

Louvain School of Management

Antecedents of Organizational Innovation: a Literature Review

**Challenge 4: Develop a Balanced Portfolio of Business
Models**

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Abstract :

This thesis delves into Gailly's fourth innovation challenge of creating a balanced business model (BM) portfolio, analysing 35 additional articles from the Limo platform. The goal is to update and enhance the website with scientific insights. It underscores AI's growing significance in BM development, the impact of company size on BMs, and the role of stakeholder management, areas less explored on the website. While Gailly focuses on BM quantification, this thesis advocates for a continuous evaluation process to ensure strategic alignment. As a conclusion, it proposes potential implementations of the literature findings into the website. By blending theory with practical strategies, the thesis presents a comprehensive framework for navigating the complexities of business model innovation in today's dynamic environment.

Keywords: Business Model Innovation; Business Model; Innovation Portfolio; Portfolio Management; Artificial Intelligence

Résumé :

Ce TFE explore le quatrième défi d'innovation de Gailly, axé sur la création d'un portefeuille équilibré de modèles économiques (BM), en analysant 35 articles supplémentaires provenant de la plateforme Limo. L'objectif est de mettre à jour et d'enrichir le site web en intégrant des connaissances scientifiques. Il met en évidence l'importance croissante de l'IA dans le développement des BM, l'impact de la taille de l'entreprise sur ces derniers, ainsi que le rôle de la gestion des parties prenantes, des aspects moins explorés sur le site. Alors que Gailly se concentre sur la quantification des BM, ce TFE préconise un processus d'évaluation continue pour garantir l'alignement stratégique. En conclusion, il propose des mises en œuvre potentielles des résultats de la littérature sur le site. En combinant la théorie avec des stratégies pratiques, le mémoire offre un cadre complet pour naviguer dans les complexités de l'innovation des modèles économiques dans l'environnement dynamique d'aujourd'hui.

Mots-clés : Innovation de Modèle Économique ; Modèle Économique ; Portefeuille d'Innovation ; Gestion de Portefeuille ; Intelligence Artificielle

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Summary

This master's thesis examines the fourth challenge outlined on Benoît Gailly's "Navigating Innovation" website, focusing on developing a balanced portfolio of business models (BMs). The study assesses the current relevance of the information provided by analysing 35 additional articles identified through the Limo platform.

The results section of this thesis mirrors the website's structure, with an additional chapter exploring the effects of sustainability, technology, and artificial intelligence (AI) on business model innovation (BMI). The first chapter outlines BMs and methods for their innovation. Following that, the second chapter highlights the significance of value propositions, stakeholder management, and ecosystems. The third chapter examines BM governance and how company size influences BM strategies. The fourth chapter concentrates on the evaluation process preceding decision-making. Moving forward, the fifth chapter explores innovation portfolios, considering cultural factors. Lastly, the final chapter addresses the impacts of sustainability, technology, and AI.

A key finding is the increasing importance of AI in developing BMs and innovation portfolios, an area not covered on the website. The literature highlights AI's potential to transform value creation, delivery, and capture through advanced analytics and robust data pipelines. Additionally, this study underscores the distinct financial challenges faced by SMEs and large companies, advocating for SMEs to adopt an agile, lean approach to overcome resource constraints. The literature review also emphasizes the critical role of effective stakeholder management in innovative BMs, a topic underrepresented on the website. While Gailly focuses on quantifying BMs, this thesis promotes a continuous and holistic evaluation process to ensure strategic alignment.

This master's thesis is concluded with a potential implementation of the literature findings into the website. By bridging theoretical considerations with practical strategies, this thesis offers a comprehensive framework for understanding and navigating the complexities of BMI in today's dynamic business environment.

Keywords: Business Model Innovation; Business Model; Innovation Portfolio; Portfolio Management; Artificial Intelligence

Preface

I would like to extend my heartfelt gratitude to my promotor, Benoît Gailly, for the opportunity to work on this thesis. His prompt communication and unwavering support have been instrumental throughout the development of this work. We had several meetings, each time providing clarity and guidance whenever I encountered questions or challenges. His insights and directions significantly streamlined my efforts, making the entire process much more manageable. Without his assistance, this thesis would not have been possible. Thank you, Benoît, for your constant encouragement and expertise.

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1 Introduction

In today's dynamic organizational landscape, innovation stands as a cornerstone for success. However, navigating the complexities of innovation can be challenging. Recognizing this need, the "Navigating Innovation" website, curated by Benoît Gailly, serves as a valuable resource, gathering insights from scientific articles to assist managers, entrepreneurs, and policymakers in overcoming innovation hurdles. Gailly divided organizational innovation into five distinct challenges. This thesis focuses on refining the website's content, particularly the fourth challenge, to enhance understanding and resources related to crafting innovative business model (BM) portfolios.

At the heart of any organization lies its BM, dictating how value is generated, delivered, and captured. Unlike mere product or service innovation, business model innovation (BMI) involves significant transformations to core elements and their connections, reshaping the organization's strategic trajectory. This journey begins by transforming initial business concepts into structured alternatives that address fundamental questions about target customers and revenue generation strategies.

The objective of this thesis is to find new and relevant scientific articles through a literature review, verifying or updating the information on Gailly's website. The research question for this thesis is: "How can the content of Benoît Gailly's "Navigating Innovation" website, particularly regarding the fourth challenge of creating a balanced portfolio of business models, be updated and enhanced with recent scientific insights?"

For this literature review, the Limo platform, the online library of KU Leuven, is utilized. This investigation focuses on articles published from 2020 onward, using keywords identified through an iterative approach. The selected articles are then filtered by analysing their titles and abstracts.

This thesis is structured as follows:

The context section provides background information on Benoît Gailly's work, with a precise explanation of the fourth challenge of organizational innovation. This sets the stage for understanding the focus and importance of the subsequent analysis.

The methodology section details the approach for conducting the literature review. It describes the search process, which involved using the Limo platform to locate relevant articles published from 2020 onward and selecting reputable journals. The section also outlines the criteria used to filter articles, focusing on the analysis of titles and abstracts to ensure their relevance and quality.

The results section is divided into two parts. The first part analyses the identified articles and journals, providing an overview of the gathered sources. The second part organizes the information from these articles into subsections that mirror the structure of Gailly's website, ensuring a coherent and systematic presentation of findings.

The discussion section is divided into three parts. The first part compares the information from this literature review with the content on Gailly's website for each subsection. The second part highlights the main overall differences between the new literature review and the existing website content. The third part proposes possible implementations to update the website based on the new findings.

The thesis concludes by summarizing the key findings and insights. It discusses the limitations of the study and offers suggestions for future research directions to further advance the understanding of organizational innovation challenges.

2 Context

In the realm of organizational discourse, innovation reigns as a prominent subject. As the world undergoes constant change, organizations must evolve accordingly. This evolution brings forth new opportunities and professions, while simultaneously rendering existing ones obsolete.

However, for many managers, innovation remains a difficult concept. Although an abundance of scientific literature exists, both scholars and managers often struggle to pinpoint relevant materials. Moreover, translating theoretical knowledge into practical application proves to be challenging. While generating ideas is one aspect, executing these concepts and effectively managing innovation projects pose a separate set of hurdles.

Recognizing these obstacles, Benoît Gailly, the promotor behind this thesis, created a website: "Navigating Innovation" (Gailly, 2024). This platform was created with insights from high-

quality scientific articles sourced from reputable journals. Its objective is to furnish a comprehensive overview of how innovation can be integrated into organizational frameworks, alongside the challenges faced by managers, entrepreneurs, and policymakers. Through its user-friendly interface, the platform offers invaluable insights into the fundamentals of innovation management, structured along the five innovation challenges.

The first innovation management challenge is cultivating a unified strategic vision for innovation. Before committing substantial financial resources, an organization must clearly define its goals, reasoning, and approach to innovation.

The second challenge is nurturing an appropriate entrepreneurial ecosystem. An innovation strategy holds little value if an organization lacks the entrepreneurial capabilities necessary for its execution.

The third challenge involves the effective identification of innovation opportunities. Bridging the gap between customer needs and the firm's offerings requires leveraging internal organizational knowledge assets and integrating external sources of knowledge, such as technological advancements.

The fourth challenge is the creation of a balanced portfolio of BMs. This challenge is discussed in more detail later in this chapter.

The fifth and final innovation challenge revolves around effectively capturing and executing innovation opportunities. To seize these opportunities, organizations must employ experimentation and proactive learning, coupled with ruthless prioritization. Entrepreneurs must anticipate and adapt to changes within their plans.

In conclusion, Gailly emphasizes that effective innovation management hinges on grasping its essence, importance, and objectives. Continuously identifying and pursuing opportunities that align with the organization's strategic goals is crucial. In today's ever-changing landscape, managers must skilfully navigate both people and resources, remaining open to engaging stakeholders. Successful innovation isn't a one-size-fits-all endeavour; instead, organizations should prioritize based on their individual purpose, resources, and environment.

Now a more in-depth analysis of the fourth challenge is given, because this will also be the scope of this literature review.

2.1 Challenge 4: Balanced portfolio

The fourth challenge, central to this thesis, explores creating a balanced portfolio of BMs, crucial for firms to manage effectively. It's essential to choose opportunities where a compelling BM can be crafted, avoiding overextension. Unfortunately, many innovations fail to become viable business prospects. The goal is to establish a balanced portfolio of BMs. This chapter is divided into five parts for clarity.

2.1.1 Business model design: asking the right questions

Creating or improving a BM entails defining how resources can be utilized to solve a problem and effectively market this solution to relevant stakeholders. A compelling BM should address four key questions: (1) Why does the problem exist, and why are we well-suited to solve it? (2) What precisely can be offered to whom and through what channels? (3) Who needs to be involved? (4) And what are the stakes involved?

Innovating new approaches to answer these questions enables managers to develop more innovative and sustainable BMs. Additionally, successful entrepreneurs prioritize understanding the "why" and the "who," recognizing that failure is not an option and acknowledging that technological specifications ("what") and financial projections ("how much") can evolve over time.

2.1.2 Designing competitive business models: Why and What?

The first strategic challenge of a BM is tackling a significant problem encountered by a target audience. It's crucial to have enough individuals facing this problem who are not only willing but also capable of adopting and paying for a new solution. The second challenge involves establishing a competitive edge over existing alternatives. The organization must showcase its ability to address this need more effectively than its competitors.

