), "What do business models do?: Innovation devices in technology entrepreneurship", *Research Policy*, Vol. 38, pp. 1559–1570.

Doleski, O.D. (2015), *Integrated Business Model: Applying the St. Gallen Management Concept to Business Models*, Springer, Berlin.

Doran, G.T. (1981), "There's a S.M.A.R.T. way to write management's goals and objectives", *Management Review. AMA FORUM*, Vol. 70 No. 11, pp. 35–36.

Duden. (2015), *Duden - Deutsches Universalwörterbuch*, 8th ed., Bibliographisches Institut GmbH, Berlin.

Easterby-Smith, M., Thorpe, R. and Jackson, P. (2015), *Management and Business Research*, 5th ed., Sage, London.

Economist. (2015), "Unsustainable goals", *The Economist*, Vol. 414 No. 8931, pp. 63–64.

Edmondson, A. and McManus, S. (2007), "Methodological fit in management field research", *Academy of Management Review*, Vol. 32 No. 3, pp. 1246–1264.

Ehrenfeld, J.R. (2005), "The roots of sustainability", *Sloan Management Review*, Vol. 46 No. 2, pp. 23–25.

Eisenhardt, K.K.M., Graebner, M.E., Eisenhardt, K.K.M. and Graebner, M.E. (2007), "Theory Building from Cases : Opportunities and Challenges", *Academy of Management Journal*, Vol. 50 No. 1, pp. 25–32.

Eisenhardt, K.M. (1989), "Building Theories from Case Study Research", *The Academy of Management Review*, Vol. 14 No. 4, p. 532.

Elkington, J. (1997), *Cannibals with Forks: The Triple Bottom Line of 21st Century*, Capstone, Oxford.

Evans, S., Gregory, M., Ryan, C., Bergendahl, M. and Tan, A. (2009), *Towards a Sustainable Industrial System: With Recommendations for Education, Research, Industry and Policy*, University of Cambridge, Cambridge.

Evans, S., Rana, P. and Short, S.W. (2014), *Final Set of Tools and Methods That Enable Analysis of Future Oriented, Novel, Sustainable, Value Adding Buisness Models and Value-Networks*, *EU SustainValue Project Deliverable 2.6*.

Evans, S., Vladimirova, D., Holgado, M., Van Fossen, K., Yang, M., Silva, E. and Barlow, C.Y. (2017), "Business model innovation for sustainability: Towards a unified perspective for creation of sustainable business models", *Business Strategy and the Environment*, Vol. 36 No. 5, pp. 597–608.

Fetscherin, M. and Heinrich, D. (2015), "Consumer brand relationships research: a bibliometric citation meta-analysis.", *Journal of Business Research*, Vol. 68, pp. 380–390.

Fetscherin, M. and Usunier, J. (2012), "Corporate branding: an interdisciplinary literature review.", *European Journal of Marketing*, Vol. 46, pp. 733–753.

Finfgeld-Connett, D. (2010), "Generalizability and transferability of meta-synthesis research findings", *Journal of Advanced Nursing*, Vol. 66 No. 2, pp. 246–254.

Flanagan, J.C. (1954), "The critical incident technique", *Psychological Bulletin*, Vol. 1, pp. 327–358.

Foss, N.J. and Saebi, T. (2017), "Fifteen Years of Research on Business Model Innovation", *Journal of Management*, SAGE PublicationsSage CA: Los Angeles, CA, Vol. 43 No. 1, pp. 200–227.

Frankenberger, K., Weiblen, T., Csik, M. and Gassmann, O. (2013), "The 4I-framework of business model innovation: a structured view on process phases and challenges", *International Journal of Product Development*, Vol. 18 No. 3/4, p. 249.

Frayling, C. (1993), "Research in Art and Design", *Royal College of Art*

Research Papers, Vol. 1 No. 1, pp. 1–5.

Freeman, R. (1984), *Strategic Management: A Stakeholder Approach*, Pitman, Boston.

Garetti, M. and Taisch, M. (2012), "Sustainable manufacturing: Trends and research challenges", *Production Planning and Control*, Vol. 23 No. 2–3, pp. 83–104.

Gassmann, O., Frankenberger, K. and Csik, M. (2014), *The Business Model Navigator*, Pearson, Harlow.

Geissdoerfer, M., Bocken, N.M.P. and Hultink, E.J. (2016), "Design thinking to enhance the sustainable business modelling process – A workshop based on a value mapping process", *Journal of Cleaner Production*, Vol. 135, pp. 1218–1232.

Geissdoerfer, M. and Martiniani, S. (2016), "favalley.in", available at: http://www.favalley.in/ (accessed 2 February 2019).

Geissdoerfer, M., Morioka, S.N., de Carvalho, M.M. and Evans, S. (2018a), "Business models and supply chains for the circular economy", *Journal of Cleaner Production*, Vol. 190, pp. 712–721.

Geissdoerfer, M., Savaget, P., Bocken, N.M.P. and Hultink, E.J. (2017a), "The Circular Economy – A new sustainability paradigm?", *Journal of Cleaner Production*, Vol. 143, pp. 757–768.

Geissdoerfer, M., Savaget, P. and Evans, S. (2017b), "The Cambridge Business Model Innovation Process", *Procedia Manufacturing*, Vol. 8, pp. 262–269.

Geissdoerfer, M., Vladimirova, D. and Evans, S. (2018b), "Sustainable business model innovation: A review", *Journal of Cleaner Production*, Vol. 198, pp. 401–416.

Geissdoerfer, M., Winkler, V., Hollm, J., Chow, G. and Higgins, D. (2018c),

"Geo", available at: https://www.go-geo.net/ (accessed 12 November 2018).

George, G. and Bock, A.J. (2011), "The Business Model in Practice and its Implications for Entrepreneurship Research", *Entrepreneurship: Theory & Practice*, Vol. 35 No. 1, pp. 83–111.

Georgescu-Roegen, N. (1977), "Inequality, Limits and Growth from a Bioeconomic Viewpoint", *Review of Social Economy*, The Association for Social Economics , Vol. 35 No. 3, pp. 361–375.

Gibbs, G. (2007), *Analyzing Qualitative Data*, SAGE, London.

Girotra, K. and Netessine, S. (2013), "OM forum – business model innovation for sustainability.", *Manufacturing & Service Operations Management*, INFORMS, Vol. 15 No. 4, pp. 537–544.

Glaser, B.G. (1978), *Theoretical Sensitivity*, Sociological Press, Mill Valley.

Glaser, B.G. (1992), *Basics of Grounded Theory Analysis: Emergence versus Forcing*, Sociological Press, Mill Valley.

Glaser, B.G. and Strauss, A.L. (2017), *Discovery of Grounded Theory*, Routledge, New York.

Grant, R.M. (2010), *Contemporary Strategy Analysis*, 7th ed., John Wiley & Sons, Chichester.

