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**Sustainable business model innovation and the  
barriers of implementation within the  
manufacturing landscape in Germany**

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## **Abstract**

**Title:** Sustainable business model innovation and the barriers of implementation within the manufacturing landscape in Germany

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This thesis examines the challenges that hinder the successful implementation of sustainable business model innovation (SBMI) within the manufacturing industry in Germany. The focus on Germany is motivated by its robust manufacturing sector, offering a distinctive context for exploring the complexities of adopting SBMI. As sustainability continues to gain traction in all areas of life, including in business, adopting sustainable practices becomes more important than ever.

Utilizing a qualitative research approach, including 14 in-depth interviews with sustainability managers and CEOs of German manufacturing companies, provided valuable insights. Continuing with a textual analysis, the study reveals a multifaceted landscape of barriers across various dimensions.

Identified challenges include human-centered issues like cultural beliefs, shareholder pressure and resource constraints. Additionally, the study identifies organizational barriers related to holistic culture integration and process improvement. Furthermore, challenges emerging from dynamic market conditions and regulatory issues at both national and global levels were recognized. The research also highlights supply chain complexity and impact measurement challenges, in particular software, metrics and reporting structures. The findings confirm the existing literature while also making new contributions to the area. New contributions are among others the relevance of human-centric challenges such as diverse beliefs and norms. Additionally, the research reveals the importance of establishing appropriate long-term partnerships.

To overcome these barriers, organizations must move beyond incremental approaches to embrace holistic change across the enterprise and consider its broader context. Achieving this transformation demands a fundamental shift in the organization's conceptualization of business purpose, requiring a comprehensive reengineering of business processes.

**Keywords:** Sustainable business model innovation, Implementation, Challenges, Change, Barriers, External factors, Internal factors, Sustainable transformation, Sustainability

## Sumário

**Título:** Inovação de modelos de negócios sustentáveis e as barreiras de implementação no panorama da indústria transformadora na Alemanha

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Esta tese examina os desafios que impedem a implementação bem-sucedida da inovação sustentável do modelo empresarial (SBMI) na indústria transformadora na Alemanha. O foco na Alemanha é motivado pelo seu sector industrial robusto, que oferece um contexto distinto para explorar as complexidades da adoção da SBMI.

Como a sustentabilidade continua a ganhar força em todas as áreas da vida, incluindo nas empresas, a adoção de práticas sustentáveis torna-se mais importante do que nunca.

Através de uma abordagem de investigação qualitativa, incluindo 14 entrevistas aprofundadas com gestores de sustentabilidade e diretores executivos de empresas industriais alemãs. Os desafios identificados incluem questões centradas no ser humano, como crenças culturais, pressão dos acionistas e restrições de recursos. Além disso, o estudo identifica barreiras organizacionais relacionadas com a integração holística da cultura e a melhoria dos processos. A investigação também destaca a complexidade da cadeia de abastecimento e os desafios da medição do impacto, em particular o software, as métricas e as estruturas de comunicação.

As conclusões confirmam a literatura existente, ao mesmo tempo que dão novos contributos para esta área. Os novos contributos são, a relevância dos desafios centrados no ser humano, como a diversidade de crenças e normas.

Para ultrapassar estas barreiras, as organizações devem ir além das abordagens incrementais e adotar uma mudança holística em toda a empresa, tendo em conta o seu contexto mais vasto. Conseguir esta transformação exige uma mudança fundamental na conceptualização do objetivo empresarial da organização, o que requer uma reengenharia abrangente dos processos empresariais.