On the operational side, the initial challenge is to formulate an initial value proposition. Subsequently, the second operational challenge involves establishing, integrating, and expanding a competitive and sustainable value chain. This encompasses appropriate design, operations, client management, and support activities.

2.1.3 Mobilizing the right resources: Who and How much?

The cornerstone of a successful BM lies in identifying and mobilizing the necessary entrepreneurial talent and expertise. Simply launching a project and assigning available personnel is not sufficient, as poor governance is often the underlying cause of failure in innovative ventures. Additionally, managers frequently underestimate the financial resources necessary to initiate and expand a sustainable BM.

2.1.4 Valuating innovative business models: quantifying the unquantifiable

To determine which business plan to pursue, valuation of the BMs is necessary. This valuation involves assigning a numerical value or score to each BM, considering what is known, believed, and uncertain.

The net present value (NPV) method is commonly used for this purpose, as it assesses the expected riskiness and potential cash flows of each BM. Additionally, conducting a sensitivity analysis is crucial to incorporate known risks and potential uncertainties, thereby minimizing managerial ignorance and enhancing decision-making.

2.1.5 Building a consistent and balanced innovation portfolio

When entrepreneurs and managers assess a new opportunity for potential selection, it's essential to evaluate its alignment with the existing portfolio of projects. This entails examining how the new opportunity will affect the coherence of the current corporate portfolio. They must analyse potential bottlenecks in crucial resources and identify possible technological and organizational synergies. Additionally, they should consider how this opportunity will impact the balance and alignment of the portfolio in terms of both strategic scope and time horizon.

3 Methodology

To find more information about the fourth innovation challenge, a selection of pertinent scientific articles is sought. The Limo platform (*Limo*, 2024), the online library of KU Leuven, was utilized for this purpose. Access to this platform is typically restricted to individuals affiliated with KU Leuven, such as students or professors. Because of this, the author acquired login credentials from an acquaintance who had access to the platform. The decision of using

Limo was influenced by the author's prior experience with the platform, making it the most logical choice for accessing scholarly resources.

Initially, the website "Navigating Innovation" was explored to pinpoint the types of articles necessary for enriching its content. As the aim is to seek out new pertinent information, the focus is on examining publication dates to determine the timeframe for sourcing information. The website is based on a paper by Benoît Gailly, authored in 2018. Upon examining the references, it became apparent that until 2019, numerous references were incorporated to gather information on the subject. However, there was a noticeable decline in references from 2020 onwards. Therefore, the decision was made to commence the search for relevant articles starting from the publishing year 2020.

Followed by the in-depth analysis of the website itself, the strategy involved searching for sources using various keywords. The choice was made to search only in titles and descriptions to narrow the scope of the search and make it more manageable. An iterative approach was employed to ultimately locate between 25 and 40 articles that could contribute to this literature review. It's crucial to note that not all articles are reliable, necessitating a rigorous approach to ensure all information can be verified.

This involved scrutinizing the different journals in which the articles are published. The ABS Journal Ranking of 2021, comprising 1703 journals, was employed to identify journals likely to provide reliable information (*ABS Journal Ranking 2021, 2021*). This ranking system assigns a rank from 1 to 4 to each journal. Articles published in journals not included in the ABS journal ranking were considered to be potentially less reliable, so they couldn't be used in this literature review. Although journals with an ABS-1 rank are considered lower quality, they were still included in the literature review. However, the information obtained from these articles had to be verified by at least one other source.

Afterwards, attention is directed towards the title to ascertain if the sources indeed contained valid information usable in this literature review. Subsequently, after reviewing the title, the abstract was examined to ensure that new and relevant information regarding the fourth challenge of organizational innovation could be obtained.

Summarized, this method involves systematically examining the publication year, journal, title, and abstract to find between 25 and 40 relevant articles on the subject of BMs and innovation portfolios.

4 Results

After various iterations, the following keywords were utilized for the search in titles and descriptions of articles:

"Design of innovative business models": 5 results; "Innovation portfolio management": 3 results; "Innovation opportunity" in combination with "portfolio management": 1 result; "Innovative business models": 12 results; "Innovative business models" in combination with "valuation": 3 results.

For all keywords except "Innovative business models," every retrieved article was reviewed for relevant journals, titles, and abstracts. For the keyword "Innovative business models," a total of 521 articles were found. Due to the large volume, a selection of the most relevant journals was made. Journals with more than three articles featuring this keyword were chosen, resulting in the selection of four different journals. Within these journals, all articles were reviewed for relevant titles and abstracts. All selected journals had an ABS-2 rank or higher. Additionally, one article from the journal "Public Organization Review" was included, as it appeared at the top of the search results and seemed pertinent to this study. A list of journals for this keyword is provided in Appendix 1.

This approach, which involved systematically examining the publication year, journal, title, and abstract, identified a total of 24 articles. Additionally, one more article from the "Journal of Business Research" was selected during the reading process due to its reference in another article, bringing the total to 25 articles. These included literature reviews and case studies related to the subject matter.

Notably, many of these articles referenced AI and digitalization, prompting a focused search for additional relevant literature on AI. Using the keywords "AI" and "business model innovation," a further search was conducted within titles and descriptions. This resulted in the discovery of 10 additional articles, which were selected following the same criteria: publication year, journal, title, and abstract. In total, 35 articles were scrutinized to gather information for

this master's thesis. A list of these articles is provided in Appendix 4, and all the different journals used are listed in Appendix 2.

Below is a graph displaying the number of articles per ABS-rank. Five articles come from lower-quality journals (ABS 1), so the information from these articles had to be analysed more carefully. To ensure reliability for these lower-quality journals, the choice was made that at least one other source had to corroborate the information before it was considered trustworthy.

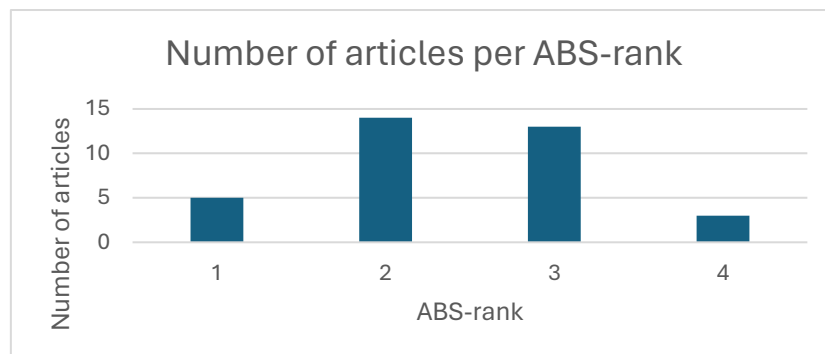


Figure 1: Number of articles used, grouped by ABS-rank

On the Limo platform, articles are categorized into different subjects, indicating that each article may cover multiple topics. To give a better overview of the subjects of all the different articles, the graph below illustrates the various subjects and the corresponding number of articles for each subject.

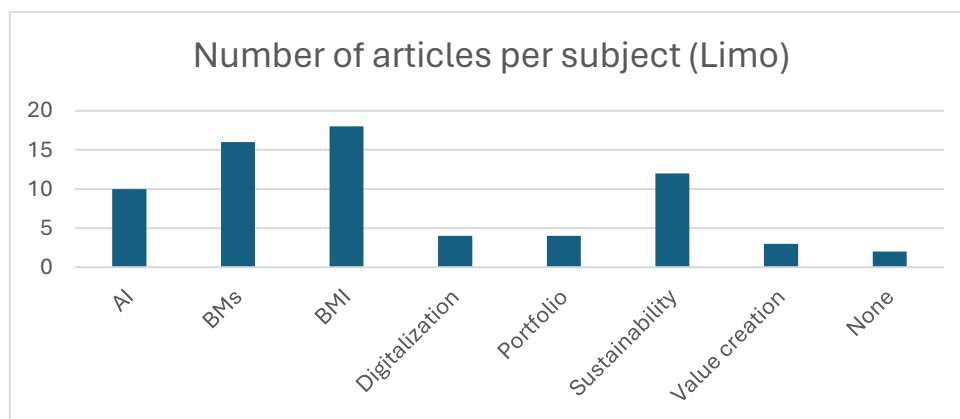


Figure 2: Number of articles per subject, indicated by the Limo platform

Given the website's foundation on 2392 references from 205 journals, it was decided to adopt the same intertitles structure as Gailly's website. Additionally, section 4.6 was included in the results, due to the extensive literature findings on the impact of sustainability, technology, and

AI. Consequently, six distinct subchapters were utilized for the results section. The graph underneath illustrates the distribution of articles across chapters, while the complete list of articles per chapter can be found in Appendix 3.

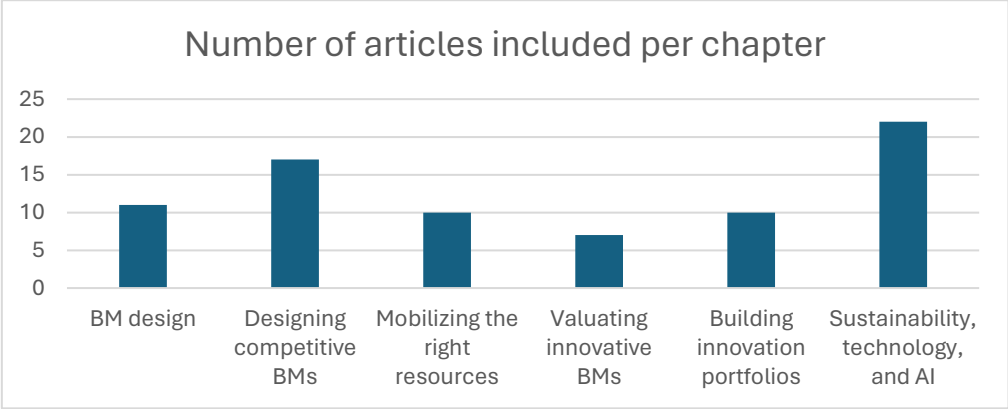


Figure 3: Number of articles used per chapter of the results section

Out of the 35 articles reviewed, 34 proved beneficial for at least one of the subchapters. The lone exception that didn't contribute relevant information, was the article authored by Katsamakas & Pavlov (2020). The journal of this article holds an ABS-1 rank.

As previously mentioned, the results section is segmented into six chapters. These encompass the existing chapters on the website, with an additional one dedicated to the integration of sustainability, technology, and AI. Each chapter begins with an overview of Gailly's insights, followed by an explanation of the subchapters within, chosen by the author. Subsequently, the information gathered from the literature review is presented.