Grossoehme, D.H. (2014), "Overview of qualitative research", *Journal If Healthcare*, Vol. 20, pp. 109–22.

Guest, G., MacQueen, K. and Namey, E. (2012), *Applied Thematic Analysis*, Sage, Thousand Oaks.

Hamel, G. (2000), *Leading the Revolution*, Harvard Business School Press, Boston.

Hardin, G. (1968), "The Tragedy of the Commons", *Science*, Vol. 162 No.

3859, pp. 1243–1248.

Hart, S.S.L., Milstein, M.B.M., Overview, E., SL, H. and MB, M. (2003), "Creating sustainable value", *The Academy of Management Executive*, Vol. 17 No. 2, pp. 56–67.

Hochberg, Y. V., Ljungqvist, A. and Lu, Y. (2007), "Whom You Know Matters: Venture Capital Networks and Investment Performance", *The Journal of Finance*, Vol. 62 No. 1, pp. 251–301.

Hodgson, G. (2005), "Institutions and Economic Development: Constraining, Enabling and Reconstituting", in Dymski, G. and De Paula, S. (Eds.), *Reimagining Growth: Towards a Renewal of Development Theory*, Zed Books, London, pp. 88–95.

Holdren, J.P. and Ehrlich, P.R. (1974), "Human population and the global environment", *American Scientist*, Vol. 62 No. 3, pp. 282–292.

Holgado, M., Corti, D., Macchi, M., Rana, P., Short, S.W. and Evans, S. (2013), "Business Modelling for Sustainable Manufacturing", in Emmanouilidis, C., Taisch, M. and Kiritsis, D. (Eds.), *Advances in Production Management Systems. Competitive Manufacturing for Innovative Products and Services*, Vol. 397, Springer, Berlin, pp. 166–174.

Hughes, M. (2011), "Do 70 Per Cent of All Organizational Change Initiatives Really Fail?", *Journal of Change Management*, Vol. 11 No. 4, pp. 451–464.

Hunter, R., Hughes, M., Liu, K., Ethridge, D. and Picard, N. (2018), "Global Top 100 companies by market capitalisation", *PricewaterhouseCoopers (PwC)*.

Jackson, T. (2009), *Prosperity without Growth: Economics for a Finite Planet*, Earthscan, Abingdon.

Jensen, B. (1997), "Make it simple! How simplicity could become your ultimate strategy", *Strategy & Leadership*, Vol. 25 No. 2, pp. 35–39.

Johnson, M. (2010), *Seizing the White Space: Business Model Innovation for Growth and Renewal*, Harvard Business Press, Boston.

Johnson, M.W., Christensen, C.M. and Kagermann, H. (2008), "Reinventing Your Business Model. (cover story)", *Harvard Business Review*, Vol. 86 No. 12, pp. 50–59.

Johnston, P., Everard, M., Santillo, D. and Robért, K. (2007), "Reclaiming the definition of sustainability", *Environmental Science And Pollution Research*, Vol. 14 No. 1, pp. 60–66.

Jones, S. (1985), "The Analysis of Depth Interviews", in Walker, R. (Ed.), *Applied Qualitative Research*, Gower, Aldershot.

Joyce, A. and Paquin, R.L. (2016), "The triple layered business model canvas: A tool to design more sustainable business models", *Journal of Cleaner Production*, Vol. 135, pp. 1474–1486.

Kates, R.W., Parris, T.M. and Leiserowitz, A.A. (2005), "What is sustainable development? Goals, indicators, values, and practice", *Environment*, Vol. 47 No. 3, pp. 8–21.

Kegan, R. and Lahey, L.L. (2001), "The real reason people won't change", *Harvard Business Review*, No. 8121, pp. 85–92.

Kemp, R. and Pearson, P. (2007), "Final report MEI project about measuring eco-innovation".

Ketokivi, M., Choi, T. and Carey, W.P. (2014), "Renaissance of case research as a scientific method", *Journal of Operations Management*, Vol. 32, pp. 232–240.

Kim, J. and McMillan, S.J. (2008), "Evaluation of internet advertising research: a bibliometric analysis of citations from key sources.", *Journal of Advertising*, Vol. 37, pp. 99–112.

Kindon, S.L., Pain, R. and Kesby, M. (2010), *Participatory Action Research*

Approaches and Methods : Connecting People, Participation and Place, Routledge, Abington.

King, N. (2004), "Using templates in the thematic analysis of text.", in Cassell, C. and Symon, G. (Eds.), *Essential Guide to Qualitative Methods in Organizational*, 2nd ed., Sage, London.

Knutas, A., Hajikhani, A., Salminen, J., Ikonen, J. and Porras, J. (2015), "Cloud-based bibliometric analysis service for systematic mapping studies", *ACM International Conference Proceeding Series*, Vol. 1008 No. 212, pp. 184–191.

Knyphausen-Aufseß, D. and Meinhardt, Y. (2002), "Revisiting Strategy: Ein Ansatz zur Systematisierung von Geschäftsmodellen", in Bieger, T., Bickhoff, N., Caspers, R., Knyphausen-Aufseß, D. and Reding, K. (Eds.), *Zukünftige Geschäftsmodelle*, Springer, Berlin, pp. 63–89.

Koskinen, I., Zimmerman, J., Binder, T., Redstrom, J. and Wensveen, S. (2012), *Design Research through Practice: From the Lab , Field ,* Morgan Kaufmann, Amsterdam.

Kotter, J.P. (2007), "Leading change: Why transformation efforts fail", *Harvard Business Review*, Vol. 85 No. 1, pp. 96–103.

Kvale, S. and Brinkmann, S. (2014), *InterViews: Learning the Craft of Qualitative Research Interviewing*, 3rd ed., Sage, London.

Labbé, M. and Mazet, T. (2005), "Die Geschäftsmodellinnovations-Matrix: Geschäftsmodellinnovationen analysieren und bewerten", *Der Betrieb*, Vol. 17, pp. 897–902.

Lagarde, C. (2018), "Towards a legacy of inclusion", *The Economist: The World in 2019*, p. 96.

Lean Stack. (2018), "Create a 1-Page Business Plan using a Lean Canvas", available at: https://leanstack.com/is-one-page-business-model

(accessed 12 November 2018).

Leung, L. (2015), "Validity, reliability, and generalizability in qualitative research.", *Journal of Family Medicine and Primary Care*, Vol. 4 No. 3, pp. 324–327.

Lewin, K. (1946), "Action Research and Minority Problems", *Journal of Social Issues*, Vol. 2 No. 4, pp. 34–46.

Lindgardt, Z. and Reeves, M. (2015), "Business Model Innovation: When the game gets tough, change the game", in Deimler, M., Lesser, R., Rhodes, D. and Sinha, J. (Eds.), *Own the Future: 50 Ways to Win from the Boston Consulting Group*, John Wiley & Sons, Hoboken, NJ,.

