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Prototyping, experimentation, and piloting in the business model context

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ABSTRACT

Business model innovation is increasingly seen as a key competitive factor in B2B settings. In this context, prototyping, experimentation, and piloting have gained prominence as agile and resourceful methods that can be employed in business model innovation pursuits. Yet, despite increasing interest in this area, and the growing number of large B2B companies who also started deploying these methods, there is a lack of clarity on the conceptual boundaries between the three concepts. This may impede the advancement of business model innovation research and practices based on the three concepts. We address this gap by conducting a structured literature review, using cross-reference searches and a key informant interview study of 43 executives in 13 B2B organisations. We offer three contributions: (1) definitions for each of these three concepts, (2) seven dominant similarities and (3) five key differences across them. Our research shows that the concepts serve distinct purposes at different stages of the business model innovation process, and we discuss these findings and their broader implications for the literature on business model innovation and for innovation management practices in B2B companies.

1. Introduction

Business model innovation is at the forefront of organisational competitive advantage in both B2C and B2B settings. Due to falling returns on technology (Chesbrough, 2007), increasing degrees of digitalisation (Ritter & Pedersen, 2020), growing complexity (Jensen, 1997), decreasing cost of capital (Mankins, Harris, & Harding, 2017), and sustainability pressures arising from multiple stakeholders (Boons and Lüdeke-Freund, 2013), business models must be frequently reviewed to respond to evolving organisational contingencies and to best explore emerging market opportunities in many industries (Christopher, 2000).

The marketing and innovation management fields are therefore increasingly concerned with the drivers and managerial implications of business model innovation (Esslinger, 2011; Schrauder, Kock, Baccarella, & Voigt, 2018; Sorescu, 2017; Visnjic, Wiengarten, & Neely, 2016), particularly in B2B contexts (Guldmann & Huulgaard, 2020; Nyadzayo, Casidy, & Thaichon, 2020; Töytäri, Rajala, & Alejandro, 2015). The industrial marketing and B2B management literature now covers a broad range of business model topics (Mason & Spring, 2011), ranging from coopetition-based platforms (Ritala, Golnam, & Wegmann, 2014) to solution business models (Storbacka, 2011), product service systems (Barquet, de Oliveira, Amigo, Cunha, & Rozenfeld, 2013), and sharing business models (Kumar, Lahiri, & Dogan, 2018).

The strategic importance of searching for the 'right' business model is often justified by a high failure rate of businesses (Pinfold, 2000). This seems to be a considerable constraint preventing the implementation of business model innovation ideas along all stages of the innovation process (Markides, 2006). Many ideas may end up in the drawer, scrapped by corporate departments, or fail in the market (Blank, 2013). To address this inertial behaviour and risk aversion, the extant literature suggests that organisations can employ three related concepts: prototyping, experimentation, and piloting (Blank, 2013, Brown & Katz, 2011, Turner, 2005).

These three concepts have been incorporated into the literature on start-ups, often presented as methods employed to minimize risks, increase agility, gain scale, and compete against powerful incumbent businesses (Blank, 2013; Brown & Katz, 2011; Ries, 2011). However, these concepts have become increasingly important to the reality of large businesses too (Ries & Euchner, 2013). Incumbents are employing

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these approaches to best cope with the complexities and uncertainties intrinsic to technological developments. Since they need to respond to evolving markets while simultaneously satisfying shareholder pressures for short-term results, lean approaches have arisen to the forefront of their strategies as means of allocating resources to test new waters without compromising their operations (Chesbrough, 2010).

Despite the importance of prototyping, experimentation, and piloting for business model innovation research and practice, their meanings, similarities and differences are not clear. This lack of conceptual clarity has detrimental implications for the advancement of business model innovation research and for the diffusion of management practices based on these concepts. Therefore, we addressed the research questions below through a systematic literature review combined with a comparative analysis of 43 interviews with managers from 13 large B2B companies.

RQ1. *What are the meanings of the terms prototyping, experimentation, and piloting in the business model innovation literature and how are they used by large B2B companies?*

RQ2. *What are the main conceptual similarities and differences among these concepts?*

The remainder of this paper is structured as follows. The second section introduces the theoretical background and research design. The third section reviews the meanings and different uses of prototyping, experimentation, and piloting, and derives synthesised definitions for each concept. The fourth section compares the three concepts, highlighting their similarities and differences. Finally, the fifth section concludes this paper, discussing research implications and prospects for the business model innovation literature and for innovation management practices in large B2B firms.

2. Theoretical background and research design

This section provides a short introduction into the field of B2B business model innovation and outlines the research design.

2.1. B2B business model innovation

The modern understanding of the business model concept emerged during the e-commerce boom of the 1990s (Zott, Amit, & Massa, 2011). In this context, business models were used to communicate complex business ideas, often based on new revenue mechanisms, to venture capitalists and other investors (Zott et al., 2011). The business model concept subsequently gained strength, becoming a strategic asset for competitive advantage and firm performance (Afuah, 2004; Casadesus-Masanell & Ricart, 2010; Chesbrough, 2007; Hamel, 2000; Magretta, 2002). It has since been deployed as 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 & Meinhardt, 2002).

Since the early 2000s, business model innovation has received increased attention from academia (Baden-Fuller & Morgan, 2010; Chesbrough, 2010; McGrath, 2010; Zott et al., 2011). This research attention has led to a broad range of meanings of business model innovation, and of methods that can be employed to purposefully stimulate its occurrence (Amit & Zott, 2012; Casadesus-Masanell & Zhu, 2013; Markides, 2006; Massa, Tucci, & Afuah, 2017).

This attention is also mirrored in the industrial marketing and B2B management literature (Mason & Spring, 2011) with a range of authors adopting the lens from coopetition-based platforms (Ritala et al., 2014) to solution business models (Storbacka, 2011), product service systems (Barquet et al., 2013), and sharing business models (Kumar et al., 2018).

The term 'business model innovation' may refer to a change in the configuration of the entire business model or its individual elements (e.g., value proposition, value creation and delivery, value capture) (Teece, 2010, 2018). Within this field, the concepts of experimentation and piloting have been discussed as pathways to business model innovations (Chesbrough, 2010). Prominent tools and concepts include Lean Start-up focused on iteratively building, measuring and testing new propositions (Ries, 2011), which has moved from the start-up to the corporate arena (Bocken & Snihur, 2020; Felin, Gambardella, Stern, & Zenger, 2020), as well as effectual logic, building on the notion of innovating based on the limited resources, partners and capabilities available (Sarasvathy, 2009).

Although the main fields of investigation of business model innovation have been in corporate venturing (Sykes & Block, 1989) and start-up development (Ries, 2011), it has recently taken the forefront of discussions on innovation management of incumbent businesses too (Berends, Smits, Reymen, & Podoynitsyna, 2016; Bocken & Snihur, 2020; Felin et al., 2020; Winterhalter, Weiblen, Wecht, & Gassmann, 2017). The relevance of business model innovation has indeed become more evident both to academics and practitioners alike. For example, an annual survey conducted by the Boston Consulting Group and BusinessWeek identified that business model innovators had an average premium that is four times higher than product or process innovators (Lindgardt, Reeves, Stalk Jr., & Deimler, 2015).