4.1 Business model design: asking the right questions

This chapter delves into Gailly's explanation of what precisely constitutes a BM and explores avenues for innovating within it. Gailly stresses the importance for entrepreneurs to adeptly navigate technological specifications and financial intricacies.

To elucidate the concept of a BM, this first subchapter initially examines its definition and the constituent elements. Subsequently, attention is directed towards strategies for innovating a BM, emphasizing a holistic approach.

4.1.1 What is a business model (innovation?)

In the literature, a BM is described as the blueprint of a business, encompassing how a company generates, delivers, and captures value (Teece, 2010). This encompasses three main elements: value proposition, creation, and capture (Osterwalder & Pigneur, 2010). The value proposition delineates what the company aims to offer, to whom, and through which channels (Morris et al., 2005). Value creation illustrates how this offering is developed across the value chain, providing insight into the resources and processes involved (Clauss, 2017). Lastly, the value capture dimension outlines how the company monetizes its value, essentially explaining its revenue generation or return on investment strategies (Morris et al., 2005; Casadesus-Masanell & Zhu, 2013). In simpler terms, the BM elucidates how the company makes money (Veleva, 2021).

In today's dynamic and increasingly technologically advanced world, relying solely on product or service innovation for competitive advantage is challenging. Hence, there is growing interest in innovating the BM itself as a means of competition (Bock et al., 2012; Donthu & Gustafsson, 2020).

As outlined by Foss & Saebi (2018), BMI involves reshaping an organization's strategy through designed, novel, and non-trivial changes to its core BM elements and the connections between them. Such innovative models can confer competitive advantages, as they are challenging for competitors, both established and new, to replicate (Teece, 2010). This innovation typically emerges in response to internal or external stimuli, with the objective of addressing emerging, hidden, or unmet customer needs (Osterwalder & Pigneur, 2010; Demil & Lecocq, 2010).

However, merely having an innovative idea for a BM is insufficient for its development. According to Im et al. (2020), the initial step to creating an innovative BM involves transforming a rudimentary business concept into structured alternatives for BMs. These alternatives should address pivotal questions such as "Who is the target customer?" and "How will revenue be generated?" Through such inquiries, the economic rationale can be elucidated, detailing how the organization intends to create, deliver, and capture value at a sustainable cost. Innovation entails the generation of novel ideas through exploration, which are then refined and leveraged through exploitation (Paiola et al., 2022). BMI extends beyond simply updating products or services with new technologies; it involves reimagining the fundamental approach

to conducting business (Amit & Zott, 2012; N. M. P. Bocken et al., 2014; Ebrahimigharehbaghi et al., 2022)

Furthermore, in order for a BM to be successful, managers have to maintain an overview of interdependencies, uncertainties, constraints, and capabilities, while being able to adapt quickly to changes within their environment (Escamilla et al., 2021; Saqib & Satar, 2021; Eckert & Hüsigg, 2022).

4.1.2 Stay competitive using a holistic approach

To maintain competitiveness through BMI, a company must alter or build their BM using one or more of the four BM themes, which encompass novelty, efficiency, complementary, and lock-in (Amit & Zott, 2001; Leppänen et al., 2023). The novelty-centric BM involves transforming operational methods or adjusting the involved stakeholders, potentially disrupting the existing market. Efficiency themes aim to minimize resource requirements for product or service production. Complementary models combine various offerings, activities, or resources to leverage synergies, like the Amazon marketplace. Finally, lock-in models discourage actors from switching to alternatives due to loyalty or network externalities. Social media platforms are an example for this kind of BM, as users are inclined to remain on a platform where their friends also participate (Haftor & Climent Costa, 2023).

As per Haftor & Climent Costa (2023), BMI in incumbent industrial firms can occur through modifications in five dimensions: exchangeables, activities, actors, transaction mechanisms, and governance setups. An exchangeable refers to something generated by an activity, which in turn yields an output for another activity. The most common exchangeable is a product. Activities encompass a series of interconnected actions that drive an organization's operations. Actors can be individuals, organizations, or machines, playing a central role in a BM by providing capabilities that create value within the model. Transaction mechanisms establish links between activities and actors, with e-commerce serving as an example. Governance setup pertains to the control of BM execution, encompassing conventional command and control structures, institutional norms, and the dynamics of actor interests.

Incumbent firms typically possess an established BM that generates inertia, leading to path dependence and impeding certain innovation endeavours (Goumagias et al., 2022). Consequently, attempting to innovate a BM by altering only one dimension often results in

failure. Instead, a holistic approach is necessary, involving the simultaneous modification of multiple dimensions, which can activate one or more of the four BM themes (Haftor & Climent Costa, 2023). Moreover, this holistic approach is vital for understanding the causal links between different elements of the BM (Cosenz & Bivona, 2021) and recognizing the interconnectivity among the individual elements within the ecosystem (Guindalini et al., 2021).

4.2 Designing competitive business models: Why and what?

According to Gailly, the primary strategic challenge in developing a successful BM lies in addressing a specific problem faced by individuals, followed by positioning oneself more advantageously than competitors to solve this problem. Operationally, the first challenge involves formulating an initial value proposition, while the second revolves around establishing, integrating, and scaling a competitive and sustainable value chain, encompassing essential components such as design, operations, client management, and support activities.

The subsequent sections draw upon insights from the literature. Initially, the discussion centres on effectuation skills, deemed essential for entrepreneurs to align resources with strategic objectives, thereby determining their competitive positioning. Next, attention shifts to the value proposition, identified by Gailly as the primary operational challenge, followed by an exploration of stakeholder management's pivotal role in establishing a resilient value chain. Furthermore, the establishment of a robust ecosystem, facilitated by effective stakeholder management, is examined as a means to enhance both the value proposition and value chain.

Concluding this chapter, emphasis is placed on the criticality of scaling up the BM, underscoring its significance in ensuring the viability and longevity of the BM.

4.2.1 Effectuation skills

Høvig et al. (2018) propose two contrasting approaches in entrepreneurship: causation and effectuation. The causation approach entails entrepreneurs setting predefined goals and then seeking means to achieve them, while the effectuation approach involves focusing on available means to materialize one or more goals that may not have been predefined. Employing effectuation skills, strategic goals are derived from available resources and are adjusted in collaboration with partners, allowing managers to maintain better control over uncertainties

(Sarasvathy, 2001; Fisher, 2012). Effectuation framework empowers entrepreneurs to navigate uncertainties and ambiguities more effectively, enhancing their capacity to innovate BMs and increasing the likelihood of success (Hensel & Visser, 2020).

4.2.2 Value proposition

As per Lanning & Michaels (1988), a value proposition embodies a firm's promise or articulation of benefits offered to customers. Firms design or refine value propositions to improve the customer value of a product, technology, or service. This value proposition has the potential to reshape the positioning of a product or service, such that individuals are inclined to pay a premium for it (Khan & Bohnsack, 2020).

Defining a compelling value proposition necessitates a deep understanding of what the customer values. Customer value is delineated across four dimensions: functional, economic, social, and emotional. Functional value arises from attributes such as quality, convenience, and performance. Economic value stems from factors like lower prices, higher value, or superior price-to-quality ratios. Social value emerges from enhancements to self-concept and social expression within circles. Lastly, emotional value is cultivated through the feelings or affective states associated with the offering (Sweeney & Soutar, 2001; Rintamäki et al., 2007). Introducing an innovative value proposition entails addressing at least one of these four customer values (Khan & Bohnsack, 2020). Research also indicates that involving customers in the design process leads to superior value propositions (Baldwin & von Hippel, 2011; Baldassarre et al., 2017).

In the context of BMs, effectively translating innovation to customers through the value proposition is paramount to enhancing customer value (Christensen & Raynor, 2013; Lim & Anderson, 2016; Khan & Bohnsack, 2020). Designers of innovative BMs must adopt a people-centric approach, recognizing that people's behaviours swiftly adapt to environmental and technological shifts (Hoch & Brad, 2020; Chou, 2021; Veleva, 2021). The two steps of customer discovery and customer validation must be iterated through repeatedly until a suitable match is identified between the customer segment and a BM capable of delivering value to this segment. This phenomenon is known as product-market fit (Guindalini et al., 2021).

Particularly for implementing sustainable BMI, the customer perspective gains heightened significance, as it necessitates a change in the customer's behaviour. The value proposition in

this realm extends beyond economic value creation to encompass environmental and societal considerations (Boons & Lüdeke-Freund, 2013; N. M. P. Bocken et al., 2014; Tyl et al., 2015). According to Bocken (2017), companies are increasingly recognized as pivotal agents for driving changes in consumer behaviour. They achieve this through various means such as marketing and branding strategies (Schoonover et al., 2021), the introduction of new BMs, and the practice of choice editing.

Entrepreneurs are uniquely positioned to tackle both environmental and social issues simultaneously, yet they often lack the resources to effectively measure the impact of their efforts on strengthening the company's value proposition. This highlights the importance of collaborating with other stakeholders who can identify local challenges, needs, and goals. Additionally, entrepreneurs need to focus on educating and empowering early adopters, leveraging social networks and forming strategic partnerships to drive meaningful change (Veleva, 2021).

4.2.3 Stakeholder management

Innovative BMs thrive on meticulous stakeholder management. Initially, it's imperative to attain clarity regarding the needs and expectations of all involved parties (Frankenberger et al., 2013; Escamilla et al., 2021). A shared vision among stakeholders becomes the cornerstone for amplifying the success of the innovation process (Kirby et al., 2011; Guindalini et al., 2021). Freudenreich et al. (2020) underscore the significance of stakeholder management as a crucial mechanism for nurturing sustainable BM innovation.

Collaborating with a diverse group of stakeholders yields invaluable insights, particularly in ventures driven by sustainability, as these stakeholders serve both as recipients and creators of value within the BM (Goodman et al., 2017; Veronica et al., 2020). The breadth and depth of stakeholder integration, alongside organizational engagement, significantly influence the performance of sustainable product and service innovations (Jonas et al., 2016; Juntunen et al., 2019; Guo et al., 2022).

For innovative development or heightened innovation efficacy, it's paramount to foster partnerships with individuals possessing specialized knowledge. These partners may encompass internal stakeholders or external entities (Haftor & Climent Costa, 2023). For instance, specialized technological suppliers can substantially augment value creation, while

leveraging the specific capabilities of other external contributors expands the firm's expertise (Paiola et al., 2022).