Locke, K. (2003), *Grounded Theory in Management Research*, Sage, London.

Lofland, J., Snow, D., Andersen, L. and Lofland, L.H. (2005), *Analyzing Social Settings : A Guide to Qualitative Observation and Analysis*, 4th ed., Cengage Learning, Boston.

Loorbach, D. and Wijsman, K. (2013), "Business transition management: exploring a new role for business in sustainability transitions", *Journal of Cleaner Production*, Vol. 45, pp. 20–28.

Lüdeke-Freund, F., Carroux, S., Joyce, A., Massa, L. and Breuer, H. (2018), "The sustainable business model pattern taxonomy—45 patterns to support sustainability-oriented business model innovation", *Sustainable Production and Consumption*, Vol. 15, pp. 145–162.

Magretta, J. (2002), "Why Business Models Matter", *Harvard Business Review*, Vol. 80 No. 5, pp. 86–92.

Mankins, M., Harris, K. and Harding, D. (2017), "Strategy in the age of superabundant capital", *Harvard Business Review*, Vol. 95 No. 2, pp. 66–75.

Mantel, K. (1990), *Wald Und Forst in Der Geschichte. Ein Lehr- Und*

Handbuch, M. & H. Schaper, Hannover.

Massa, L., Tucci, C. and Afuah, A. (2017), "A Critical Assessment of Business Model Research", *Academy of Management Annals*, Vol. 11 No. 1, pp. 73–104.

Mckelvey, B. (2002), "Managing Coevolutionary Dynamics", *18th EGOS Conference, Barcelona, Spain, July 4–6, 2002*.

McMichael, A.J., Campbell-Lendrum, D.H., Corvalan, C.F., Ebi, K.L., Scheraga, J.D. and Woodward, A. (Eds.). (2003), *Climate Change and Human Health : Risks and Responses*, World Health Organization, Geneva.

Miles, M.B., Huberman, A.M. and Saldaña, J. (2014), *Qualitative data analysis*, 3rd ed., Sage, Los Angeles.

Mitchell, D. and Coles, C. (2003), "The ultimate competitive advantage of continuing business model innovation", *Journal of Business Strategy*, Vol. 24, pp. 15–21.

Mitchell, D.W. and Coles, C.B. (2004), "Business model innovation breakthrough moves", *Journal of Business Strategy*, Vol. 25 No. 1, pp. 16–26.

Nidumolu, R., Prahalad, C.K. and Rangaswami, M.R. (2009), "Why sustainability is now the key driver of innovation", *Harvard Business Review*, Vol. 87 No. 9, pp. 56–64.

O'Connor, H., Madge, C., … R.S.-T.S. handbook of and 2008, undefined. (2008), "Internet-based interviewing", *The Sage Handbook of Online Research Methods*, Sage, London, pp. 271–289.

O'Riordan. (1993), "The Politics of Sustainability", in Turner, K. (Ed.), *Sustainable Environment Economics and Management: Principles and Practice*, Belhaven Press, London, pp. 37–69.

Osterwalder, A. and Pigneur, Y. (2010), *Business Model Generation*, John Wiley & Sons, Hoboken.

Osterwalder, A., Pigneur, Y., Bernarda, G. and Smith, A. (2014), *Value Proposition Design: How to Create Products and Services Customers Want*, Wiley, Hoboken.

Osterwalder, A., Pigneur, Y. and Tucci, C.L. (2005), "Clarifying Business Models", *Communications of the Association for Information Systems*, Vol. 16 No. 1, pp. 1–40.

Oxford Dictionary. (2010), *Oxford Dictionary of English*, edited by Stevenson, A., 3rd ed., Oxford University Press, Oxford.

Parker, G., Van Alstyne, M. and Choudary, S.P. (2017), *Platform Revolution : How Networked Markets Are Transforming the Economy and How to Make Them Work for You*, W. W. Norton & Company, New York.

Parmenter, D. (2015), *Key Performance Indicators for Measuring Construction Success*, 3rd ed., Wiley, Hoboken.

Patel, N. (2015), "90% Of Startups Fail: Here's What You Need To Know About The 10%", *Forbes*, Vol. 16 No. Jan.

Pigosso, D.C.A. and McAloone, T.C. (2016), "Maturity-based approach for the development of environmentally sustainable product/service-systems", *CIRP Journal of Manufacturing Science and Technology*, Vol. 15, pp. 33–41.

Pinfold, J.F. (2000), "Examining New Venture Failure Rates: A New Zealand Study", *Small Enterprise Research*, Vol. 8 No. 1, pp. 56–72.

Plattner, H., Meinel, C., Weinberg, U. and Leifer, L. (2011), *Design Thinking: Understand - Improve - Apply*, edited by Meinel, C., Leifer, L. and Plattner, H., Springer, Berlin.

Platts, K.W. (1993), "A Process Approach to Researching Manufacturing

Strategy", *International Journal of Operations & Production Management*, Vol. 13 No. 8, pp. 4–17.

Ponciano, L. (2013), "The voices of youth in foster care: A participant action research study", *Action Research*, SAGE PublicationsSage UK: London, England, Vol. 11 No. 4, pp. 322–336.

Porter, M.E. and Kramer, M.R. (2011), "Creating shared value: How to reinvent capitalism and unleash a wave of innovation and growth", *Harvard Business Review*, Vol. 89 No. 1/2, pp. 62–77.

Post, J., Preston, L. and Sauter-Sachs, S. (2002), *Redefining the Corporation: Stakeholder Management and Organizational Wealth*, Stanford University Press, Palo Alto.

Prahalad, C.K. (2009), *The Fortune at the Bottom of the Pyramid*, 5th ed., Prentice Hall, Upper Saddle River.

Prahalad, C.K. and Bettis, R.A. (1986), "the Dominant Logic - a New Linkage Between Diversity and Performance", *Strategic Management Journal*, Vol. 7 No. 6, pp. 485–501.

Prahalad, C.K. and Ramaswamy, V. (2004), "Co-creating unique value with customers", *Strategy & Leadership*, Vol. 32 No. 3, pp. 4–9.

Prendeville, S. and Bocken, N. (2017), "Sustainable Business Models through Service Design", *Procedia Manufacturing*, Vol. 8 No. October 2016, pp. 292–299.

PwC. (2013), "Global Top 100 companies by market capitalisation", *PricewaterhouseCoopers (PwC)*.

Rana, P., Short, S.W. and Evans, S. (2013), "Towards a Sustainable Business Form: A Business Modelling Process and Tools", *Sustainable Consumption Research and Action Initiative (SCORAI) Conference on "The Future of Consumerism and Well-Being in a World of Ecological*

Constraints", Worcester, USA, 12-15 June 2013.