Whereas business model innovation has become recognized as a source of longevity and sustainable competitive advantage (Mitchell and Coles, 2003), the means of driving these business model innovations, such as prototyping, experimentation, and piloting have not been mapped, or documented in systematic ways across companies of different sizes, sectors and geographical locations (see e.g., Blank, 2013; Brown & Katz, 2011; Turner, 2005). Furthermore, these terms have been used interchangeably by academics and practitioners. They either do not specify the terms, refer to only one or two out of the three approaches, or do not explicitly draw the lines between them. Table 1 illustrates this lack of conceptual clarity among the three terms.

Finally, empirical investigations of prototyping, experimentation and piloting in business model innovation have mostly relied on the activities of start-ups. Exceptions include e.g., Berends et al. (2016), Bocken and Geradts (2020), Guldmann and Huulgaard (2020), Laasch (2019) and Weissbrod and Bocken (2017), but these often focus on specific sub-field like *sustainable* and *circular* business model innovation. Little is known, therefore, about the similarities and differences among the three concepts both in theory, and in the marketing and innovation management practices of large B2B companies (Winterhalter et al., 2017).

2.2. Research design

Our research consisted of two parts: 1) A systematic review of the business model innovation literature, followed by 2) key informant interviews with 43 interviewees in 13 B2B large companies operating in multiple sectors and geographical locations. Our aim is to provide a deep and detailed comprehension of the use of the terms 'prototyping', 'experimentation', and 'piloting', their interconnections and their integration within business model innovation processes both in theory and in the marketing and innovation management practices of large B2B companies.

Systematic literature reviews are useful methods to unpack the diversity of knowledge in a specific academic domain. The process of inclusion or exclusion of theoretical contributions follows a strict, replicable and transparent set of criteria – and, hence, is not implicitly biased as conventional literature reviews. Instead, it allows a wider coverage of scientific perspectives while simultaneously providing an audit trail to question the identified conclusions (Pittaway, Robertson, Munir, Denyer, & Neely, 2004; Tranfield, Denyer, & Smart, 2003).

Our systematic literature review process started with an initial search on the Scopus database, focused exclusively on journal articles or reviews in English with the search strings – described in Table 2 – either in their titles, abstracts, or keywords. This process resulted in 529

Table 1
Coverage of prototyping, experimentation, and piloting in business model innovation literature.

Coverage	Examples of References	Justification
Not specified	Ries, 2011; Blank, 2013	Lean Start-up aims at translating the business model concept as quickly as possible into a minimum viable product offered to the market. Despite the agile and experimental approach, it does not explicitly cover the three concepts, but rather mixes elements of all three.
Covers only 1 or 2 of the concepts	Mitchell and Coles (2004)	Refers to experimentation in their third process step, i.e., the development and test of potential business models. Other steps consist of: understanding and applying the current business model, vision development, and implementation of the new business model
	Chesbrough (2007)	Describes a 3-step business model innovation process with business model experiments as the second step. The first and third step are: the analysis of the current business model and the implementation of the new business model.
	Brown (2009) and Plattner, Meinel, Weinberg, and Leifer (2011)	Describes prototyping as a central part of innovation activities. The lines between experimentation and piloting are blurred.
	Zott and Amit (2015)	Covers prototyping in the 4th and 5th steps (i.e., refine and include experimentation activities and implement). The remaining steps are: observe, synthesise, and generate.
	Turner (2005)	Discusses piloting. As part of the discussion, he refers to prototyping as a preceding step to piloting but notes that some authors do not make a distinction between the two concepts.
Ambiguously framed or conceptually blurred	Johnson (2010), Teece (2010); Frankenberger, Weiblen, Csik, and Gassmann (2013), and Wirtz and Daiser (2018)	Each of the three concepts constitutes a separate, yet interconnected step in the process of business model innovation. While prototyping is taken as part of the concept design phase, experimentation and piloting are part of the detail design phase, where each element of the concept is planned in more details. It is, however, not clear why they must be integrated and what contributions can be expected from each.
	Osterwalder and Pigneur (2010)	Refers to the business model framework as a prototype rather than as a possible technique for business model innovation

documents, whose relevance to this research was determined after scanning their abstracts. At this stage, we also aimed at avoiding duplicates and minimizing redundancies, and we validated this result with a random control sample of 50 entries from Thomas Reuters Web of Science and EBSCO Business Source Complete reference databases, following the same criteria.

Our resulting sample of 128 articles was supplemented with contributions arising from cross-reference snowballing (Wohlin, 2014) to cover a comprehensive range of additional literature, as well as to reveal cross-fertilization between concepts. Our iterative snowballing builds on the approach of Geissdoerfer, Savaget, Bocken, and Hultink (2017) and Wohlin (2014), as summarized in Fig. 1. Relevance was defined as the capacity of contributing to the clarification of the two main research questions. Next to innovation management, we also considered publications from Business Marketing, Management and Engineering. Our exclusion/inclusion criteria are summarized in Table 3.

At the conclusion of our snowballing process, we gathered a total of 253 articles in our sample, whose contents were thoroughly examined and contrasted.

Based upon the emerging observations arising through the systematic literature review, we conducted simultaneously interviews with 43 key informant interviewees from 13 B2B companies through preliminary data collection, supplemented by secondary materials when primary data did not suffice. We designed an inductive and exploratory semi-structured interview protocol, where we prompted interviewees with open-ended questions, such as: How do you design and revisit your business model? Do you use piloting, experimentation and prototyping in your business model innovation process? How? Which of these methods do you use and in what circumstances? What do you mean by them, and how do they differ?

We realised the need of conducting inductive, qualitative work here due to the lack of working definitions differentiating prototyping, experimentation, and piloting in the examined literatures, as well as the fact that these agile means have not yet been systematically investigated in the contexts of large companies. The justification and approach undertaken here, therefore, follows the suggestions by Eisenhardt (1989), Eisenhardt and Graebner (2007) Beverland and Lindgreen (2010) and Goffin, Åhlström, Bianchi, and Richtnér (2019) on best practices to build theory from qualitative research and recommendations by Pratt (2008) on reporting the results from qualitative data analysis.

The informants were chosen due to their explanatory potential. This means that we focused on interviewees capable of providing detailed descriptions of empirical practices on prototyping, experimentation, and piloting and business model innovation, as well as of revealing insights that are complementary to the systematic literature review. Pragmatic criteria were equally relevant, most especially the possibility of having access granted by interviewees (Yin, 2014; Easterby-Smith, Thorpe, Jackson, & Jaspersen, 2018; Creswell, 2014; Silverman, 2013). For example, we used the author network plus attendance of key industry-academic events like the Berkeley Innovation Forum and World Open Innovation Conference to source contacts and added more detail on this in the text.