**Palavras-chave:** Inovação do modelo empresarial sustentável, Implementação, Desafios, Mudança, Barreiras, Fatores externos, Fatores internos, Transformação sustentável, Sustentabilidade

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## List of abbreviations

<b>BoP</b>	Base of the pyramid
<b>et al.</b>	Et alia
<b>SBM</b>	Sustainable business model
<b>SBMI</b>	Sustainable business model innovation
<b>S.PSS</b>	Sustainable product-service systems

# 1 Introduction

Business as usual is challenging a sustainable future. This is indicative of the likelihood of an increasing worldwide population, rapid global growth, and related increases in resource use and environmental impacts. Globally, the world used the equivalent of 1.75 earths to support human activities in 2022 (WWF). Businesses have a significant impact on both the economy and the daily life of everyone. Corporate management has a critical role in determining how businesses, the economy, and society will develop in the future (Schaltegger et al., 2012). Thus, corporate sustainability plans are essential to sustainable development as well as to successfully guiding a business through the social, legal, political, and economic considerations connected to sustainability in a competitive market (Schaltegger et al., 2012). It is not a new understanding that ecological systems and the natural capital necessary for human well-being must be valued (Costanza et al., 1997).

To address the issues of a sustainable future, a comprehensive strategy is needed. SBMI provides a number of advantages. Top management is beginning to reconsider revenue-generating business models in order to include sustainability components (Zhu & Liu, 2021; Stubbs & Cocklin, 2008). Reactions to environmental changes should occur concurrently with social and economic transformations (Bocken et al., 2014). SBMIs have gained significant traction in recent years as valuable tools for promoting sustainable development (Velter et al., 2021). These advancements ensure the preservation of the environment and tackle social inequalities (Joyce and Paquin, 2016).

“Despite the importance of these [sustainability] issues, the reasons for failure remain relatively unexplored” (Geissdoerfer et al., 2018). There are gaps in the current literature on SBMIs as few studies focus on the factors that influence their adoption. This limited focus prevents a complete understanding of how these factors promote or hinder the adoption of SBMIs. It is crucial to extend the investigation to provide a more detailed explanation of SBMI adoption (Dhir et al., 2023). This exploratory, qualitative study contributes to close this gap by answering the following research question:

- *What internal and external factors act as barriers to the successful implementation of sustainable business model innovation?*

The purpose of this dissertation is to contribute to the literature on the implementation of SBMIs, through identifying the barriers hindering the implementation of sustainable processes. Additionally, the objective is to provide managers who are looking to implement a sustainable business model with insightful information that will help them anticipate potential obstacles and strategically navigate past them.

To answer the research question this research is organized into six major chapters, each providing a sequential and interconnected insight into the topic of the barriers of implementing SBM in different industries within the manufacturing sector in Germany. The introduction aims to explain the significance and relevance of sustainable business model innovation and state the research purpose.

In Chapter 2 - *Literature Review* ensures a critical understanding and theoretical foundation of the topic and enables the reader to situate the relevancy and outcomes of this examination. The theoretical framework serves as a versatile foundation that can be applied across industries. As the research progresses, interviews and analysis in later chapters will address the manufacturing context in Germany, ensuring a seamless transition from theory to application.

Chapter 3 - *Methodology*, clarifies the methodological foundations of the study. It explains the reasons for selecting a qualitative research approach and outlines the procedures for data collection and analysis.

Thereafter, Chapter 4 - *Findings* presents the results derived from the data analysis by presenting an extensive table, offering a data-driven understanding of the research questions, as well as a short textual elaboration on the findings.

This leads into Chapter 5 - *Discussion*, is a critical analysis of the findings in relation to the existing literature. This section aims to identify the contributions of this study by examining how the findings are consistent with or diverge from the established literature. Emphasis is placed on highlighting new aspects that have not been addressed in the existing literature. In addition, the chapter explores the practical implications and addresses the limitations of the study.

Finally, Chapter 6 – *Conclusion* provides a reflection on the study's key insights, their implications, and the contribution of the research to the wider academic discourse on the implementation of sustainable business models.

## **2 Literature Review**

This chapter offers a comprehensive literature review and theoretical foundation about the rising trend of sustainable business model innovation, its motivations and its barriers of implementation.

Definitions, theories and frameworks will be presented to provide an understanding of the topic of research. The thorough literature review identifies research gaps, which will be addressed in this dissertation, to highlight the significance of the study.