Rapoport, R.N. (1970), "Three Dilemmas in Action Research: With Special Reference to the Tavistock Experience", *Human Relations*, Vol. 23 No. 6, pp. 499–513.

Rashid, A., Asif, F.M.A., Krajnik, P. and Nicolescu, C.M. (2013), "Resource Conservative Manufacturing: an essential change in business and technology paradigm for sustainable manufacturing", *Journal of Cleaner Production*, Vol. 57, pp. 166–177.

Richardson, J. (2008), "The business model: an integrative framework for strategy execution", *Strategic Change*, Vol. 17 No. 5–6, pp. 133–144.

Ries, E. (2011), *The Lean Startup*, Penguin, London.

Ritala, P., Huotari, P., Bocken, N., Albareda, L. and Puumalainen, K. (2018), "Sustainable Analysis, business model adoption among S&P 500 firms: a longitudinal content study.", *Journal of Cleaner Production*, Vol. 170, pp. 217–226.

Robson, C. and McCartan, K. (2015), *Real World Research*, 4th ed., Wiley, Chichester.

Rockström, J., Steffen, W. and Noone, K. (2009), "Planetary boundaries: exploring the safe operating space for humanity".

Romero, D. and Molina, A. (2009), "Value co-creation and co-innovation: Linking networked organisations and customer communities", *IFIP Advances in Information and Communication Technology*, Vol. 307 No. August 2016, pp. 401–412.

Roome, N. and Louche, C. (2016), "Journeying toward business models for sustainability: A conceptual model found inside the black box of organisational transformation", *Organization & Environment*, Vol. 29 No. 1, pp. 11–35.

Sachs, J. (2015), *The Age of Sustainable Development*, Columbia University Press, New York.

Schallmo, D. (2013), *Geschäftsmodell-Innovation: Grundlagen, Bestehende Ansätze, Methodisches Vorgehen Und B2B-Geschäftsmodelle*, Springer, Wiesbaden.

Schaltegger, S., Hansen, E. and Lüdeke-Freund, F. (2012), "Business Cases for Sustainability and the Role of Business Model Innovation", *International Journal of Innovation and Sustainable Development*, CSM, Centre for Sustainability Management, Lüneburg, Vol. 6 No. 2, pp. 95–119.

Schaltegger, S., Hansen, E.G. and Lüdeke-Freund, F. (2016), "Business Models for Sustainability: Origins, Present Research, and Future Avenues", *Organization & Environment*, Vol. 29 No. 1, pp. 3–10.

Shehabuddeen, N., Probert, D., Phaal, R. and Platts, K. (2000), *Representing and Approaching Complex Management Issues*, *Centre for Technology Management Working Paper Series*, Cambridge.

Silverman, D. (2013), *Doing Qualitative Research*, 4 th., Sage, Los Angeles.

Simon, H.A. (1996), *The Sciences of the Artificial*, 3rd ed., MIT Press, Boston.

Slocum, J.W., Mcgill, M. and Lei, D.T. (1994), "The new learning strategy: Anytime, anything, anywhere", *Organizational Dynamics*, Vol. 23 No. 2, pp. 33–47.

Srai, J.S., Kumar, M., Graham, G., Phillips, W., Tooze, J., Ford, S., Beecher, P., et al. (2016), "Distributed manufacturing: scope, challenges and opportunities", *International Journal of Production Research*, Vol. 54 No. 23, pp. 6917–6935.

Stirling, A. (2009), "Direction, Distribution and Diversity! Pluralising Progress in Innovation, Sustainability and Development.", *STEPS Work. Pap.*, Vol.

32, pp. 1–45.

Stokes, D. and Bergin, R. (2006), "Methodology or 'methodolatry'? An evaluation of focus groups and depth interviews", *Qualitative Market Research: An International Journal*, Vol. 9 No. 2, pp. 26–36.

Stringer, E.T. (2014), *Action Research*, 4. ed., Sage, Los Angeles.

Stubbs, W. and Cocklin, C. (2008), "Conceptualizing a Sustainability Business Model", *Organization & Environment*, Vol. 21 No. 2, pp. 103–127.

Susman, G.I. and Evered, R.D. (1978), "An Assessment of the Scientific Merits of Action Research", *Administrative Science Quarterly*, Vol. 23 No. 4, p. 582.

Teece, D.J.D. (2010), "Business Models, Business Strategy and Innovation", *Long Range Planning*, Vol. 43 No. 2–3, pp. 172–194.

The Federal Government. (2014), *The New High-Tech Strategy: Innovations for Germany*, Federal Ministry of Education and Research (BMBF), Berlin.

Timmers, P. (1998), "Business Models for Electronic Markets", *Electronic Markets*, Vol. 8 No. 2, pp. 3–8.

Tracy, S.J. (2013), *Qualitative Research Methods : Collecting Evidence, Crafting Analysis, Communicating Impact*, Wiley-Blackwell, Chichester.

Tranfield, D., Denyer, D. and Smart, P. (2003), "Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review", *British Journal of Management*, Vol. 14 No. 3, pp. 207–222.

Tukker, A. (2004), "Eight types of product–service system: eight ways to sustainability? Experiences from SusProNet", *Business Strategy and the Environment*, Vol. 13 No. 4, pp. 246–260.

Turner, J.R. (2005), "The role of pilot studies in reducing risk on projects and programmes", *International Journal of Project Management*, Vol. 23 No. 1, pp. 1–6.

UN General Assembly. (2005), "Resolution adopted by the General Assembly. 60/1. 2005 World Summit Outcome, New York."

United Nations. (2019), "United Nations: Partnerships for SDGs platform", *Sustainabledevelopment.Un.Org*, available at: https://sustainabledevelopment.un.org/partnership/browse/ (accessed 20 April 2019).

Upward, A. and Jones, P. (2015), "An Ontology for Strongly Sustainable Business Models Defining an Enterprise Framework Compatible With Natural and Social Science", *Organization & Environment*, Vol. 29 No. 1, pp. 97–123.

Van de Ven, A.H. (2007), *Engaged Scholarship: A Guide for Organizational and Social Research: A Guide for Organizational and Social Research*, Oxford University Press, Oxford.

Venn, J. (1880), "On the Employment of Geometrical Diagrams for the Sensible Representation of Logical Propositions", *Proceedings of the Cambridge Philosophical Society*, Vol. 4, pp. 47–59.

Vladimirova, D. (2012), *Transformation of Traditional Manufacturers towards Servitized Organisations*, Cranfield University.

Weber, J. and Schäfer, U. (2016), *Einführung in Das Controlling*, 15th ed., Schäffer-Poeschel, Stuttgart.