Although we are not investigating characteristics varying per sector and location, we also took these variables into consideration with the aim of diversifying our database to increase our chances of unpacking novel contributions. Table 4 demonstrates these variables across our database of interviews with key informants from B2B companies. It is

Table 2
Overview of number of articles of initial literature search.

Search strings	Results	Relevant after scanning abstract
prototyp* AND “business model*”	236	52
experiment* AND “business model*”	235	63
pilot* AND “business model*”	58	13
Σ	**529**	**128**

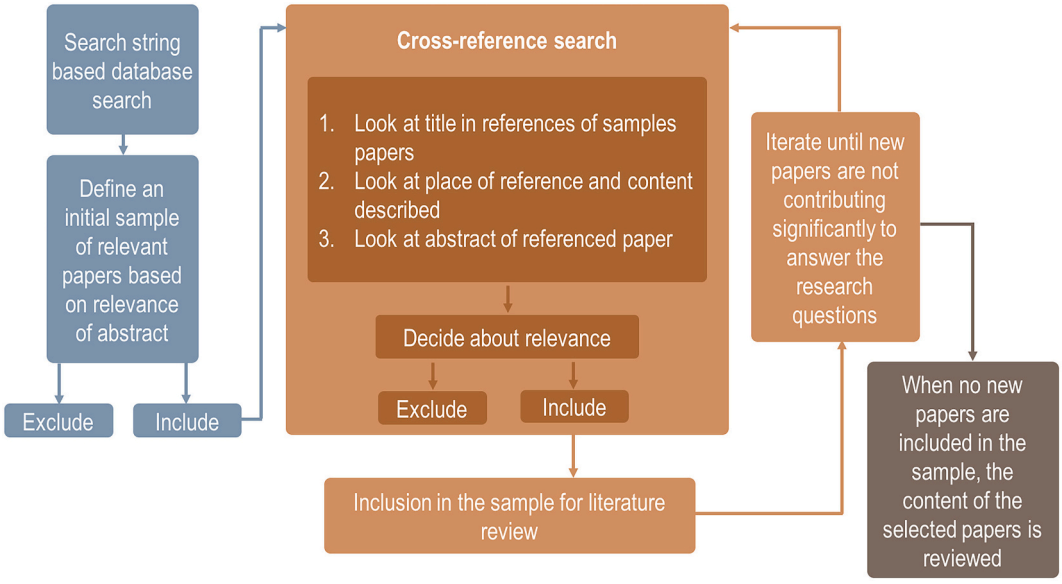

Fig. 1. The literature review process, adapted from Geissdoerfer, Savaget, Bocken, and Hultink (2017) and Wohlin (2014).

Table 3
Inclusion and exclusion criteria.[a]

Criterion	Inclusion	Exclusion
Publication type	Peer reviewed academic journals	Any other publication type (e.g., books, contribution to edited volumes, conference paper, periodicals, working papers)
Language	English	Any other languages
Availability	Available online as full text through institutional libraries	Not available online as full text. Remark: this was sometimes the case for older articles. We did not use a document delivery service to receive scanned copies of those articles.
Research Discipline	Q1 and Q2 journal papers in Innovation Management, Business Marketing, and Engineering	Q3 and Q3 journals, and any other research discipline
Time period	1900 to present*	Any study published before 1900
Relevance	Articles addressing prototypes, experiments, and pilots as business model innovation concepts	Articles containing prototypes, experiments, and pilots in their research methodology section
Number of Citations	Greater than or equal to 10	Less than 10

[a] Q1 and Q2 refers to the two top quarters of publication as ranked by Web of Science Journal Citation Reports, Q3 and Q4 to the remaining ones.

important to highlight that this research is committed to ensuring confidentiality of our participants and consequently, interviews are henceforth referred to by randomly allocated numbers.

The interviews were conducted in-person by the first author with B2B managers in 2018 and 2019, each interview lasting between 1 and 3 h, with 1.1 h on average. When viable, we attempted to interview multiple company representatives per B2B company, to uncover contrasting perceptions. The interviews were semi-structured (Silverman, 2013; Yin, 2014), with pre-established questions designed to answer our research questions, but we framed them as open-ended questions that allowed us to explore unanticipated insights that emerged during the interviews.

Following the interview protocol in Appendix A, the first author prompted interviewees specifically about business models, business models innovations, and more specifically about their experimentation, piloting and prototyping practices. The questions in our interview protocol aimed to gather insights on which practices they used, how the terms prototyping, experimentation, and piloting were used, and the context of and motivation for using each practice. Depending on their answers, the first author asked follow-up questions that were not on the script. For example, if they reported that they did both experimentation and piloting, the researcher asked: How are they different? Who in your company pursues each of those practices? What is the benefit of experimentation over piloting? With this semi-structured approach, we covered the "essentials" for this research, as informed by the literature review, but also explored more in-depth emergent insights from interviews on a novel and understudied research topic.

Table 5 shows that all interviewed B2B companies performed at least one of the three practices: prototyping, experimentation, and piloting. Five companies reported performing only one (C3, C4, C6 and C8), four performed two (C1, C2, C9 and C12), and the remainder performed all three (C7, C10, C11, C13). Furthermore, in total, eleven companies reported on prototyping, eleven on experimentation, and nine on piloting. Piloting is, therefore, slightly underrepresented in our sample when compared to the other two. However, our key informant interviews with these 13 B2B companies provided sufficient insights to understand each and contrast all of them. (See Tables 6–8.)

Despite this small variance, our approach here is inductive – not focused on representation of the total population. Robustness here means having the ability of providing valuable insights on organisations that focus either on prototyping, experimentation, or piloting, and from organisations that combine more than one of these three means of pursuing business model innovation.

After finishing the data collection, we analysed the recorded key informant interviews through thematic interpretation of content by coding and contrasting relevant extracts. In other words, we identified a condensed description of similar patterns and discrepancies across our interviews, which were subsequently overlapped with the results from the systematic literature review to provide the summarized set of observations presented in the following section.

3. Results: Meanings and uses of prototyping, experimentation, and piloting

In this section, we portray findings from the systematic literature review and from the interviews with key informants from large B2B companies for each of the three investigated concepts: prototyping,

Table 4
Overview of interviewed companies.