### **2.1 Definition of Sustainable Business Model Innovation**

Sustainable Business Model innovation (SBMI) can be defined as developing value propositions that create value for multiple stakeholders at the same time as well as for the environment and society (Baldassarre et al., 2017). SBMI is also described as the interrelation between a set of elements and their interactions with the stakeholders which delivers, creates, captures and exchanges sustainable, long-term value to a broad range of stakeholders (Geissdoerfer et al., 2018). Besides satisfying the multiple stakeholders, including customers, shareholders, suppliers, and partners, SBMI has the ability to also ensure the interests of the environment and society. Particularly, such models generate both, monetary and nonmonetary value (Velter et al. 2020).

SBMI has its origin in business model innovation, which has the aim to attract customers to pay for value and convert this into profits by innovating value creation, delivery and capture mechanism of a company (Baden-Fuller & Morgan, 2010). Since the awareness increased regarding severe global environmental and social issues, corporations have more difficulties gaining a sustainable competitive advantage. Among other factors, corporate interest therefore expanded to also embed environmental and social value into the business model innovation process, leading to SBMI (Bocken et al., 2013). SBMI incorporates a broader notion of value, which shifts its focus from the shareholder to a multi-stakeholder perspective (Schaltegger et al. 2016). A sustainable business model has the ability to shape markets and society by providing solutions to global issues, occasionally surpassing the impact of non-governmental organizations and regulatory bodies (Schaltegger et al., 2016).

## **2.1 Types of sustainable business models**

Sustainable business models (SBMs) have a significant contribution to solving urgent social and environmental problems. The following modern approaches demonstrate several perspectives on sustainability, each created to accomplish particular objectives and specifications. The extensive range of SBMs shows the flexibility and agility of businesses to solve global sustainability issues. In the following sub-section, three well-known SBM kinds are examined: Sustainable Product-Service Systems, Base of the Pyramid (BoP) models, and Circular Business Models. It is important to recognize that a broad range of SBMs exist, each tailored to different needs (Bocken et al., 2014).

### **2.1.1 Sustainable Product-Service Systems**

Sustainable Product-Service Systems, known as S.PSS, are becoming more widely recognized as a viable business model that promotes a change from traditional product-centric strategies to service-oriented ones. Based on interactions between stakeholders, the model provides an integrated mix of products and services that fulfill a particular demand. The ownership of the product remains with the provider, who seeks environmentally or socially beneficial solutions continuously, while retaining economic advantages. S.PSS implies providing clients with value by giving them access to the features and advantages of items rather than by directly selling them. The approach is classified into three types (Vezzoli et al., 2021).

One type is a product oriented S.PSS, where organizations market a product alongside related service aimed to extend the lifetime of the product. These services provide added value to the product life cycle by offering services such as maintenance or repair (Vezzoli et al., 2018). Vezzoli (2018) identified the German office furniture manufacturer Wilkhahn as an example by providing extensive post-purchase services for their office chairs, including as routine inspections, updates for older models, and recycling options when a chair reaches the end of its life.

Another type is the use oriented S.PSS, involving practices such as product leasing, renting and pooling. The goal is to provide ‘enabling platforms’ for customers (Vezzoli et al., 2018). An example is the car sharing service ShareNow from Berlin. By allowing individuals to rent cars for a short time period, rather than owning their own vehicles, the number of cars on the road and the need to manufacture cars are lowered, leading to lower emissions (Vezzoli et al., 2018).

The third type is a result oriented S.PSS, which is characterized by features such as activity-management and pay per service unit (Roman et al., 2023). In this type, the manufacturer retains ownership of the products and is only compensated by the customer for achieving the agreed results. This relieves the customer of the difficulties and costs associated with the purchase, operation and maintenance of the products, while the company has an incentive to continuously search for environmentally friendly solutions (Vezzoli et al., 2018). Phillips “pay-per-lux” service is an example of this type of S.PSS. Customers can purchase an all-inclusive lighting solution through the "pay-per-lux" service, which requires an ongoing fee that covers design, equipment, installation, maintenance, and updates. Phillips promotes economical and efficient lighting by offering the light as a whole service rather than charging for energy usage (Vezzoli et al., 2018).