Customers rank among important stakeholders for any enterprise, if not the most important one. Thus, fostering delicate communication and collaboration with customers is crucial, coupled with a nuanced understanding of appropriate customer segmentation. Introducing select customers as partners during new BM testing phases can mitigate costs and enhance effectiveness (G. Im & Rai, 2008; Bednarek et al., 2016). Moreover, their feedback can delicately guide the organization toward innovative solutions (Paiola et al., 2022). As highlighted by Lewandowski (2016), a value proposition can be cocreated with the customer to make sure that the proposition is in line with the interest of the targeted customer segments. Customers should be at the core of an organisation's value offer (Salvador et al., 2021).

Establishing resilient value chains is crucial. Collaborative partnerships spanning the entire value chain ensure a steady supply of resources and maintain the flow of high-quality feedstock (Salvador et al., 2021). These enduring partnerships throughout the value chain are pivotal for the success of every entrepreneur's BM (Veleva, 2021).

4.2.4 Ecosystem

In today's landscape, companies operate within complex networks comprising various organizations, collectively constituting a business ecosystem. Within this ecosystem, these entities collaborate and compete to enhance their value proposition (Moore, 1993; Iansiti & Richards, 2006). As noted by Li (2009), a robust ecosystem can amplify the value creation potential of a firm beyond what a single product or service can achieve. Furthermore, such ecosystems foster stakeholder engagement by ensuring mutual benefits for all involved parties.

Building on the research conducted by Gomes et al. (2023), an ecosystem is defined as a framework characterized by co-discovery and co-production, featuring an ecosystem value proposition, non-hierarchical control, interdependence, and governance (Jacobides et al., 2018; Thomas & Autio, 2019; Micheli & Muctor, 2021; Thomas & Ritala, 2022; Thomas et al., 2022; Gomes et al., 2023). To effectively manage this interdependence, firms must coordinate multiple interconnected projects both internally and externally (Thomas & Autio, 2019).

To cultivate a healthy business ecosystem, BMs should be created to encompass diverse actors and offer a spectrum of value propositions (Im et al., 2020). These actors encompass pivotal stakeholders such as customers, partners, suppliers, employees, and owners (Best et al., 2022). It's crucial to recognize that value creation extends to all participants involved in executing the BM, encompassing both internal and external partners (Chou, 2021; Haftor & Climent Costa, 2023). All partners strive to achieve a collective goal by defining internal and external projects in terms of resources, temporality, and decision-making, without relying on hierarchical mechanisms (Gomes et al., 2023).

For an innovative BM, also the internal ecosystem of the company plays a crucial role. Research indicates that the management culture, rooted in employees' values and behaviour patterns, can be altered to initiate a change in management culture (Bayramov et al., 2023). Sometimes, the organizational culture of a company must undergo transformation to foster innovation within the enterprise. This shift in organizational culture should be viewed as a continuous process that cannot be overlooked (Singaraju, 2021). Ultimately, this organizational culture should align with the strategic goals of the enterprise.

4.2.5 Scale-up the business model

Simply having a compelling value proposition isn't sufficient to ensure competitiveness in a BM. After crafting an innovative BM, it's crucial to expand and scale operations to broaden the customer base and increase revenues (Cavallo et al., 2023). Scaling also involves adapting the business to cater to a larger, global market (Sullivan, 2016). Given the dynamic and competitive digital landscape, BMs must continuously undergo experimentation, refinement, development, and renewal to achieve varying degrees of novelty (Demil & Lecocq, 2010; Brown & Ellis, 2017; Foss & Saebi, 2017; Sjödin et al., 2020).

Scaling up can pose challenges, with premature scaling being a significant cause of failure, as noted by Guindalini et al. (2021). Premature scaling occurs when firms skip the validation step and attempt to grow before achieving product-market fit. Additionally, sustainable entrepreneurs identify the lack of supportive government policies, such as carbon taxes and bans on certain product disposal, as the primary barrier to scaling up their firms. However, they also perceive this lack of policies as a potential opportunity once the government begins implementing such measures (Boucher & Heinonen, 2019; Caldera et al., 2019; Veleva, 2021).

Ebrahimigharehbaghi et al. (2022) also emphasize that BMs must be constructed on a regulatory foundation to ensure value creation in accordance with legal requirements.

4.3 Mobilizing the right resources: Who and how much?

In this chapter, Gailly underscores the criticality of identifying and harnessing the necessary entrepreneurial talent and expertise to ensure effective governance. Additionally, he highlights the peril of underestimating financial resources, emphasizing that it can lead to missed innovation opportunities.

Turning to the literature, discussions centre around the governance of BMs and portfolios, crucial for selecting the right entrepreneurs and managing innovation portfolios effectively. Although there's a dearth of information regarding the significance of financial resources, a correlation is observed between the required financial resources and the size of the company. Consequently, the final section will delve into the impact of company size on innovation and resource allocation.

4.3.1 Governance

While human and social capital are vital for entrepreneurs, personality traits also play a significant role in shaping their actions and responses to challenges. Additionally, the engagement of top management in overseeing business model portfolios is pivotal. Their involvement can drive substantial transformations, enable more frequent assessments, and uncover potential synergies across various BMs. Hence, this section is structured into three components: managerial capabilities, entrepreneurial personality, and top management's involvement in BMs and portfolio management.

Managerial capabilities

Managers wield various key managerial competencies, encompassing human capital, social capital, and cognition. These competencies play a crucial role in fostering BMI by enhancing organizational decision-making (Teece, 2018).

Human capital comprises knowledge and skills acquired through education, training, or experience, primarily manifesting as leadership and entrepreneurial capabilities. Leadership skills embody exploitative capabilities, while entrepreneurial skills denote explorative capabilities, both essential for crafting and executing BMs to sustain a competitive edge

(Heubeck & Meckl, 2022). Individuals who possess entrepreneurial knowledge and skills are often more inclined to embark on innovative projects and exhibit higher levels of self-efficacy when it comes to creating new ventures (Shahab et al., 2018).

Social capital is defined as goodwill, encompassing formal and informal social connections within an organization (Nahapiet & Ghoshal, 1998; Adler & Kwon, 2002). This fosters innovation by enhancing interaction within networks (Gant et al., 2002), thereby playing a crucial role in enhancing the organization's ecosystem.

Cognition is indispensable for subjectively evaluating BMs, because it refers how information is processed by managers (Walsh, 1995).

During the initiation phase, human capital forms the bedrock of knowledge and expertise for strategic objectives. Subsequently, social capital becomes imperative for information exchange and decision-making efficacy (Manev et al., 2005; Alguezaui & Filieri, 2010). Trust and collaboration streamline innovation implementation by improving communication and information flow.

The mix of human and social capital shapes managers' cognitive assessment of various BM options. Therefore, it is advisable to train or recruit personnel to augment human and social capital within the organization (Heubeck & Meckl, 2022). Despite ongoing debates regarding the efficacy of entrepreneurship education, literature consistently indicates a positive correlation between such education and entrepreneurship self-efficacy (Wilson et al., 2007; Sánchez, 2013; Bae et al., 2014; Maresch et al., 2016). Additionally, education can enhance entrepreneurship-related knowledge, skills, and competencies (Martin et al., 2013; Sánchez, 2013). Emphasizing experiential learning through real-world experiences, action-based learning, and practical teaching models is crucial in this regard (Rasmussen & Sørheim, 2006; Nabi et al., 2017; Guindalini et al., 2021).

Entrepreneurial personality

While Sarasvathy (2001) suggests that the effectuation framework, discussed in 4.2.1, is solely influenced by experience and expertise, findings by Hensel & Visser (2020) suggest a significant link between effectuation and personality traits. Their research indicates that an entrepreneur's managerial capabilities are positively influenced by a higher sensitivity to feedback, and despondency is positively correlated with transformational leadership qualities.

Moreover, extraversion, particularly sociability, facilitates synergistic interactions with others, while ambition fuels achievement-oriented drive. Entrepreneurs must also possess a keen awareness of their unique talents to mobilize intellectual resources effectively across different facets of the BM. Additionally, being self-directed and assertive is advantageous for identifying and seizing business opportunities.

However, alongside these positive personality traits, there are also negative ones to consider. Agreeableness, characterized by warm and cohesive interactions, is associated with lower intellectual autonomy, crucial for fostering innovative or disruptive ideas. Furthermore, thoughtfulness, the ability to design and adapt work procedures, negatively impacts the development of a holistic view of available means, hindering entrepreneurs in transforming resources into innovative strategic goals. The significance of trust continues to spark debate, as it holds the potential for both positive and negative impacts on performance, as indicated by the research of Hensel & Visser (2020), which resonates with the insights from Welter (2012).

Involvement of top management

To be able to adapt quickly to changes, it is crucial that top management is also included in the management of BMs or portfolios, because big changes cannot be done by middle managers (Brasil et al., 2021; Si et al., 2022). The involvement of top management makes sure that there are regular reviews of the BMs, to make sure that they are still aligned with the strategic goals of the firm (Cooper et al., 1999; Yang & Xu, 2017; Eckert & Hüsigg, 2022).

Additionally, the involvement of a top management team during implementation is essential. They must identify potential synergies between the different BMs while maintaining sufficient separation to safeguard the new BM and protect the existing ones, ensuring the longevity of both projects (Markides & Oyon, 2010; Paiola et al., 2022).

4.3.2 Company's size

The ability to innovate a BM is influenced by the size of the firm. Small and medium-sized enterprises (SMEs), in contrast to large corporations, typically possess fewer financial and non-financial resources (Leithold et al., 2016), placing them at a disadvantage compared to their larger competitors. SMEs often concentrate on a specialized and narrow range of products and services due to their simplified value creation process. Additionally, SMEs commonly adopt a

flat organizational structure with minimal middle management, fostering closer employee connections. This organizational setup enables SMEs to adapt more readily to evolving customer needs and competitor actions, rendering them more agile in responding to changes (Cosenz & Bivona, 2021).