Wells, P.E. (2008), "Alternative business models for a sustainable automotive industry", in Tukker, A., Charter, M., Vezzoli, C., Stø, E. and Andersen, M.M. (Eds.), *Perspectives on Radical Changes to Sustainable Consumption and Production 1. System Innovation for Sustainability.*, Greenleaf, Sheffield, pp. 80–98.

Wells, P.E. (2013), *Business Models for Sustainability*, Edward Elgar, Cheltenham.

Wilkinson, S. (2011), "Analysing Focus Group Data", *Qualitative Research. Issues of Theory, Method and Practice*, Sage, London, pp. 168–184.

Wirtz, B. and Daiser, P. (2018), "Business Model Innovation Processes: A Systematic Literature Review", *Journal of Business Models*, Vol. 6 No. 1, pp. 40–58.

Wirtz, B.W., Pistoia, A., Ullrich, S. and Göttel, V. (2016), "Business Models: Origin, Development and Future Research Perspectives", *Long Range Planning*, Vol. 49 No. 1, pp. 36–54.

Wise, N. (2016), "Outlining triple bottom line contexts in urban tourism regeneration", *Cities*, Vol. 53, pp. 30–34.

Wohlin, C. (2014), "Guidelines for snowballing in systematic literature studies and a replication in software engineering", *EASE'14 Proceedings of the 18th International Conference on Evaluation and Assessment in Software Engineering*.

Woollard, R. and Ostry, A. (2001), *Fatal Consumption: Rethinking Sustainable Development*, UBC Press.

Yang, M., Evans, S., Vladimirova, D. and Rana, P. (2017a), "Value uncaptured perspective for sustainable business model innovation", *Journal of Cleaner Production*, Vol. 140, pp. 1794–1804.

Yang, M., Vladimirova, D. and Evans, S. (2017b), "Creating and Capturing Value Through Sustainability: The Sustainable Value Analysis Tool", *Research-Technology Management*, Vol. 60 No. 3, pp. 30–37.

Yang, M., Vladimirova, D. and Rana, P. (2014), "Sustainable value analysis tool for value creation", *Asian Journal of Management Science and Applications*, Vol. 1 No. 4, pp. 312–332.

Yin, R.K. (2014), *Case Study Research: Design and Methods*, 5th ed., Sage, London.

Yu, D. and Hang, C. (2010), "A reflective review of disruptive innovation theory", *International Journal of Management Reviews*, Vol. 12 No. 4, pp. 435–452.

Zott, C. and Amit, R. (2010), "Business Model Design: An Activity System Perspective", *Long Range Planning*, Vol. 43 No. 2–3, pp. 216–226.

Zott, C. and Amit, R. (2013), "The business model: A theoretically anchored robust construct for strategic analysis", *Strategic Organization*, Vol. 11 No. 4, pp. 403–411.

Zott, C. and Amit, R. (2015), "Business Model Innovation", in Shalley, C., Hitt, M.A. and Zhou, J. (Eds.), *The Oxford Handbook of Creativity, Innovation, and Entrepreneurship*, Oxford University Press, Oxford, pp. 395–405.

Zott, C., Amit, R. and Massa, L. (2011), "The business model: recent developments and future research", *Journal of Management*, Vol. 37 No. 4, pp. 1019–1042.

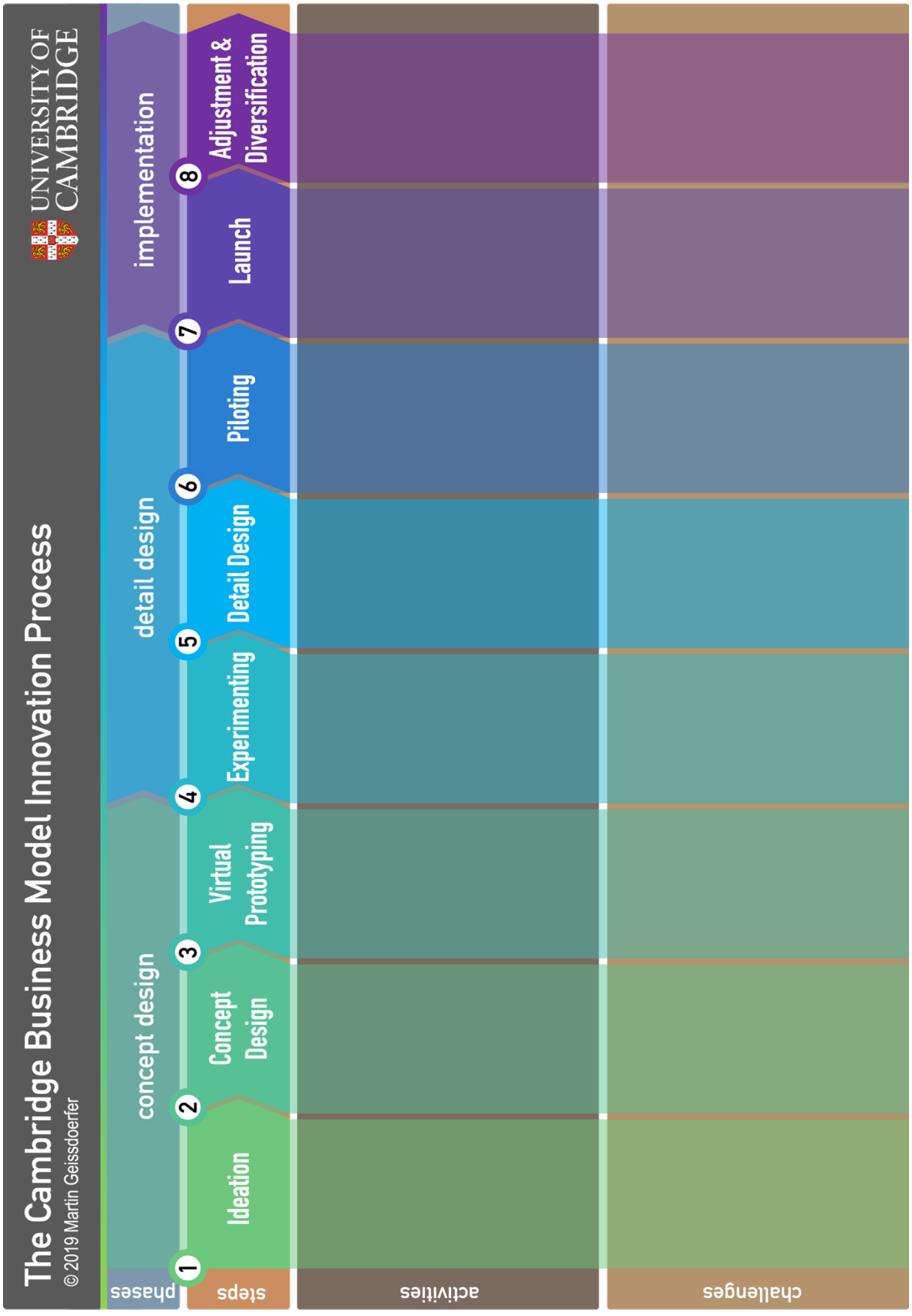
Appendix A: Topic guide for focus groups