Company	Industry[a]	Country[b]	# Employees[c]	Inter-viewees	Lead interviewee role	Est. hours
C1	Oil and Gas Storage and Transportation	Spain	between 1000 and 10,000	10	Corporate Entrepreneurship Manager	8
C2	Integrated Oil and Gas	Spain	between 50,000 and 100,000	3	Head of Innovation	4
C3	Industrial Conglomerates	UK	between 100,000 and 500,000	1	Head of Energy Efficiency and Environmental Care	1
C4	*E*-commerce	China	between 100,000 and 500,000	1	Head of Business Development	3
C5	Apparel, Accessories and Luxury Goods	Germany	between 10,000 and 50,000	10	Director Product Division Sportswear	9
C6	IT Consulting and Other Services	China	between 100,000 and 500,000[d]	1	Partner	2
C7	Auto Parts and Equipment	China, Germany	between 100,000 and 500,000	3	Senior Manager Business Development	4
C8	Electrical Components and Equipment	Spain	between 100,000 and 500,000	1	Solar Product Operations Manager	1
C9	Research and Consulting Services	Germany	between 1000 and 5000[e]	2	Managing Director	2
C10	Electronic Equipment and Instruments	Germany	between 10,000 and 50,000	3	Senior Vice President Strategic Corporate Development & Head of Digital Innovation Partners	5
C11	Automobile Manufacturers	USA	between 100,000 and 500,000	2	Strategy & Portfolio Manager	3
C12	Steel	Germany	between 100,000 and 500,000	3	CTO	1
C13	Aerospace and Defence	Germany	between 100,000 and 500,000	3	Venture Builder and Digital Instigator	3
13		**5**		**43**		**46**

[a] The industry definition is based on the Standard and Poor's Global Market Intelligence database and the organisations' industry is adopted from its entry in the database. In cases where no entry is available, the industry is determined by the authors and marked with an asterisk.
[b] The listed country refers to the location of the interviewed organisational unit. For example, for C6 we interviewed the China based Senior partner of an US IT consulting and other services firm.
[c] Employee numbers according to MarketLine database, accessed on 14/03/2019, unless otherwise indicated.
[d] Company report for 2017
[e] Company website

Table 5
Occurrence of prototyping, experimentation, and piloting in the companies.

Company	Industry	Country	Prototyping	Experimentation	Piloting
C1	Oil and Gas Storage and Transportation	Spain	x	x	
C2	Integrated Oil and Gas	Spain	x		x
C3	Industrial Conglomerates	UK			x
C4	*E*-commerce	China		x	
C5	Apparel, Accessories and Luxury Goods	Germany			x
C6	IT Consulting and Other Services	China	x		
C7	Auto Parts and Equipment	China, Germany	x	x	x
C8	Electrical Components and Equipment	Spain		x	
C9	Research and Consulting Services	Germany	x	x	
C10	Electronic Equipment and Instruments	Germany	x	x	x
C11	Automobile Manufacturers	USA	x	x	x
C12	Steel	Germany	x	x	
C13	Aerospace and Defence	Germany	x	x	x

piloting and experimentation.

3.1. Prototyping

Prototyping performs a central role in the Design Thinking literature (Plattner et al., 2011). It has not been extensively used in business model innovation, except for the Business Model Canvas (Osterwalder & Pigneur, 2010) – which is often referred to as a framework for prototyping businesses, since it leads to the portrayal of core business components and their respective interactions. The trend seems, nonetheless, to be changing due to the increasing cross-fertilization between literatures on Design Thinking and (sustainable) business model innovation (e.g., see Baldassarre, Calabretta, Bocken, & Jaskiewicz, 2017; Geissdoerfer, Bocken, & Hultink, 2016; Liu & Mannhardt, 2019). Approaches covering prototyping include: Brown (2009a), Brown and Katz (2011), Brown and Wyatt (2012), d.school. (2010), Denning (2013); Geissdoerfer et al. (2016), Plattner, Meinel, and Weinberg (2009), Plattner et al. (2011), and Waloszek (2012).

Brown (2009a) refers to prototyping as a strategy employed by innovators to build an idea with materials, instead of only with their minds. This practice allows design thinkers to perceive limitations and identify various viable directions that can be taken. Brown and Wyatt (2012) add that prototyping is seen as a form of going beyond assumptions blocking the deployment of effective solutions, through a process that is inherently optimistic, constructive, quick, experiential and cheap. Once the prototype is ready, its insertion in the 'real world' rapidly provides valuable insights on what works, in what circumstances, and how people will likely use them. By observing a prototype and its implementation, new ideas and potential improvements can then be identified, explored, iterated, tested, and refined. They can, thus,

Table 6
Illustrative data of 'Prototyping'.

Category	Instance	Representative quotes
Intuitive use	Prototyping activities without framing as prototypes	"We usually validate the BMC [business model canvas] with the client of the process […] you also need to validate with the final customer not only your solution but also their problem" (C2)
	Prototypes as Communication tool for milestone presentations	"From the 16 projects it was coming back to 4 ideas for which 16 solutions were developed […] it was then presented to the board" (C2)
	Use of prototyping materials and techniques	"Too really test with other people and to have the hearth to think differently […] they work in a safe space, they work in cross-functional teams" (C7)
Design Thinking methodology	Referring to "Design Thinking"	We use sort of a combination of Design Thinking, Lean Startup, everything that we had discussed earlier this morning" (C11)
	Use of external DT consultants	"This [process] has not been developed by us but this has been developed by IDEO [a DT consultancy] […] now more and more external facilitators are covering this [process]" (C2)
	Hiring of employees with DT expertise	"We have [employee X] who was at IDEO and was doing this everyday" (C10)

Table 7
Illustrative data of 'Experimentation.

Category	Instance	Representative quotes
Intuitive use	Use of online A/B experimentation	"We had this initial service, we tested it out, got good feedback, now we see how we can make it better by using AI for example or bringing another partner into the mix […] we are now adding new layers to the service" (C11)
	Use of AI to automatise experiments	"You could also use AI for this […] but we are still very far away from this" (C5)
	"Offline" marketing experiments, like labs and test stores	"you basically first build a prototype within one store and then you do experiments with it. [Then] you basically tried in different stores and tried to track what customers are doing" (C9)
Lean Startup methodology	Referring to "Lean Startup"	"8 themes of 5 people […] different from the original team […] were working another 3, 4 months […] they were developing the business model with Lean Startup […] to validate the different hypotheses of the business model" (C2)
	Use of external LS consultants	"You had met [professor X] […] they also help us with using Lean Startup and similar techniques" (C7)
	Development of own Lean Startup and Agile based method	We use sort of a combination of Design Thinking, Lean Startup, everything that we had discussed earlier this morning" (C11)

unpack unforeseen challenges and unintended consequences before taking higher stakes involved with full-scale commercialization (Brown, 2009; Brown & Wyatt, 2012).

Table 8
Illustrative data of 'Piloting'.

Category	Instance	Representative quotes
Intuitive use	As a separate process	"3 of the 5 themes with the business plans was then given to different business units [for piloting]" (C2)
	As an unstructured phase	"[First implementation] is done by our IT, […] we want to get to a point where we do an 80% solution in a week instead of a 120% solution in 3 years (C5)
	Systematically	"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." (C9)

The d.school. (2010) takes an alternative approach, when highlighting the role of prototyping to learn not only about potential solution-oriented products and services, but also to maximize empathy-oriented learning about people. Despite their differences, in both cases, prototypes constitute tangible boundary objects to facilitate thinking, understanding, learning, and communicating concepts and ideas (d.school., 2010; Geissdoerfer et al., 2016).