Due to differences in size, BMI strategies tailored for large corporations may not always be applicable to SMEs (Cosenz & Bivona, 2021). SMEs and large companies encounter distinct challenges in creating value, with large firms focusing on reducing organizational inertia (Haftor & Climent Costa, 2023), while SMEs strive to overcome (financial and non-financial) resource constraints (Schoonover et al., 2021). Consequently, large companies, with their greater resources, can engage in BMI with relatively lower risk to survival. Conversely, if SMEs attempt similar innovations and fail, they risk significant resource loss, potentially jeopardizing their viability. Hence, SMEs must leverage their agility and embrace a lean approach to BMI. This approach allows them to blend the structured design tools commonly employed by large companies with the flexibility needed to adapt to market changes (Cosenz & Bivona, 2021).

The essence of this lean approach revolves around the "build-measure-learn" loop, wherein SMEs formulate innovation hypotheses, conduct corresponding tests, measure the outcomes, and solicit customer feedback. Based on these insights, the firm adjusts its BM accordingly. Through this innovation experimentation, SMEs capitalize on their flexibility while mitigating resource risks (Cosenz & Bivona, 2021). During the experimentation phase, SMEs frequently find themselves reliant on revenue streams from their existing BMs due to limited resources and capabilities. Consequently, there's a pressing need for additional endeavours to innovate their BMs (Paiola et al., 2022).

4.4 Valuating innovative business models: Who and how much?

In this chapter, the website underscores the significance of valuating BMs during the decision-making process. However, the literature reveals a scarcity of information specifically addressing valuation, instead focusing more on evaluating BMs prior to selecting them for inclusion in the innovation portfolio. This aspect will be explored in detail at the outset of this chapter. Subsequently, the chapter will delve into the distinct evaluation processes for incremental and radical innovation projects, highlighting their differences and implications for decision-making.

4.4.1 Evaluation

For the selection of BMs, it's crucial to compare different models based on the same set of information and criteria (Hutchison-Krupat, 2018; Hutchison-Krupat & Kavadias, 2015). A decision can be trusted because the use of a repeatable process in the evaluation. Additionally, it's important to consider both short and long-term projects during valuation (Cooper et al., 2001).

Evaluation should not be a one-time event right before the selection process; rather, it should be conducted continuously to yield intermediate results. These results can then inform better alignment of the portfolio or BM with the firm's strategic goals, and it enables the portfolio manager to respond quicker to changes (Hoch & Brad, 2020; Im et al., 2020; Eckert & Hüsigg, 2022). This underscores that developing a BM or portfolio isn't a static endeavour; rather, it's a dynamic process of continual adjustment and recalibration to identify processes, products, or services that resonate with customers (Schoonover et al., 2021). Moreover, the evaluation of BMs may lead to slight adjustments in strategic goals (Si et al., 2022).

While numerous analytic evaluation methods exist, including financial return, capacity criteria, and expected risk, they alone are insufficient for driving portfolio construction (Si et al., 2022). Research indicates that many evaluation processes tend to exhibit bias toward the financial perspective (Pateli & Giaglis, 2004). However, given the multilevel and multifactor nature of BMs, a multidimensional approach is necessary. Im et al. (2020) propose a multi-criteria decision-making (MCDM) process for evaluating different BMs. Moreover, solely relying on financial measures can overlook crucial information and lead to the selection of projects with lower impact, while potentially ignoring projects that could yield greater returns for a larger investment (Brasil et al., 2021).

According to Costa & Pesci (2016), there is no “gold standard” of measurements for environmental and social goals, but these metrics have to be defined and constructed together with all the relevant stakeholders. These goals are also dependent on local goals, needs and stakeholder demands. In the research conducted by Veleva (2021), all the entrepreneurs reported that they were unable to measure and communicate the social and environmental impacts of their products and services.

4.4.2 Incremental versus radical innovation

The distinction between radical and incremental innovation is significant: radical innovation entails fundamental changes, whereas incremental innovation involves small improvements to existing structures. Portfolio management decisions often lean towards incremental innovation due to its lower risk of failure. Achieving ambidextrous portfolio management requires segregating decision-making resources into distinct portfolios for radical and incremental innovation. Each portfolio necessitates unique governance, rules, and budgets (Brasil et al., 2021). Radical innovation projects necessitate risk-oriented approaches (Martinsuo et al., 2014), whereas incremental innovation projects predominantly rely on financial approaches (Cooper, 2013; Brasil et al., 2018; Gomes et al., 2023). Furthermore, radical innovation projects typically require oversight from C-level managers, whereas incremental innovation projects can be managed by lower-level project managers (Brasil et al., 2021).

According to Brasil et al. (2021), effective management of radical innovation projects involves tailored approaches in terms of separation, fit, and alignment. Firms must fully segregate radical and incremental innovation projects across evaluation processes, resource allocation, financial resources, and other criteria. Additionally, they should allocate resources and methods that align with the firm's objectives to each portfolio. Finally, there must be alignment across all levels of the organization and management system to ensure successful innovation portfolio management.

4.5 Building a consistent and balanced innovation portfolio

In this concluding section, Gailly delves into the integration of new BMs with the existing portfolio, exploring their effects on resource allocation, potential synergies, and organizational dynamics. He underscores the importance of maintaining balance and alignment within the portfolio, particularly regarding strategic scope (exploitation vs. exploration) and time horizon. These facets will be thoroughly examined in the section about innovation portfolios.

Moreover, the literature reveals the influence of organizational culture on innovation portfolios, which will be elaborated upon in the final section dedicated to culture. This section will delve into how cultural factors shape the innovation landscape and impact decision-making within the portfolio context.

4.5.1 Innovation portfolio

Within an organization, various BM alternatives must be managed simultaneously while adapting to changing market conditions. A BM portfolio facilitates this, helping to maintain competitiveness and sustainability.

A BM portfolio integrates external demands with internal activities, ensuring alignment with customer needs and firm objectives (Kester et al., 2014; Costantino et al., 2015; Im et al., 2020). Moreover, achieving optimal alignment within the innovation portfolio requires a balanced diversification of the BMs (Kester et al., 2014). To acquire a balanced, consistent innovation portfolio, it's of crucial importance to manage this portfolio. Portfolio management entails investigation, evaluation, and prioritization (Kaiser et al., 2015) to optimize the selection of new BMs that are compatible with each other and already existing BMs (Paiola et al., 2022).

Because of the completely different nature of incremental and radical innovations, it's important that the portfolio includes a good mix between both types of innovation (Si et al., 2022). According to Burleson (2021), a symptom of bad innovation portfolio management, was the inclusion of only incremental improvements. Innovation portfolios should be managed on a multilevel basis that takes individual, project, organizational, and strategic levels into account (Brasil et al., 2021).

Furthermore, portfolio management decides which innovation projects will be developed, updated, or cancelled (Cooper, 2013; Kester et al., 2014; Si et al., 2022). The literature indicates that innovation portfolio management should transition from a R&D-focused practice (Kavadias & Chao, 2008; Kavadias, 2014) to a more holistic approach that addresses multilevel organizational challenges (Meifort, 2016).

During portfolio management, firms must determine which projects to execute internally and which ones to undertake in collaboration with external partners (Hannah & Eisenhardt, 2018; Gomes et al., 2022). Furthermore, effective portfolio management involves continuous monitoring and feedback from the market to identify necessary adjustments (Im et al., 2020; Schoonover et al., 2021). Additionally, ensuring clarity regarding portfolio management responsibilities throughout the organization is crucial (Tolonen et al., 2014).

When introducing a new BM into the portfolio, it's crucial to address the ambidexterity problem. This entails conducting exploration of the new BM concurrently with the exploitation of well-established BMs (Markides, 2013; Khanagha et al., 2014; Kim & Min, 2015; Mao et al., 2020; Visnjic et al., 2022). Additionally, as discussed in 4.3.1, the involvement of a top management team during implementation is essential. They must identify potential synergies between the two BMs while maintaining sufficient separation to safeguard the new BM and protect the existing ones, ensuring the longevity of both projects (Markides & Oyon, 2010; Paiola et al., 2022). Moreover, the decision to terminate projects that no longer contribute to the strategic goals of the firm is also crucial for successful portfolio management (Too & Weaver, 2014; Yang & Xu, 2017).

4.5.2 Culture

Cultural aspects within an organization play a significant role in influencing the success of an innovation portfolio. These factors include extensive communication, organizational learning, innovation power, and risk aversion (Meifort, 2015; Kock & Georg Gemünden, 2016; Kock et al., 2016; Eckert & Hüsigg, 2022).

As highlighted in paragraph 4.3.1, both human and social capital are crucial for the value proposition. According to Heubeck & Meckl (2022), culture may impact the relationship between social and human capital, leading to variations in the importance of social capital in different countries or regions. Additionally, the country-specific context may introduce technical and behavioural barriers. While technical barriers are generally addressable, overcoming behavioural barriers requires more time and effort (Ebrahimigharehbaghi et al., 2022). Furthermore, geographic location plays a pivotal role in portfolio success (Veleva, 2021). A location can offer a supportive culture, access to capital, and other resources. This influences how quickly a firm can respond to customer needs and establish trust and legitimacy (Neumeyer & Santos, 2018).

4.6 Sustainable Innovation: Interplay of Sustainability, Technology, and AI

While the website lacks information regarding the influence of sustainability, technology, and AI on BMI, the literature offers substantial insights into this intersection. Hence, this final

section is dedicated to underscore the significance of these factors within an innovation portfolio.

In today's dynamic environment, the integration of sustainability and technology is essential for developing a robust innovation portfolio. These elements must be thoroughly examined to maintain a competitive edge. Additionally, AI is a transformative technology poised to revolutionize various sectors. To effectively harness AI's potential, managers must gain a comprehensive understanding of its capabilities. Therefore, this section delves into the intricate details of sustainability, technology, and AI.

4.6.1 Sustainability

Today's economy encompasses not only economic concerns but also environmental and social impacts that entrepreneurs must address. This necessitates a shift towards more sustainable economic systems and industrial processes (Ghisellini et al., 2016; Barbieri & Santos, 2020), prompting companies to rethink their BMs (Näyhä, 2020). Sustainable business model innovation (SBMI) offers opportunities to generate new revenue streams, enhance competitive advantage, and fulfil environmental and social objectives (Gómez et al., 2018; Bocken & Geradts, 2020; Ebrahimigharehbaghi et al., 2022).

One approach to enhance sustainability is through eco-innovation, defined by Reid & Miedzinski (2008) as the creation of goods, processes, systems, services, and procedures that meet needs while minimizing natural resource use and toxic substances.