The Cambridge Business Model Innovation Framework

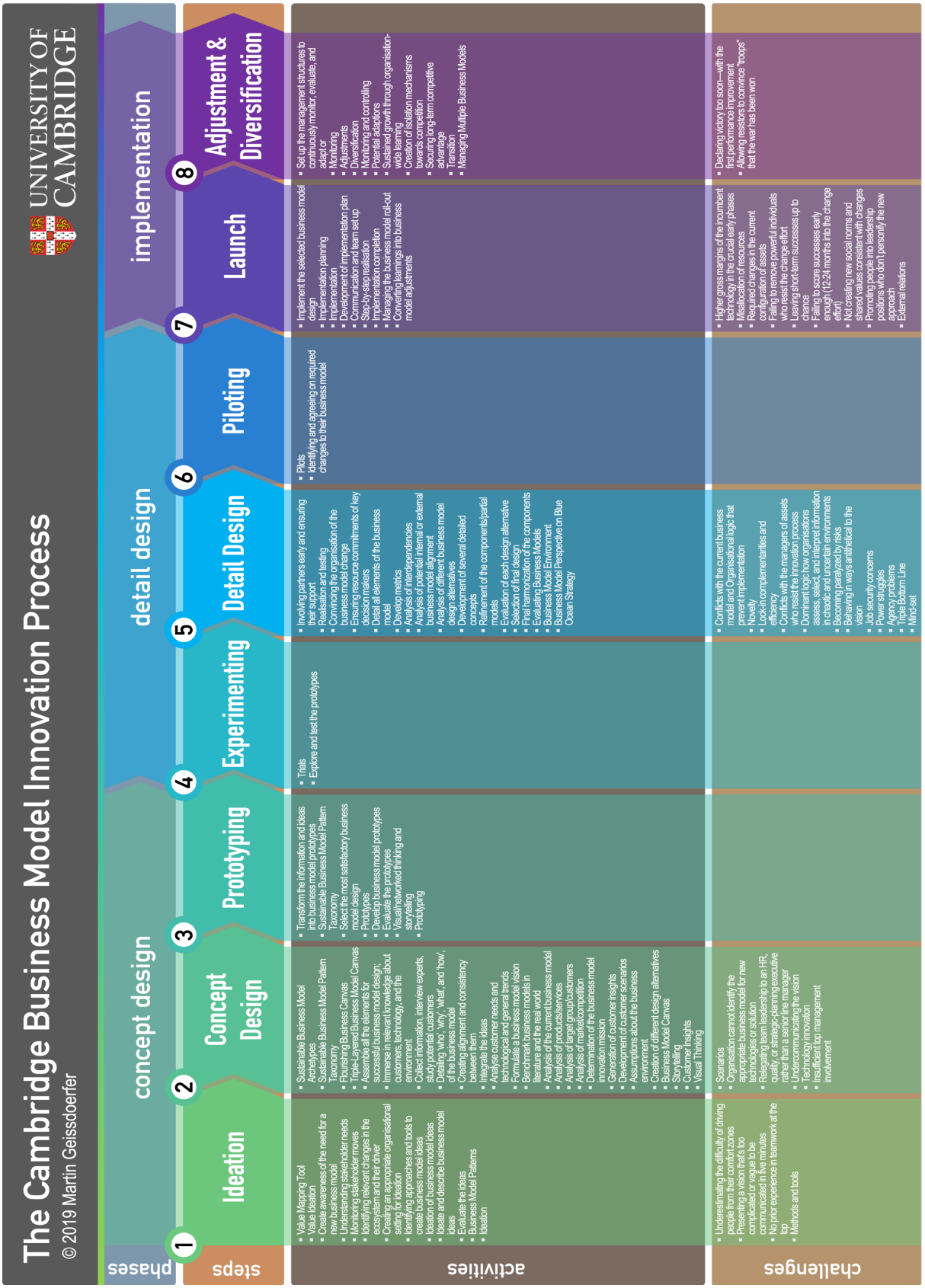
Topic guide for focus groups

1. **Background**
    a. What does your department do?
    b. Which market are you targeting?
    c. What role do you have in the company?
2. **Motivation**
    a. What are the sustainability ambitions of your companies or your customers?
    b. Why do you think business model innovation is important to achieve this?
    c. What is usually the outcome of the business model innovation process?
    d. Is there a gap between the outcome and the expectation towards the process?
3. **Steps**
    a. Which are the main phases when you develop new business models?
4. **Key activities**
    a. What are the main activities in these phases?
    b. What tools are used
5. **Challenges**
    a. What are the main challenges you face?
    b. What are the main challenges in each of the phases?
    c. How do you think the business model innovation process could be improved?
6. **Steps from the literature**
    a. Do you have special meetings or activities to ideate?
        i. What are challenges you encounter there?
        ii. What do you think could be improved/how would you advise others to do it?
    b. How do you come up with a first concept of the new business?
        i. What challenges do you encounter with conceptualising?
        ii. What do you think could be improved/how would you advise others to do it?
    c. Do you use any means to make your concept more tangible?
        i. What challenges do you encounter with prototyping?
        ii. What do you think could be improved/how would you advise others to do it?
    d. Do you test certain aspects of your concept/ideas?
        i. What problems do you encounter with experimentation?
        ii. What do you think could be improved/how would you advise others to do it?
    e. How do you elaborate the details of your concept?
        i. What problems do you encounter with detail design?
        ii. What do you think could be improved/how would you advise others to do it?
    f. Do you run any pilots before you launch/roll out entirely?
        i. What problems do you encounter with piloting?
        ii. What do you think could be improved/how would you advise others to do it?
    g. What activities are involved in the new business/product launch?
        i. What are your main challenges?
        ii. What do you think could be improved/how would you advise others to do it?
    h. How do you decide when you have to do adaptions or run a new business/product?
        i. What problems do you encounter?
        ii. What do you think could be improved/how would you advise others to do it?

Appendix B: Framework version 0 without entries



Appendix C: Framework version 0 with entries[2]



[2] All entries are included, for better readability, please refer to Table 23

Appendix D: Topic guide for qualitative interviews

Berkeley UNIVERSITY OF CALIFORNIA

UNIVERSITY OF CAMBRIDGE

Business model innovation in large corporations

Interview guide

This guide aims at investigating an organisation's business model innovation department, its key processes, challenges, and how they open their activities for external teams and ideas. It also discusses examples of business model teams or projects that followed parts of the process.

1) Background

1. What role do you have in the company?
2. Do you have a dedicated business model innovation department or team?
3. What does this department do?