Plattner et al. (2011) propose that Design Thinking opens up a vibrant and interactive conceptual environment for learning through rapid conceptual prototyping. They also emphasize that it was only when they started approaching conceptual prototyping as "communication media", that they could develop further insights, such as on bandwidth, granularity, time constants, and context dependencies. Furthermore, they empirically verified that the outcomes of repeated prototyping outperform a single round of prototyping. This outcome signals the importance of multiple iterations, which opens room for wider and deeper learning about aspects influencing the success of a solution.

In the interviews, most companies used prototyping in an intuitive way, often referring to activities without framing them as prototypes. These were employed either in the context of developing design prototypes (e.g., C2, C6, and C9)[1] or as a communication tool for milestone presentations (e.g., C1, C2, C7). The employed techniques ranged from using office materials at hand in their meeting rooms for building simple artefacts (C2), buying specialised handicraft materials and cardboard walls (C7), and using specially assigned areas that were fashioned in an open and "designerly" way (C9).

Three companies, C2, C10 and C11 knowingly used Design Thinking methodology facilitated by IDEO (C2) and a former IDEO consultant hired by the company (C10). Their activities roughly followed the approaches described by Brown (2009) and Plattner et al. (2011) and included Design Thinking style prototyping. These prototypes were used (1) to communicate within the project groups; (2) discover gaps in the concept, (3) communicate the concepts to other employees in the company or as part of milestone presentations; (4) use the prototype as a basis to interview sample customers, and (5) use the prototype to let sample customers interact with it and observe their comments and behaviour.

The interviewed companies that applied prototyping perceived the technique to be essential to their business model innovation activities. For example, the business model innovation office at C10 told us that, "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 to 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. [If it] goes down well with the

[1] To increase readability, for more than three companies in the data, only examples are provided. For a full overview, please refer to Table 4.

customer then there is the decision that now we build it."[2]

Based on the literature and practices of large B2B companies, we define business model prototyping *as quickly iterating low-resolution artefacts to communicate and test ideas in low-risk environments* (Brown, 2009; Brown & Katz, 2011; Brown & Wyatt, 2012; d.school., 2010; Denning, 2013; Geissdoerfer et al., 2016; Plattner et al., 2009; Plattner et al., 2011; and Waloszek, 2012; C1–2, C6–7, C9–12).

3.2. Experimentation

The primary reason to deploy experiments is to test whether a change in a variable is wholly or partially responsible for an effect in another. As demonstrated by Patzer (1996), experiments assist to infer causality through evidence of association; appropriate timing; and elimination of alternative explanations. In randomized control trials for medical research, for example, an experiment might involve assigning research subjects to a treatment and placebo groups to best control the influence of external variables and, as a result, best infer causality of treatment (Chatterji, Findley, Jensen, Meier, & Nielson, 2016). Besides biological research, experimentation has been an integral part of scientific investigation in disciplines of social sciences too, such as social psychology (e.g., Kahneman, 2012), development economics (e.g., Banerjee and Duflo, 2011), behavioural economics (Harrison and List, 2004), marketing (Patzer, 1996), and strategic management (Chatterji et al., 2016).

However, in strategy, marketing, organisational research and innovation management, the trend is relatively recent, and has been influenced by the rapid diffusion of the concept of 'lean start-up', which favours experimentation over extensive planning, feedback over intuition, and interactive design processes instead of top-down and linear strategic decisions (Ries, 2011). An interactive process for experimentation has been described in Osterwalder et al. (2014) and Ries (2011), although the latter focuses mostly on customer validation.

Experimentation becomes key for organisational development, for companies of different sizes and sectors to test potential future business opportunities (Chesbrough, 2010). However, it has become more deeply rooted in the start-up world, as it is also directly connected to other important concepts of lean organisational development, such as "minimum viable product' and 'pivoting' (Blank, 2013).

Davenport (2009) describe that experimenting may not be appropriate for every initiative, but it is critical for most tactical endeavours, becoming central to corporate decision making - and, thus, replacing strategic choices based on "I bet" to "I know". However, experimentation requires a well-established, standardised process, moving away from the laboratory and towards the boardroom, besides providing the required infrastructure to make that happen. This process starts with the creation of hypotheses, then moving on to the design of components and conditions of the test (e.g., sites, units and control groups). The following state of the process is, naturally, to conduct the test for the specified period, obtaining data that can be rapidly analysed to inform appropriate actions and whose results can also, ideally, become part of a learning library. The experiment might then lead to its rollout or, if needed, further testing of the revised hypotheses.

Anderson and Simester (2011) emphasize that companies do not have to deploy complex experiments. They can be rather simple and still be capable of inferring relevant causality to inform strategic choices. By using basic research techniques, managers can then embrace the "test and learn" approach. For example, companies can take an action with a group of customers, while simultaneously taking a different one with a control group to compare results. This is a relatively simple experiment, whose datasets are easy to be analysed and interpreted, yielding immediate guidance for steering strategic decisions.

Weissbrod and Bocken (2017) incorporate the idea of experimentation with business models to drive sustainable changes within companies. Experimenting, in this context, means a systematic way of identifying, testing and learning about value creation that can be adopted by businesses (Chesbrough, 2010; Osterwalder et al., 2014). By adopting business model experiments, companies can confront its inertia towards novel endeavours, due to lack of resources or what Sandberg and Aarikka-Stenroos (2014) describe as restrictive mindsets. They can then explore new value opportunities, and analyse contextual characteristics, such as time required, places that should be prioritized, and stakeholders that should be involved (Weissbrod & Bocken, 2017).

These observations are corroborated by our interviewees. Some companies (e.g., C10, C11, and C13) conducted experimentation through online customer interfaces, where features are introduced to a randomly selected group of users and their behaviour is subsequently compared to that of other customers, representing the control group. If the behaviour is desired, the features are introduced to the whole customer interface. If not, further tweaks are tested until a desirable behaviour is observed. One company (C5) discussed the usefulness of Artificial Intelligence (AI) to automatize experimentation and achieve a dynamic, real evolutionary approach, but none of the organisations has started implementation in this direction.

Two of our interviewed companies, C2 and C7, explicitly used the Lean-Startup methodology. C7 was facilitated by the Innovation Acceleration Group at Berkeley, roughly following the approach described in Blank (2013) and Ries (2011). Most other companies developed their own experimentation elements (e.g., C10, C11, and C13), often based on Lean Startup and the underlying Agile (Rigby, Sutherland, & Takeuchi, 2016) concept (e.g., C10, C12, C13). The experiments are often based on marketing experiment designs, like test stores or market research labs (e.g., C4, C9, and C10).