Transitioning to a more circular economy or SBMI requires collaborative efforts across industries and stakeholders throughout the value chain, emphasizing interdependence (Barbieri & Santos, 2020). Collaboration between stakeholders provides access to valuable information and resources for sustainability-driven innovations (Goodman et al., 2017; Veronica et al., 2020), enhancing competitive advantages and ensuring that entrepreneurs stay true to their sustainability mission (Veleva, 2021). This highlights again the importance of social capital and effective stakeholder management (Neumeier & Santos, 2018; Freudenreich et al., 2020; Guo et al., 2022).

Effective SBMI entails investments in eco-innovations at various levels—product, process, and organizational (Barbieri & Santos, 2020). Regional considerations such as resource and technology availability are also crucial when implementing a circular economy (Pant et al.,

2019), underscoring the importance of strategic partnerships across the value chain to ensure stability in supply and demand (Salvador et al., 2021).

Another avenue is the sufficiency-based BMs, which aim to reduce material throughput and energy consumption by encouraging moderation in end-user consumption (Bocken & Short, 2016). Entrepreneurs can influence stakeholders and drive momentum towards new policies, norms, and institutions (Veleva, 2021). Customer-centric design, as discussed in 4.2.2, can facilitate behaviour change among consumers (Khan & Bohnsack, 2020). Additionally, at times, simply changing needs may not suffice for the success of an innovative solution, necessitating broader societal changes (Schoonover et al., 2021).

Importantly, investing in environmentally conscious structures don't need to result in financial decline (Triguero et al., 2013). Social impacts can even differentiate firms from competitors (Veleva, 2021). However, the lack of resources to measure environmental and social impacts can hinder sustainable BM pursuits, placing entrepreneurs pursuing new sustainable BMs often at a competitive disadvantage (Veleva, 2021). Additionally, the absence of governance policies presents a significant barrier to scaling up sustainable businesses.

4.6.2 Technology and digitalization

According to Chesbrough (2003), the economic value of technologies is contingent upon effective BMs, as they provide the necessary link to a business purpose. Conversely, BMI is increasingly driven by firms' innovative utilization of digital technologies, which introduce novel activities within the BM (Haftor & Climent Costa, 2023). Moreover, an innovative BM has the capacity to render an inferior technology attractive, spawn new markets, and disrupt existing ones (Khan & Bohnsack, 2020).

The utilization of technology can be categorized according to the five dimensions of BMI outlined in section 4.1.2. Digital technologies are employed to update exchangeables within offerings, automate activities by substituting human actors with machine counterparts, and establish new transaction mechanisms facilitated by machines. These technological implementations enable adjustments in the governance setup, offering firms new avenues for value creation and competitive advantage (Chou, 2021; Haftor & Climent Costa, 2023). Additionally, technology can play a role in driving environmental change within companies (Chou, 2021).

Heubeck & Meckl (2022) suggest that the digital transformation prompts managers to reconsider their BMs, given that digital technologies have shifted the focus from physical to intangible value offerings. Managers face the challenge of bridging the gap between technological advancements and economic growth, by navigating internal constraints and mitigating external uncertainties (Chesbrough & Rosenbloom, 2002; Bouncken et al., 2021).

The digitalisation of BMs is gaining more and more interest among researchers, managers and entrepreneurs (Urbinati et al., 2017; Rachinger et al., 2018; Khin & Ho, 2019). Kohtamäki et al. (2024) offer a comprehensive definition, characterizing a digital BM as "the firm's logic for value creation, delivery, and capture that has been significantly shaped by digital technologies." This definition underscores the interplay of these three dimensions within the digital realm. Among the digital technologies facilitating this transformation, the Internet of Things stands out as a pivotal enabler, contributing significantly to the digitalization of BMs.

Internet of Things (IoT)

The Internet of Things (IoT) constitutes a network of interconnected devices capable of exchanging data not only among themselves but also with the cloud. These devices are often equipped with sensors and software, encompassing both mechanical and digital machines, as well as consumer objects (Alexander, 2023). This integration facilitates the linkage of physical and virtual objects through digital networks. IoT holds promise for BMI by enabling the introduction of new services alongside existing offerings, optimizing cost-efficiency through enhanced data collection, ensuring long-lasting customer and stakeholder relationships, and enhancing product-service portfolios (Paiola et al., 2022).

The integration of IoT can reshape conventional business processes and models into a digital business ecosystem (Song et al., 2019). This ecosystem functions as a collaborative network of interconnected organizations that mutually influence each other (Senyo et al., 2019). By facilitating collaboration among various stakeholders, this platform cultivates competitive differentiation, leading to the generation of additional revenue streams (Hoch & Brad, 2020). For instance, a digital platform enabled by IoT can provide real-time information on production costs or product design, effectively bridging the gap between supply and demand sides of the market and enhancing information circulation (Ebrahimigharehbaghi et al., 2022). Another example of an IoT platform is one that alerts users to excessive electricity usage, helping them

maintain consumption at sustainable levels, thus benefiting the environment (Sunar & Swaminathan, 2022).

4.6.3 Artificial intelligence (AI)

Artificial intelligence (AI) is described as the most advanced form of digitalization (Kohtamäki et al., 2019; Parida et al., 2019). It sets itself apart from previous information technologies with the ability to learn and operate in ways that appear intentional (Bailey et al., 2019; Huang et al., 2019). AI is predicted to radically change the way firms create, deliver, and capture value (Sjödín et al., 2021). That's why it is likely that stakeholders will learn more and more about the pros and cons of the innovative technology (Li, 2010; Wellers et al., 2017). The technology can both be used to generate disruptive innovations, but also for improving already existing services (Ferràs-Hernández et al., 2023). Although it is a revolutionizing technology, managers have to know how it can be commercialized by creating an appropriate BM (Bouncken et al., 2021; Marshall et al., 2024).

AI capabilities

Burström et al. (2021) propose that firms can engage in BMI by leveraging various AI capabilities. As outlined by (Sjödín et al., 2021) these capabilities include data pipeline capabilities, algorithm development capabilities, and AI democratization capabilities.

Data pipeline capabilities serve as the foundation for all AI functions, enabling companies to collect and structure data from their environment. The quantity and quality of data, along with a robust network infrastructure, are crucial for this capability. According to Åström et al. (2022) Ferràs-Hernández et al. (2023), the potential of AI is amplified in a centralized environment where a large volume of data is readily accessible. AI facilitates the monitoring and control of various processes by providing detailed insights into equipment health and performance (Burström et al., 2021). In addition to managing vast amounts of data, firms must also consider the necessary computing power required for processing (Ferràs-Hernández et al., 2023; Nielsen, 2023).

Algorithm development capabilities harness the cognitive functions of AI to predict future states or actions of different elements within the firm. Through forecasting, AI generates reports and insights for employees. Algorithms also enable optimization strategies for machinery, energy consumption, and storage, contributing to firms' efforts to achieve carbon

neutrality (Shaik et al., 2023). The ultimate goal of this capability is autonomy, where processes operate without human intervention (Burström et al., 2021). For instance, in the legal sector, AI automates labour-intensive tasks, enhancing accuracy and expertise (Brooks et al., 2020).

AI democratization capabilities are essential for making AI accessible across the entire organization, enabling everyone to utilize its potential. The objective is to encourage experimentation with AI so that its additional value can be realized. Implementation of AI technology within organizational processes and behaviours is crucial for creating value for customers (Burström et al., 2021). While AI can generate expert knowledge, its effective utilization in the business environment is paramount. Companies require AI experts or managers who understand the principles of AI to leverage it for generating new competitive advantages (Ferràs-Hernández et al., 2023; Nielsen, 2023; Shaik et al., 2023). Additionally, this capability is crucial because the benefits of AI rely on the industry trusting the information generated by the technology (Åström et al., 2022).

To effectively leverage these capabilities, collaboration among diverse stakeholders across various industries is paramount to enhance information sharing and align the entire ecosystem, particularly between AI and the ecosystem (Burström et al., 2021; Ferràs-Hernández et al., 2023; Shaik et al., 2023). Through harnessing data from these stakeholders, generative AI can tap into collective brainpower to generate innovative solutions (Marshall et al., 2024).

Despite AI's readiness for adoption, not all functionalities are equally developed. Therefore, organizations must balance their AI exploitation and exploration strategies to maximize its benefits. Additionally, AI is not yet mature enough to replace all aspects of human cognition, necessitating a thoughtful approach to its integration (Burström et al., 2021; Åström et al., 2022).

AI value management

Value creation

This dimension concerns the final product or service offer to the customer, created by the firm. AI's capacity to process vast amounts of data and utilize numerous variables for segmentation enables it to uncover hidden patterns that traditional analysis might overlook. Consequently, AI can provide deeper insights into customer intelligence, allowing firms to gain a better

understanding of customer operational needs. This understanding facilitates the delivery of products or services tailored to specific customer segments with greater precision (Burström et al., 2021; Sjödin et al., 2021). Additionally, Åström et al. (2022) highlight that the primary advantages of AI stem from its forecasting capabilities enabled by algorithms. This forecasting ability allows for the anticipation of faults before they occur, enabling the implementation of proactive measures within the network.

Value delivery

This dimension focuses on configuring processes and activities to fulfil the value promised to the customer. Åström et al. (2022) emphasize the importance of close collaboration between AI providers and their customers to configure value-delivery systems effectively. Given the complexity of value-delivery systems, AI can play a crucial role in their configuration for the BM. One advantage of AI in this dimension is its ability to process vast amounts of data throughout the entire supply chain (Tao et al., 2018). By leveraging AI-generated market insights, businesses can better align their back-end operations with front-end needs, reducing the knowledge gap between market and R&D units (Burström et al., 2021; Åström et al., 2022).

According to Sjödin et al. (2021), data-driven delivery operations transform value delivery processes by integrating AI-generated data into operational and strategic processes, enabling continuous improvement. This technology provides real-time recommendations, benefiting both back-end and front-line actors in optimizing value delivery processes.

Value capture

The final dimension pertains to elements such as cost structures, potential revenue streams or models, and financial viabilities, all of which can be influenced by AI. Through forecasting and optimization, AI enhances risk assessment and induces cost-saving effects. AI algorithms can also analyse pricing levels of service contracts, thereby improving profitability and driving service business development, leading to new revenue streams (Burström et al., 2021; Sjödin et al., 2021). Additionally, AI facilitates a deeper understanding of the needs of different actors, fostering better supplier/customer relationships (Zhou et al., 2015; Zheng & Wu, 2017).