2) Motivation

1. What is your organisation's motivation for engaging in business model innovation?
2. Did other, e.g. social or environmental, objectives play a role?
3. How do you measure success?
4. How successful have your business model innovations been? (c.f. expectations)
   a. Financially
   b. Meeting your societal and environmental ambitions

3) Business model innovation

1. Do you have an example of a project that went through your business model innovation process?
2. What happened?
3. What were the major steps?
4. Who was in charge of these activities?
5. Who else was involved?
6. What were the major challenges?
7. How did you solve them?
8. What went particularly well?
9. Did you use prototyping, experimentation, or piloting?
10. How many times did you adjust your plan?
11. How did you ensure that you reach your strategic objectives?
12. Are there conflicts between the new business models being tested and the established business model of the organization?
13. How do you deal with these conflicts?

4) Process steps

1. For each of your steps (using the process phases the interviewee proposed in 3)
   a. What were the main activities
   b. What were the major challenges?
   c. How did you solve this?
   d. Did you use any management tools?
   e. Would you do something differently in retrospective?

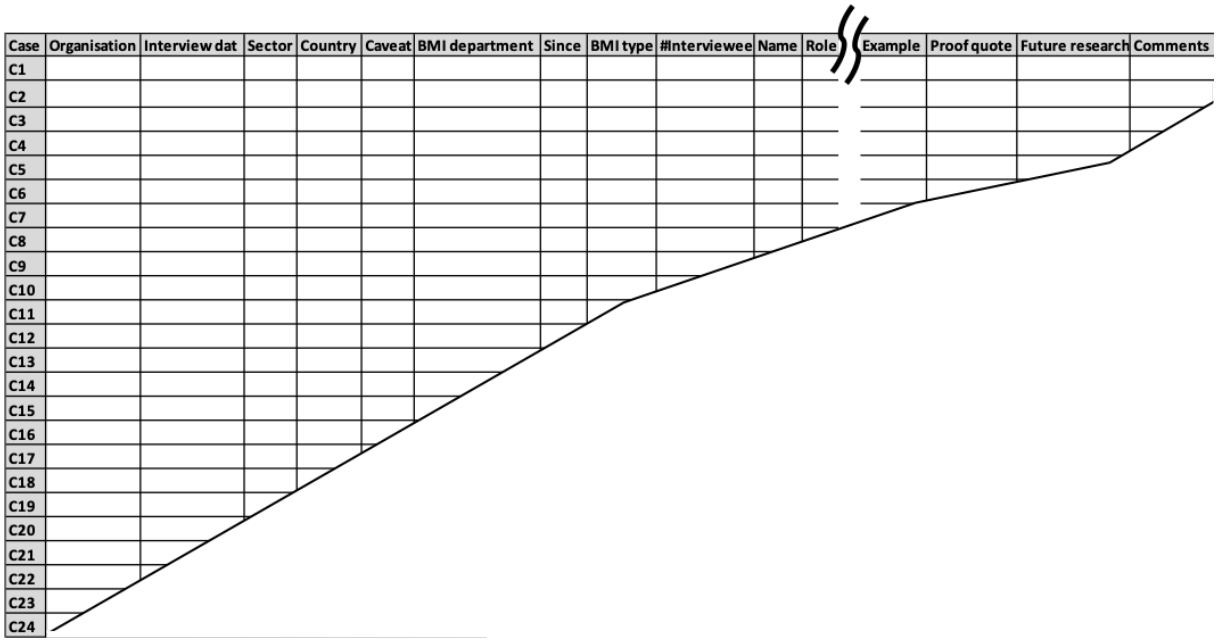
5) Opening the process

1. How do you generate ideas?
2. How do you select/prioritise generated ideas?
3. How do you compose teams?
4. How important do you think it is to bring in external people and ideas?
5. Why is that so important?
6. How do you attract ideas/teams?
7. How do you integrate ideas/teams?
8. How does the contractual framework look like?
9. How are the new businesses set up at the end of the process?

6) Is there anything that you feel was important for business model innovation success/failure?

7) Who else should we talk to?

Appendix E: Spreadsheet for first step interview analysis



Case	Organisation	Interview dat	Sector	Country	Caveat	BMI department	Since	BMI type	#Interviewee	Name	Role	Example	Proof quote	Future research	Comments
C1															
C2															
C3															
C4															
C5															
C6															
C7															
C8															
C9															
C10															
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C15															
C16															
C17															
C18															
C19															
C20															
C21															
C22															
C23															
C24															

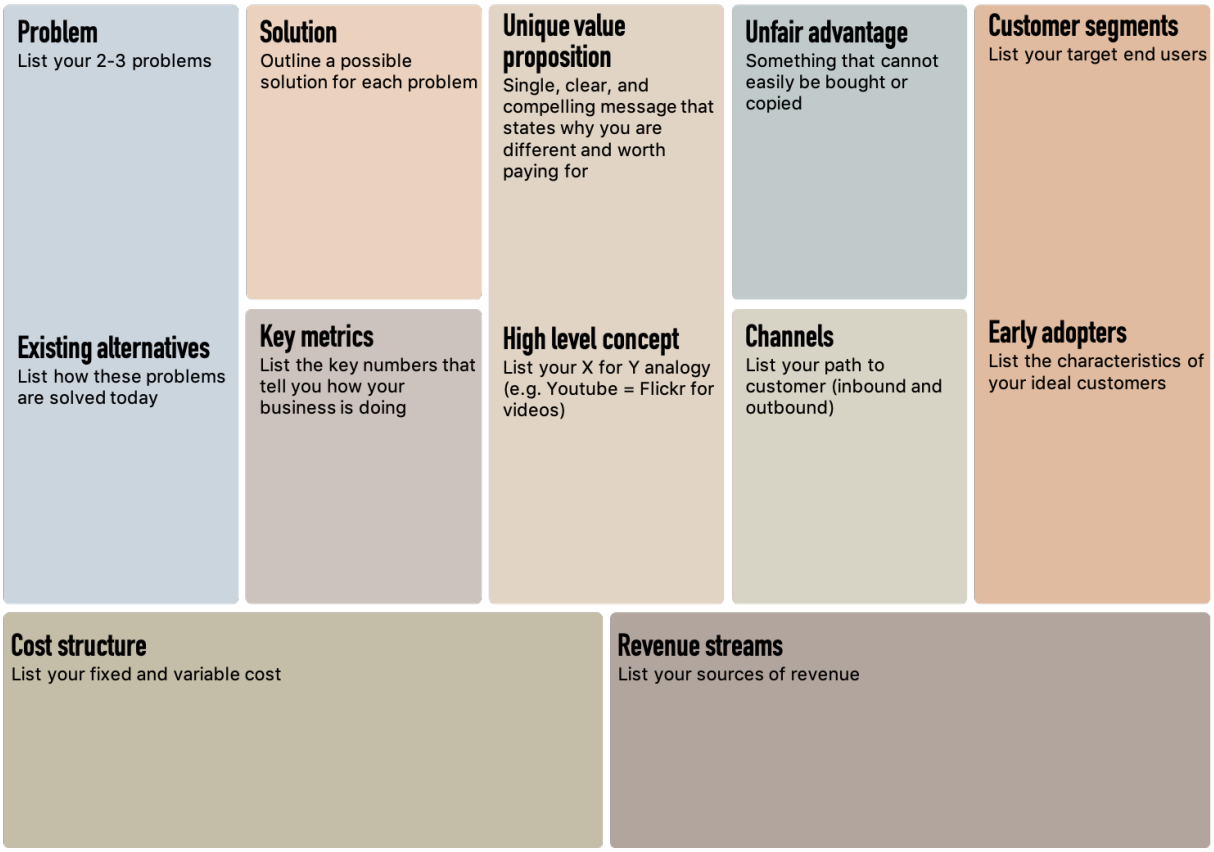
Appendix F: Spreadsheet for second step interview analysis