The importance of experimentation was generally put forward by the organisations that conducted it (e.g., C7, C9, and C10). For example, C9 states, "I think when we […] are working in a good way […] we would like to be faster than anyone else. They [, i.e., the experiments] really help people to implement ideas." C11 states that, "a lot of people at the senior levels think about 'what's the big picture', the market analysis, and 'how can we run the numbers on this', but with innovation that is not always the right approach of going straight to the numbers, so we try to focus on 'what's the need', 'what's the customer demand', 'what's the customer experience' and then iterate our way to a business model".

Based on the literature and the observed managerial practice, we define business model experimentation as *a structured and systematic way of testing key business assumptions about opportunities and bottlenecks of successful commercialization by formulating hypotheses, designing and executing tests to either accept/reject the hypotheses or pivot the experiment to other directions* (Kahneman, 2012; Banerjee and Duflo, 2011; Harrison and List, 2004; Patzer, 1996; Chatterji et al., 2016; Blank, 2013; Davenport, 2009; Anderson & Simester, 2011; Weissbrod & Bocken, 2017; Chesbrough, 2010; Osterwalder et al., 2014; C1, C4, C7–13).

3.3. Piloting

Authors, such as Glass (1997), Billé (2010a), Prescott and Soeken (1989), Turner (2005) and van Teijlingen and Hundley (2001) emphasize that pilots are becoming increasingly disseminated within organisational practices - including companies of different sizes and sectors as well as governmental bodies, non-profit organisations, and in academic research. Several studies on business model innovation (e.g., Lindgardt et al., 2009; Girotra & Netessine, 2013; Geissdoerfer, Savaget, & Evans, 2017; Bocken et al. 2017), discuss piloting as an important component of the business model innovation process. However, they do so without explicitly addressing what piloting is and without much information about what it entails. It seems thus paradoxical that, despite its importance in practice, piloting is academically understudied and underreported.

In academic publications, when justifying research methods, scholars often refer to elements of a pilot study, such as pre-testing of a

[2] Translated from German by the authors

questionnaire. Piloting is academically deployed as a trial run, a small-scale version in preparation for a major study aiming at minimizing risks (Polit, Beck, & Hungler, 2001), trying-out a research instrument (Baker 1994), or convincing funding bodies of a research proposal (Teijlingen and Hundley, 2001). However, full reports of pilot studies – and instructions on how to undertake them – are rare. Teijlingen and Hundley (2001) suggest that the reason for this may be that these studies are not seen as academically valid or publishable in academic journals, because of the requirements to present testable and verifiable data, obtained from a comprehensive survey rather than a pilot.

Despite being underreported in the literature, pilots are introduced as explorations into unknown territories (Glass, 1997). The term is used to discuss the appeal of a project by avoiding wasted efforts and money on an inadequately designed project, by testing practices, ideas, and technologies in a preliminary and smaller scale than the ultimate goal (Billé, 2010b). Pilots allow the team to learn about adverse contingencies, feasibility, and costs, as well as to anticipate (and, hence, reduce) risks. By doing so, the team can then be better equipped to design and implement a full-scale project.

Turner (2005) describes how pilot studies can provide data to help reducing uncertainty, by allowing teams to better define what the outcomes of the full-scale project should be and the process that should lead to that outcome. More precisely, pilots can lead to risk mitigation strategies, including, for example, project abandonment, risk avoidance, reduction of the likelihood or impact of risks, risk transfer (e.g., insurance or through outsourcing contracts), and contingency plans.

Other benefits of piloting, according to Billé (2010b), consist of allowing organisations to act promptly by: circumventing bureaucracies that are needed for full-scale implementation; being flexible and more adaptable than full-scale projects; overcoming resistance by convincing decision-makers of testing projects through a relatively cheap and rapid alternative; mobilizing and instigating team members to engage by providing them with optimism and something to gnaw on, building up momentum, increasing productivity, and promoting learning-by-doing.

However, as described by van Teijlingen and Hundley (2001), pilots can also lead to making inaccurate predictions or assumptions by relying too much on small-scale data. Other potential problems may occur when pilots require great amounts of resources. That can make it difficult to halt the project after an unsuccessful pilot, with team members getting tempted to inaccurately change the project to avoid the conclusion that the proposed full-scale project, given the available resources, is not feasible or desirable.

Glass (1997), focusing on computing, sets up a guideline composed of five steps for piloting, varying in terms of rigor. This step-by-step approach is potentially adaptable to other sectors and projects, and consists of the following focal areas:

- *planning*: defining the problem, examining and selecting the alternatives, as well as identifying key independent variables, variables to control, and operational success criteria;
- *designing*: defining pilot tasks, operational success criteria, mechanisms for obtaining data, relevant constituencies, constituency input and approach, evaluation mechanisms, data evaluation and validation approach, cost/benefit measurement, milestones and deliverables, ways to control variables, statistical approaches, and confidence factor;
- *conducting*: following the design, logging and explaining design deviations, recording issues and resolutions, and saving data for evaluation and accountability;
- *evaluating*: reassessing feasibility via operational success criteria, performing analysis of cost/benefit vs. implementation, documenting recommendations, critiquing pilot approach, applying confidence factors, and including confidence factor in the conclusions; and
- *using*: pilot findings will provide the basis for new and ongoing alternatives.

Some interviewees see piloting as a separate, succeeding step after the actual business model innovation process, rather than an integral part of it (e.g., C2, C5). Their companies were measuring the success of the business model innovation process by how many ideas were accepted for a pilot by top management. For example, C2 conducted their business model innovation programme until a viable concept was developed, and subsequently passed it on to an interested business unit for piloting. They measured the success of their program by calculating how many of their projects made it to that stage. These companies conducted piloting within one of their business units as an unstructured phase, often jeopardised by conventional business metrics and management control systems that were set by the hosting department. These thresholds are designed as a metric for established and profitable business activities. Therefore, they are not adequate to analyse pilots, even if these are successful early-stage ventures. For example, Company 2 / Interviewee 3 reported that a successful pilot "did not have enough zeros behind the comma", when being evaluated by the controlling of their highly profitable oil and gas business unit. Similarly, there were issues with partnering business units, for example, Company 5 / Interviewee 1 reported, "the prioritisation is very much taking place at the IT [department] at the moment […] they most often 'have no capacity' [laughs]".[3]

Other organisations used piloting systematically within their business model innovation process to minimize risks by first rolling out a new business to a specific market segment (e.g., C9, C10, and C13). Usually, these target populations were selected geographically. Examples include single stores, cities and countries. C11 describes piloting as "we bring it from power point to reality" and state that, "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".

The importance of piloting was generally put forward by the organisations that conducted it (e.g., C2, C5, and C9). For example, C2 states, "we were thinking that it would be a good idea to go into this kind of market with this kind of solution, but we have found that it was not, because of these reasons […] this is also a good learning for the company".

Based on the literature and our interviews, we define piloting as *a semi-controlled launch of the business concept in parts of the target market, testing all elements of the business model within a smaller-scale and easier to analyse setting to test contingencies, costs, and feasibility, at reduced initial investment and risks compared to the implementation of a full-scale project.* (Glass, 1997; Turner, 2005; Billé, 2010b; van Teijlingen and Hundley, 2001; C2–3, C5, C7, C9–10, C10–11, C13).