Establishing dedicated partnerships is crucial to accessing back-end AI competencies, ensuring seamless integration and scalability of new AI developments (Sjödin et al., 2021). Effective value capture involves distributing value equitably among network actors, making the role of

sales managers in the AI sphere pivotal in identifying win-win opportunities for all ecosystem actors (Åström et al., 2022).

Lastly, AI can be instrumental in developing proof-of-concept value indicators derived from large datasets. These indicators quantify business gains, allowing their inclusion in a value-based pricing model (Åström et al., 2022).

Implementation of AI into business models

In the examination of AI implementation within BMs, two dimensions emerge as critical considerations.

Firstly, firms must prioritize the cultivation and enhancement of their AI capabilities. This entails developing interdependent components such as data pipelines, algorithmic development, and AI democratization. A robust data pipeline forms the backbone of successful AI integration, while advancements in algorithmic development unlock its full potential for value creation. Additionally, initiatives aimed at democratizing AI access are essential for fostering acceptance of the technology within the broader ecosystem. This final step is crucial as it ensures that AI initiatives are inclusive and accessible to all stakeholders. Without such initiatives, many AI-endeavours risk failure. Therefore, it is imperative to employ these capabilities in an interdependent and synergetic manner, with feedback loops established among them. Together, these capabilities establish the foundation for effective AI utilization and ensure scalability within BMs (Sjödín et al., 2021).

Secondly, AI capabilities must be strategically integrated across the three primary value dimensions: creation, delivery, and capture. Contrary to prior approaches that treated these dimensions in isolation, a significant interdependence is revealed, largely influenced by AI's disruptive impact on traditional value processes. AI capabilities exert simultaneous effects on various facets of a business (Burström et al., 2021). The advanced analytics enabled by AI empower businesses to discern the nuanced needs of stakeholders within the ecosystem more effectively. Consequently, this enhanced understanding facilitates the adaptation of products, services, and operational processes to align more closely with customer preferences and market dynamics.

5 Discussion

In the discussion section, the aim is to compare this master's thesis with the fourth challenge outlined on Benoît Gailly's website "Navigating Innovation." Initially, a comparison is drawn regarding the content covered in both studies, utilizing the intertitles from the website as a reference point. Following this, the main differences between the literature reviews conducted in each study are highlighted. Finally, the chapter concludes with a proposed integration of the new insights garnered from this thesis into the various sections of the website.

5.1 Comparison

This section compares the two studies using Gailly's structure, as the goal is to incorporate insights from this study into the "Navigating Innovation" website. Gailly's approach focuses on practical applications of BMs and innovation portfolios within companies. Aligning with the website's original structure, which is already concise and reader-friendly, will help bridge the gap between theory and practice. Each subsection will analyse the differences and similarities between the studies.

5.1.1 Business model design: asking the right questions

According to Gailly, designing or improving a successful BM involves both building and validating a credible story about how resources can be mobilized to address a specific problem and effectively selling this story to relevant stakeholders. This thesis defines a BM with three main elements: value proposition, value creation, and value capture.

The value proposition outlines what the company offers, to whom, and through which channels, aligning with the credible story mentioned on the website. Value creation describes how this offering is developed across the value chain, providing insights into the resources and processes involved, which corresponds to the mobilization of resources. Finally, the value capture dimension details how the company monetizes its value, explaining its revenue generation or return on investment strategies, aligning with the process of selling the story to stakeholders.

Gailly focuses on practical implementation, posing four questions: (1) Why is there a problem, and why are we well-positioned to solve it? (2) What exactly could be sold to whom and how?

(3) Who needs to be mobilized? (4) How much is at stake? This thesis, more theoretical, does not ask these questions.

Gailly further emphasizes that successful entrepreneurs recognize the inevitability of changes in technology specifications and financial projections. This thesis echoes this sentiment, highlighting the necessity for managers to quickly adapt to environmental changes.

Furthermore, this thesis indicates that BMI can occur through modifications in five dimensions: exchangeables, activities, actors, transaction mechanisms, and governance setup. Attempting to innovate a BM by altering only one dimension often results in failure. Instead, a holistic approach is necessary, involving the simultaneous modification of multiple dimensions.

5.1.2 Designing competitive business models: Why and what?

Gailly identifies the "why" and "what" questions as the first and second strategic challenges. While these specific challenges are not discussed in this thesis, they relate to the value proposition of a BM, which is noted as the first operational challenge on the website. Understanding customer problems involves recognizing what customers value across functional, economic, social, and emotional dimensions. The two steps of customer discovery and customer validation must be iterated repeatedly until a suitable product-market fit is identified. This product-market fit is closely related to the "why" and "what" questions discussed on the website. A strong value proposition can also significantly influence the positioning of a product or service. Additionally, a manager's effectuation skills are crucial for aligning resources with strategic goals.

Gailly also addresses the challenge of establishing, integrating, and scaling a competitive and sustainable value chain. Both studies stress the importance of scaling the BM and effective client management. This thesis further discusses building resilient value chains through collaborative partnerships to ensure a steady resource supply and maintain high-quality feedstock. Moreover, this thesis places greater emphasis on stakeholder management, highlighting the need to cultivate partnerships with experts and maintain effective communication and collaboration with customers to better understand and segment them appropriately. Unlike Gailly, this thesis emphasizes understanding the business ecosystem as crucial to enhance the value proposition and a resilient value chain.

5.1.3 Mobilizing the right resources: Who and how much?

Gailly emphasizes the importance of identifying and mobilizing entrepreneurial talent and expertise in an innovative BMs to ensure robust governance. This thesis also addresses this, focusing on the importance of human and social capital. It suggests that while education can enhance entrepreneurship-related knowledge, skills, and competencies, the inherent personality traits of entrepreneurs are equally crucial. Therefore, careful selection of governance for a BM or portfolio is essential.

Moreover, this thesis underscores the role of top management in implementing significant changes, something middle management cannot achieve. Top management involvement ensures that the goals of various BMs align with the firm's strategic objectives and helps identify potential synergies between different BMs.

Gailly warns that underestimating financial resources is a common way to squander innovation opportunities. However, this issue is not addressed in the literature review. Instead, the review highlights that SMEs face greater challenges in overcoming financial and non-financial resource constraints, while large companies struggle more with reducing organizational inertia. This represents a significant difference between the two reviews.

5.1.4 Valuating innovative business models: quantifying the unquantifiable

The website emphasizes the importance of quantifying a BM by integrating known data, beliefs, and uncertainties to compare different BMs before making decisions. In contrast, the literature in this thesis focuses more on the evaluation process rather than valuation. It does not highlight the need for quantifying BMs but stresses that all BMs should be evaluated using the same process to ensure comparability.

The thesis suggests that incremental and radical innovation projects should be evaluated separately, with distinct governance, rules, and budgets for each type of project. Additionally, the evaluation process should be continuous to ensure that the BM or portfolio aligns with the company's strategic goals.

The study further indicates that analytical evaluations based solely on financial returns, capacity criteria, and expected risks are insufficient for portfolio construction. Due to the multilevel and multifactor nature of BMs, a multidimensional or holistic approach is necessary

for their evaluation. While Gailly provides two specific methods for quantifying BMs, these methods were not utilized in the reviewed literature.

5.1.5 Building a consistent and balanced innovation portfolio

In this final section, Gailly discusses how new BMs integrate with the existing portfolio and how they impact resource bottlenecks and potential technological and organizational synergies. Similarly, the literature review highlights the importance of selecting new BMs that are compatible with existing ones and identifying synergies between different BMs. Portfolio management requires managers to decide which projects to execute internally and which to pursue with external partners.

Gailly also emphasizes maintaining the balance and alignment of the portfolio in terms of strategic scope (exploitation vs. exploration) and time horizon. This literature study addresses this as the ambidexterity problem, which involves simultaneously exploring new BMs and exploiting established ones. Additionally, a balanced innovation portfolio should include both incremental and radical innovations to manage risk effectively.

Additionally, this thesis highlights the influence of cultural aspects on the management of innovation portfolios, a topic not discussed on the website.

5.2 Main differences

Although both texts address the challenges and strategies related to BMI and portfolio management, Gailly focuses more on practical considerations and strategies, while this study provides a broader theoretical overview. The author chose to maintain the original structure of the website to effectively bridge the gap between theoretical considerations and practical application.

While the literature review validates most of the information on the website, there are key content differences, particularly regarding the discussion about AI, the distinction between SMEs and large companies and their financial aspects, the emphasis on stakeholder management, and the valuation versus evaluation debate.

A significant difference is the discussion about AI in this thesis. The website lacks information on the increasing importance of AI for developing BMs and innovation portfolios. According to the literature, AI is predicted to radically change how firms create, deliver, and capture value.

Effective AI integration requires developing AI capabilities synergistically, with interdependent feedback loops. A robust data pipeline is essential for successful AI integration, while advancements in algorithms unlock AI's full potential for value creation. AI democratization ensures access and inclusivity for all stakeholders, and these capabilities must be strategically integrated across value creation, delivery, and capture, revealing significant interdependence and disrupting traditional processes. Advanced AI analytics enable businesses to better understand stakeholder needs, adapt offerings, and align with market dynamics.

Gailly warns that underestimating financial resources can squander innovation opportunities, a topic not addressed in the literature review. Instead, the review highlights that SMEs face greater challenges in overcoming financial and non-financial resource constraints, while large companies struggle more with reducing organizational inertia. SMEs, with their flatter structures and closer employee connections, can respond more agilely to changes and should adopt a lean approach to BMI, combining structured design tools with flexibility.

While the website mentions setting up a competitive and sustainable value chain, it lacks an emphasis on stakeholder management. This is mainly because the second innovation challenge already contains a lot of information about stakeholder management and the innovation ecosystem. The literature review highlights that effective stakeholder management is crucial for innovative BMs. Understanding stakeholder needs and fostering a shared vision are essential. Collaborating with partners, including customers and those with specialist knowledge, enhances innovation. Involving customers in the design process leads to better value propositions and reduces costs.

Gailly emphasizes the importance of valuating BMs by quantifying them. In contrast, the literature review focuses on evaluating BMs, requiring a consistent and repeatable evaluation process using consistent criteria. This process should be continuous to ensure alignment with strategic goals. A holistic approach is necessary, rather than relying solely on financial measures to evaluate BMs.