Step	Activity	Company
0	Fostering entrepreneurship culture/ mindset	C01
0	Industry will change	C01
0	Current business model not sustainable	C01
0	Entrepreneurial culture change	C01
0	Little space for innovation in core business	C01
0	Create space for employees to develop	C01
0	Opening to start-up ecosystem	C01
...	...	...
1	Business units select and form teams	C01
1	Transfer opportunities into challenges	C02
1	Solution discovery	C02
1	Ideas generation	C02
...	...	...
2	Prototype building that shows core function	C20
2	Prototype testing	C20
2	Interview internal clients, like sales people	C20
...	...	...

Appendix G: Spreadsheet for third step interview analysis

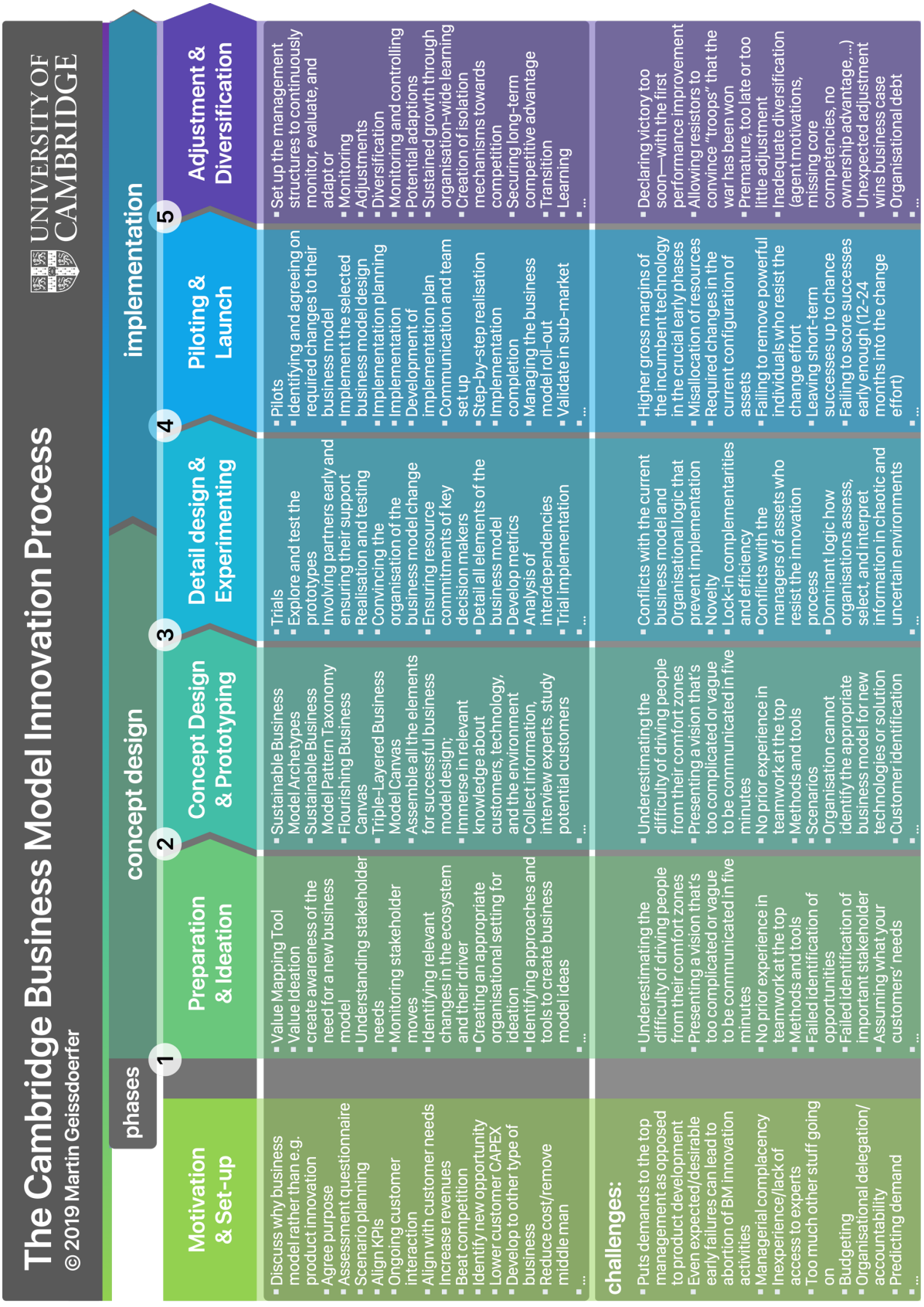
Step	Activity	Case examples	Sustainability focus
0	Fostering entrepreneurship culture/mindset in the organisation	C1, C17, C18, C20	
0	Opening to local/start-up ecosystem	C1, C18, C19, C20	
0	Digitalisation/digital transformation	C17, C18, C19, C20, C22	
0	Aim at specific sustainability strategy like resource consumption	C3, C4, C6, C9, C20	x
0	BMI to implement/leverage sustainable technology	C3, C5, C6, C9, C19, C20	x
...	...	...	...
1	Hire/recruit team/support staff	C6, C19, C22	
1	Self-forming teams	C20	
1	Value mapping	C5	x
1	Set sustainability targets	C17	x
...	...	...	...
2	Problem definition/challenge description	C2, C20	
2	Prototype building/development and testing	C2, C6, C18, C20, C22	
2	Business model canvas	C2, C5, C18, C19	
...	...	...	...

Appendix H: Lean Canvas[3]



[3] From workshop notes, source provided in workshop: "Lean Stack", see Lean Stack (2018)

Appendix I: Framework 4 as a map tool[4]



[4] For better readability, not all entries are included, for a full list of items, see Table 36.

Appendix J: Framework 4 as a brainstorming tool