4. Discussion

After systematically contrasting and reflecting upon the findings in the previous section, we were able to pinpoint the main similarities and differences between the three terms; hence, providing more clarity for academics and practitioners engaged in the field of B2B business model innovation. We then discuss how our work contributes to business model literature and provide detailed guidance to practitioners of B2B companies.

4.1. Similarities

There was a broad acknowledgement among investigated B2B organisations that some form of exploration or testing is desirable for business model innovation. However, the three concepts, prototyping, experimentation, and piloting were often used interchangeably by the companies and in literature. It is important to highlight that not all

[3] Translated from German by the authors

companies used all three techniques, and most organisations did not clearly separate the three concepts. While all companies agreed on the importance of testing and stakeholder integration, there was considerable confusion about the terminology and what activities each of the concepts comprises. The same applied to the reviewed literature.

The concepts were sometimes used as part of a process package like design thinking (C2 and C10), Lean Start-up and Agile (e.g., C10, C12, C13), or LEGO serious play (C3). The signalling of quality and credibility of a project team and its business model concept seems to play an important role. Both successful test purchases (C9) and visual material of test customers interacting with a prototype (C1) were seen as appropriate means to signal these qualities to sponsors and decision makers. If there was a clear distinction, this tended to be comprised by an underlying concept, such as Lean Start-up (e.g., C10, C12, C13) and Design Thinking (C2 and C10). None of the companies followed Osterwalder and Pigneur's (2010) terminology of referring to a business model framework as a prototype, despite all interviewees being aware of the business model canvas concept (e.g., C4, C5, C8).

Regardless of this diversity, Table 9 summarizes the main similarities and their respective meanings based on the systematic literature review and the managerial insights gleaned from the interviews with key informants. In a nutshell, the three terms are often used to describe processes of reality checking before marketing or rolling out an innovation. The main similarity consists, therefore, of exploring or testing ideas in an agile, practical way to receive customer feedback and communicate to leadership and shareholders, while concomitantly minimizing risks of innovative endeavours.

4.2. Differences between prototyping, experimenting and piloting

The main differences among the three concepts observed in the literature and the managerial practices in B2B companies are summarized in Table 10.

The reasoning of prototyping tends to be more inductive than the others. It is the most exploratory of the three approaches, employed to identify viable directions and unknown limitations. Experimentation, alternatively, tends to deploy a more deductive approach, based on the formulation, testing and validation of previously established hypotheses to find explanations. This tradition draws from deductive scientific approaches, such as in biology, to infer causality, correlation or patterns between previously identified variables. Piloting lies in between the other two, tending to employ an abductive method. In other words, in piloting, there are 'working hypotheses'[4] which serve as a frame of reference for guidance. Piloting can then pre-test or validate the working hypothesis, but the process is also flexible enough to allow for the identification of limitations and viable directions that have not been previously conceived.

Table 9
Similarities between the concepts of prototyping, experimenting, and piloting.

Similarities	Meaning
Agile	Aim to catalyse or accelerate the speed of an innovation, by quickly exploring and testing what is unknown or can only be hypothesised and enabling quick development iterations
Efficient	Deploy less and often easily available and cheaper resource than traditional development processes with similar outputs
Pragmatic	Do not intend to find a perfect solution, the focus here is on good-enough, testing and exploring to quickly reach a riper solution
De-risking	Given the uncertainties of markets and technologies, these approaches de-risk innovation processes, expanding the knowledge base
Non-confrontational	These techniques are relatively cheap and do not confront short-term interests of the leadership and shareholders
Convincing	The results can be used to justify and, hopefully, convince the leadership and shareholders to pursue high-stakes ventures
Data proximity	Try to get data as close as necessary for the respective development step to the real market situation

Table 10
Differences between prototyping, experimenting, and piloting in the business model context.

	Prototyping	Experimenting	Piloting
Objective	Understanding and exploration of concept elements	Testing individual or a small number of variables	Rolling out parts of the business
Setting	In a workshop setting or in a user context	Testing hypotheses in a given business environment	In parts of the target market
Method	Rapid, low resolution design thinking techniques	Online, lab or field experiment, or simulation	Partial roll-out to certain customer segments or geographies
Relative effort and risk	Low	Moderate	High
Relative maturity of concept to be tested	Low	Moderate	Moderate

Their objectives are also distinct – and directly associated to their underlying reasoning. Our research has observed in the interviews with key informants from large B2B companies that, whereas prototyping has been used mostly to understand and explore new elements, experimentation is more focused on a set of pre-defined variables to be empirically tested, and piloting on pragmatically rolling out parts of the business, building upon previous experiences while expanding to unexplored areas. Thus, they can also build on one-another: prototyping can be used to gain a deep qualitative understanding of a problem and solution context that enables the formulation of meaningful hypothesis that must be quantitatively tested. With this information meaningful pilots can be designed and executed.

The settings and the employed methods also differ among prototyping, experimentation and piloting. Prototyping of business models tends to be conducted within a creative or workshop setting, often in a deliberately selected environment where exploratory approaches can be undertaken. Techniques are rapid and imaginative, often implementing ones from design thinking. Alternatively, experimentation tends to be located in a semi-controlled business environment where critical, pre-established variables can be better understood. Methods consist of tests in lab, online environments, specific fields, or statistical simulations. Lastly, piloting occurs in parts of the market segment, where working hypothesis can be tested, but unknown limitations and opportunities can be further explored. It therefore focuses on partially rolling out features to market segments or geographies where it can simultaneously test and explore.

The efforts and risks intrinsic to each of them are also related to their respective levels of maturity. Prototyped projects tend to be the least mature among the three. Given low levels of maturities, the approach is essentially exploratory, involving low efforts and risks. Experimentation has moderate maturity. Since it is most often conducted in a semi-controlled environment, tests and validations do not require extensive

[4] Kaplan (1964, p. 88) describes that 'working hypothesis' help guiding and organising further investigation: "The working hypothesis is not a guess at the riddle, a hunch as to what the answer might be. It is an idea…about the next steps that may be worth of taking".

efforts and do not imply in great risks. Piloting also has a moderate level of maturity. However, it is conducted in a specific market segment which may be compromised in case of failure; hence, risks tend to be higher than in the other two.

4.3. Contributions to literature

Our study clarifies the uses of the terms prototyping, experimentation and piloting in large B2B companies. Reflecting on our findings, we provide two key contributions to business model literature; and, more particularly, to the literature at the intersection of business model, disruptive innovation and B2B marketing.