5.3 Implementation on website “Navigating Innovation”

This section outlines a possible practical implementation of the information from this thesis in Gailly's website. The existing structure and text of the website will be maintained, as it is based on 2392 references and 205 journals. Since the literature study of this thesis is based on only

35 articles, altering the structure or deleting text would not be advisable. Additionally, almost all the information gathered by Gailly is corroborated by this literature review. Therefore, no text will be deleted; instead, supplementary information will be added.

5.3.1 Business model design: asking the right questions

After the last sentence of the third paragraph, the holistic approach can be emphasized: “Attempting to alter only one of the four key questions could still result in failure of the business model. Therefore, a holistic approach must be used, involving the simultaneous modification of multiple dimensions.”

5.3.2 Designing competitive business models: Why and what?

Something that isn’t emphasized in this part of the website is the focus on stakeholder management within the ecosystem. This is already highlighted in the second challenge of the website, so there is no need to further focus on the ecosystem or stakeholder management.

In the paragraph about the value proposition on the website, more information can be provided on how to design a suitable value proposition by stating: “An innovative business model must adopt a people-centric approach, recognizing that people’s behaviour swiftly adapts to environmental and technological shifts. To find an appropriate customer segment, the two steps of customer discovery and customer validation must be iterated repeatedly until a suitable product-market fit is identified.”

5.3.3 Mobilizing the right resources: Who and how much?

In the first paragraph of this chapter, Gailly talks about entrepreneurial talent and expertise. Here, more information about the managerial capabilities can be added by stating: “Managerial competencies are crucial for successful entrepreneurs. The two most important competencies are human and social capital. The mix of human and social capital shapes managers' cognitive assessment of various BM options. Therefore, it is advisable to train or recruit personnel to augment human and social capital within the organization.”

In the second paragraph about the importance of the governance of BMs, an emphasis on the inclusion of top management can be added: “The inclusion of top management in the governance of business models is crucial. They ensure regular reviews of the portfolio of business models, aligning the firm’s strategic goals with its various business models.

Furthermore, they can identify possible synergies between different business models to increase the efficiency of resource use.”

In the last paragraph about the underestimation of financial resources, the influence of the company’s size can be emphasized by including: “Although for SMEs the main challenge of an innovation project is to overcome (financial and non-financial) resource constraints, large companies must focus on reducing organizational inertia. Consequently, large companies, with their greater resources, can engage in business model innovation with relatively lower survival risk.”

Because the importance of AI is identified in the literature review but not on the website, a paragraph can be dedicated to this subject. This can be best added in this chapter because AI itself is also a resource that must be mobilized. This paragraph can be placed after the last paragraph and be written as: "Artificial intelligence (AI) is a transformative technology, and managers must understand its application in business model innovation. Effective AI integration involves synergistically developing and employing AI capabilities with interdependent feedback loops. The primary advantage of AI lies in its ability to analyse big data using specific algorithms. These capabilities should be strategically integrated into all four key questions of a business model to better understand stakeholder needs, adapt offerings, and align with market dynamics."

5.3.4 Valuating innovative business models: quantifying the unquantifiable

After the first paragraph, a second paragraph can be added to emphasize the importance of the evaluation process: “Business models should be evaluated using a consistent process to ensure comparability. Furthermore, continuous evaluation of all business models is essential to receive ongoing feedback and respond swiftly to changes. Given the significant differences between incremental and radical innovation projects, both types should be evaluated separately, each with its own governance, rules, and budgets.”

5.3.5 Building a consistent and balanced innovation portfolio

In the last paragraph, additional information can be included on how to ensure the balance and alignment of the portfolio. This can be achieved by adding the following phrase after the last sentence: “Additionally, a balanced innovation portfolio should include a good mix of both incremental and radical innovations to manage risk effectively.”

After the last paragraph, another paragraph can be added, dedicated to portfolio management: “During portfolio management, firms must decide which projects to execute internally and which ones to pursue in collaboration with external partners. Furthermore, effective portfolio management involves continuous monitoring and feedback from the market to identify necessary adjustments.”

6 Conclusion

In conclusion, this thesis explores the multifaceted realm of innovation management, particularly focusing on the fourth challenge outlined in Benoît Gailly's "Navigating Innovation" framework: developing a balanced portfolio of BMs. By meticulously examining scholarly literature and leveraging the Limo platform, 35 articles were identified and analysed to uncover relevant insights into this challenge.

To maintain coherence with Gailly's approach, the same intertitles from his website were used to structure this thesis. An additional chapter was included in the results section to address the substantial literature on the influence of sustainability, technology, and AI. The discussion section, however, focused on comparing the information from this literature review with the five chapters on Gailly's website.

Although almost all information from the website was verified with this literature review, there were some key differences. These include discussions on AI, distinctions between SMEs and large companies and their financial aspects, emphasis on stakeholder management, and the valuation versus evaluation debate. The thesis concludes by suggesting how the new insights from the 35 articles could be integrated into the website. It was decided to keep the original information intact and only add relevant findings from this literature review.

From defining BMI to exploring the interplay of sustainability, technology, and artificial intelligence, this thesis provides actionable insights to guide organizations on their innovation journey. By leveraging these insights and adopting a holistic approach to innovation management, organizations can enhance their competitive advantage and drive sustainable growth in today's dynamic business environment.

6.1 Limitations

Several limitations of this master's thesis need to be acknowledged, including access restrictions to the Limo platform, selection bias of articles, temporal limitations, and a focus on AI.

The Limo platform's access restriction is a significant limitation, as it is only accessible to students or personnel of KU Leuven. This makes the methodology not replicable for others wishing to verify or extend this research using the same resources, impacting reproducibility and transparency.

Selection bias is another limitation. The reliance on the ABS journal ranking of 2021 to determine article credibility may exclude relevant high-quality articles from non-ranked journals. Additionally, the keyword-based search in titles and descriptions might miss pertinent articles with keywords elsewhere in the text. The iterative keyword selection process could also overlook relevant studies using different terminology, leading to an incomplete literature review. Ultimately, only 35 articles were reviewed, so some relevant articles were likely missed.

Temporal limitations are also a concern. Focusing on articles published from 2020 onwards may neglect earlier research that remains relevant to understanding the current state of innovative BMs and innovation portfolio management.

The focus on AI introduces another potential limitation. After the initial search for articles on BMs and innovation portfolios, a second search specifically targeted information about AI. While AI is undoubtedly relevant, this focus could create an imbalance, potentially overlooking other emerging themes of equal importance.

6.2 Future research

A similar analysis can be conducted for the other four challenges of organizational innovation. The first three are well-documented and recently updated. However, the fifth challenge needs a thorough update, as noted by Benoît Gailly. Enhancing the fourth challenge requires a detailed study on the valuation process of BMs, emphasizing the importance of quantifying BMs before decision-making. Additionally, future research can include more information about the influence of environmental and social impacts.

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Appendix

1. Journal list from keyword “innovative business models”

Journal	Amount	ABS-rank
Journal of business research	1	3
Journal of cleaner production	7	2
Public organization review	1	2
Production and operations management	2	4
Technological forecasting & social change	1	3

2. Journal list of all the articles from the literature review

Journal	Amount	ABS-rank
Business process management journal	1	2
Business strategy and the environment	1	3
California management review	1	3
Cambridge journal of regions, economy and society	1	3
Electronic markets	1	2
Industrial marketing management	1	3
International journal of entrepreneurial behaviour & research	1	3
International journal of innovation science	1	1
Journal of business models	2	1
Journal of business research	4	3
Journal of cleaner production	7	2
Journal of small business management	1	3
Management review quarterly	1	1
Production and operations management	3	4
Public organization review	1	2
Research technology management	1	2
Review of managerial science	2	2
Strategy & leadership	1	1
Technological forecasting & social change	1	3
Technology analysis & strategic management	1	2
Technovation	2	3

3. List of articles per chapter of the results section

BM design: asking the right questions	Designing competitive BMs: Why and what?
Cosenz & Bivona, 2021	Bayramov et al., 2023
Ebrahimigharehbaghi et al., 2022	Cavallo et al., 2023
Eckert & Hüsigg, 2022	Chou, 2021
Escamilla et al., 2021	Ebrahimigharehbaghi et al., 2022
Goumagias et al., 2022	Gomes et al., 2023
Guindalini et al., 2021	Guindalini et al., 2021
Haftor & Climent Costa, 2023	Guo et al., 2022
Im et al., 2020	Haftor & Climent Costa, 2023
Paiola et al., 2022	Hensel & Visser, 2020
Saqib & Satar, 2021	Hoch & Brad, 2020
Veleva, 2021	Im et al., 2020
	Khan & Bohnsack, 2020
	Paiola et al., 2022
	Salvador et al., 2021
	Schoonover et al., 2021
	Sjödin et al., 2020
	Veleva, 2021

Mobilizing the right resources: Who and how much?	Valuating innovative BMs: quantifying the unquantifiable
Brasil et al., 2021	Brasil et al., 2021
Cosenz & Bivona, 2021	Eckert & Hüsigg, 2022
Eckert & Hüsigg, 2022	Gomes et al., 2023
Guindalini et al., 2021	Im et al., 2020
Haftor & Climent Costa, 2023	Schoonover et al., 2021
Hensel & Visser, 2020	Si et al., 2022
Heubeck & Meckl, 2022	Veleva, 2021
Paiola et al., 2022	
Schoonover et al., 2021	
Si et al., 2022	

Building a consistent and balanced innovation portfolio	Sustainable Innovation: Sustainability, Technology, and AI
Im et al., 2020	Åström et al., 2022
Paiola et al., 2022	Barbieri & Santos, 2020
Si et al., 2022	Brooks et al., 2020
Brasil et al., 2021	Burström et al., 2021
Gomes et al., 2022	Chou, 2021
Schoonover et al., 2021	Ebrahimigharehbaghi et al., 2022
Eckert & Hüsig, 2022	Ferràs-Hernández et al., 2023
Heubeck & Meckl, 2022	Guo et al., 2022
Ebrahimigharehbaghi et al., 2022	Haftor & Climent Costa, 2023
Veleva, 2021	Heubeck & Meckl, 2022
	Hoch & Brad, 2020
	Khan & Bohnsack, 2020
	Kohtamäki et al., 2024
	Marshall et al., 2024
	Nielsen, 2023
	Paiola et al., 2022
	Salvador et al., 2021
	Schoonover et al., 2021
	Shaik et al., 2023
	Sjödin et al., 2021
	Sunar & Swaminathan, 2022
	Veleva, 2021

4. List of articles used for literature review

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