As Zott et al. (2011), Teece (2010), and Massa et al. (2017) have demonstrated, the business model has become an influential theoretical construct within innovation and strategic management. However, the business model innovation process – as covered, for example, by Mitchell and Coles (2004)Chesbrough (2007), Johnson (2010); Osterwalder and Pigneur (2010), Teece (2010), Amit and Zott (2012), Frankenberger et al. (2013) and Wirtz and Daiser (2018) – does not differentiate between the terms prototyping, piloting and experimentation. The literature currently lacks a shared definition of the three terms, often using them interchangeably.

By highlighting the differences in conceptualisation and application of prototyping, experimentation and piloting, we reduce the conceptual ambiguity and provide a basis to explore the nuances of different business model process models. Our empirical work elicits that companies use them for different reasons, and in different circumstances. Despite being used interchangeably in the literature, prototyping, experimentation and piloting are distinct activities: each is pursued with different objectives, settings and methods in the business model innovation process of large B2B companies.

Our findings also shed light on the particular role of piloting, experimentation and prototyping in the context of incumbent B2B companies – and that is especially relevant for the literature that connects business model with disruptive innovation. These studies often focus on 1) incumbents being disrupted by outsider start-ups because incumbent businesses do not invest in uncertain and high-risk innovations with scarce resources needed to engage with current competition; and 2) B2C companies, and how they capture and deliver value to multiple stakeholders (Chesbrough, 2010;Christensen, 1997; Markides, 2006). Our work focuses instead on the understudied business model practices of incumbents in B2B. We show that they also employ methods which are often associated to start-ups and to B2C companies, either to maintain their competitive advantage or to explore new markets for further differentiation.

Literature argues that incumbent corporations have access to resources, brand name and existing customer and supplier networks, which make them particularly prone to exploit existing advantages rather than exploring unchartered terrains (Jakopin & Klein, 2012). This inertial behaviour of incumbents often justifies why they "miss out" new opportunities, because they are too focused on their current competitive advantages (March, 1991). However, our study notes that incumbent B2B companies are increasingly taking advantage of prototyping, experimenting, and piloting as means of exploring more uncertain routes. Radical innovations can be pursued without the perceived associated risks and uncertainties, and through a more gradual and cost-effective process; hence attracting more support from risk-averse managers (Christensen, 1997; Markides, 2006). Our work therefore shows that piloting, prototyping and experimentation improve the ambidextrous capabilities of B2B incumbents, balancing efficiency in their legacy operations, with increased agility in new business building by exploring new options (Duncan, 1976; Harmancioglu, Sääksjärvi, & Hultink, 2020; O'Reilly & Tushman, 2004).

4.4. Contributions to managers of incumbent B2B companies

Our research has key implications for B2B marketing management and industrial practitioners. Prototyping, experimentation, and piloting are not the same: Each concept has key differences, ignoring these can cause confusion and ineffective deployment of the underlying techniques. Targeted deployment of the three methods can reduce costs and risks and increase success rates: If each concept is deployed for the right purpose at the right time in the process, potential failures can be uncovered before entering the market when considerable investments are made.

These methods are not mutually exclusive either; in fact, each is embedded at different stages of the business model innovation process of large companies. By combining prototyping, experimentation, and piloting, stakeholder integration can be improved, and frequent reality-checks can be implemented throughout different stages of a business model innovation process.

Our study notes that prototyping is particularly helpful for ideation processes, conducted in more informal settings, which can stimulate cognition and break up with organisational inertia. It is particularly helpful for quick communication and for testing of rough ideas with different stakeholders in the early conceptual phases of the process.

Experimentation seems to be better deployed when the organisation already has a clearer direction of what ideas should be delved into, leading to a more careful and controlled elaboration of new offerings before – or at early stages of – market entry. It can be used to test key hypotheses and bottlenecks when detailing each conceptual element. Its main contribution lies, therefore, on gaining enough maturity in terms of desirability, feasibility, viability (Brown, 2008) and potentially also environmental and social sustainability (Baldassarre et al., 2020), to be marketed.

Piloting logically follows as one of the latest stages of business model innovation, when new offerings may be mature, but still need to be tested against contextual contingencies. Consequently, among the three concepts, piloting is the one that involves tightest connection to external agents, especially with the market and the post-production stakeholders (e.g., consumers, retailers, etc). Therefore, piloting is particularly helpful to test and roll-out the final concept in parts of the target market and scale it from there when successful.

5. Conclusions

This study focused on the notional ambiguity and lack of clarity for the conceptual boundaries between prototyping, experimentation and piloting in the business model: A research gap that impedes the advancement of business model innovation research and practices. Our research investigated this gap by conducting a structured literature review using cross-reference searches, and a key informant interview study of 43 executives in 13 B2B organisations. We show that the concepts serve distinct purposes at different stages of the business model innovation process and can be located in clear conceptual boundaries. From the findings, we derived definitions for each of these three concepts and revealed seven dominant similarities and five key differences across them.

There are several opportunities to build on our contributions. Firstly, based on our findings we recommend investigating the frequency of prototyping, experimentation, and piloting in different jurisdictions and sectors, as well as developing sets of indicators to investigate which companies have incorporated, in which moments, and for what purposes.

Secondly, while the investigated literature generally assumes that their integration increases the likelihood of successful business model innovation, this correlation remains largely unexplored. A deductive and more quantitative approach could test the veracity of the findings we unpacked in an expanded sample. We therefore recommend investigation on how and to what extent they influence success rates of

business model innovation.

Thirdly, future contributions can expand on our work through comparative qualitative analysis, which can unpack the differences in the uses of these three methods between B2B with B2C companies, as well as between incumbent companies and start-up. Also, our sample only represents large firms, mostly from the Global North and working in high-tech sectors. Future studies diversifying geographical coverage, company sizes, sectors and technological intensity could build upon and add more nuances to our findings.

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Appendix A. Sample interview guide

1) **Background**
   1. What does your department do?
   2. Which market are you targeting?
   3. What role do you have in the company?
2) **Business model changes**
   1. Did you undergo a substantial shift in
      a. Your product or service offering?
      b. The way you charge your customer for it?
      c. Your value chain?
   2. What was the motivation for doing this?
   3. How did this impact your business model (offering, charging, value chain)? ➔ Could you draw how it looked before and afterwards?
   4. How successful have your business model innovations been? (c.f. expectations)
3) **Business model innovation**
   1. What happened?
   2. What were the major steps?
   3. Who was in charge of these activities?
   4. Who else was involved?
   5. What were the major challenges?
   6. How did you solve them?
   7. What went particularly well?
   8. How many times did you adjust your plan?
4) **Prototyping, experimentation and piloting**
   1. Do you use prototyping? If so, why and how?
   2. Do you use experimentation? If so, why and how?
   3. Do you use piloting? If so, why and how?
   4. If you use more than one above, what are the similarities between them? What are the differences?
5) **For each of the 3 concepts your company deploys:**
   1. What were the main activities?
   2. What were the major challenges?
   3. How did you solve this?
   4. Did you use any tools?
   5. Would you do something differently in retrospective?
6) **Is there anything that you feel was important for the success/failure?**
7) **Who else should we talk to?**

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