### **2.1.2 Base of the Pyramid**

BoP models emphasize the development of goods and services that address the needs of underprivileged and low-income populations as part of an inclusive approach to sustainable business (Prahalad, 2006). By utilizing these groups' potential as both clients and microentrepreneurs, these models aim to address societal issues and improve living standards (Prahalad & Hammond, 2002). The understanding is that the greater value created for the people living in BoP means a greater value created for businesses, originating from the conception of mutual value creation. BoP models frequently concentrate on industries like healthcare, agriculture, and clean energy with the goal of reducing poverty, raising living standards, and generating economic possibilities (Hart & Milstein, 2003). An example of a company engaging in the base of the Pyramid is “Nuru energy”. The firm offers researchable light bulbs which provide an alternative to noxious kerosene lamps to villages without access to electricity in Africa. They target households living below the poverty line with the mission to bring clean energy to every village (Nuru Energy (A): Financing a social enterprise, 2013).

### **2.1.3 Circular Business Models**

Implementing a circular economy system requires the creation and adoption of business models designed to minimize the use of resources, extend their life, and maximize value extraction throughout the process (Geissdoerfer et al., 2020). By including techniques like recycling, remanufacturing, and waste reduction, these models seek to reduce resource consumption and environmental effect. The circular economy strategy encourages ongoing consumption of

materials and goods, which lowers the demand for raw materials and lowers waste production (Rizos et al., 2017). Businesses that wish to embrace circular economy usually review their business models by reconsidering their value propositions and creating value chains that provide realistic production efficiency, cost effectiveness, and commercial performance (Schulte, 2013).

In response to presently unsustainable trajectories, the circular economy is generally regarded as a tool for implementing and designing a sustainable business model in various sectors (Nosratabati et al. 2019). Therefore, circular business models encompass not just the creation of sustainable value, proactive multi-stakeholder management, and a long-term outlook, but also the practices of closing, slowing, intensifying, and narrowing resource loops (Bocken et al., 2016).

## **2.2 Drivers & motivations of sustainable business model innovation**

In recent years, there has been a noticeable increase in the adoption of SBMI, which is indicative of businesses' increasing dedication to tackling issues related to environmental, social, and economic sustainability (reference?). The literature points to several motivations that lead companies to invest in and implement sustainable business models.

First and foremost, implementing SBMI enhances organizational productivity through efficiency, employee retention, recruitment, and engagement (reference?). Especially the fact that SBMI can lead to direct business benefits, for instance cost savings and new revenue streams, is an incentive for companies to implement it (Bocken et al., 2014; Schaltegger et al. 2012). By entering into the expanding market segment of environmentally and socially responsible consumers, customer loyalty and market share can be potentially enhanced. This leads to a sustainable competitive advantage. Achieving this involves aligning with sustainability goals while maintaining efficiency and profitability concurrently. The companies can therefore distinguish themselves in the market and from competitors (Nosratabati et al. 2019). Furthermore, SBMI offers solutions that extend beyond financial gains (Schaltegger et al., 2016). The approach not only contributes to the enablement of competitive advantage but also creates, delivers, captures, and exchanges sustainable value for its multi-stakeholders (Geissdoerfer et al. 2018).

Businesses must also follow industry-dependent obligations to include sustainability into their business models in order to comply with regulations, which includes following environmental

laws and standards. By being ahead of legislations as well as stakeholder concerns, companies can gain an accelerated competitive advantage (Schaltegger et al. 2012).

The motivation to improve organizational resilience can be a significant driver to engage in SBMI. A fundamental aspect of long-term success is the ability to combat and recover from disruption. By implementing SBMI, which include addressing environmental and social risks, companies can improve their overall organizational resilience by effectively mitigating these risks (Buliga et al., 2016).

Attracting and maintaining talent is a key determinant of business success. Commitment to sustainability enhances employee engagement, simplifying recruitment and retention efforts. SBMI can be driven by a workforce that is aligned with a company's sustainability mission, making employee attraction a critical aspect of the sustainability strategy (Greening & Turban, 2000). Furthermore, reputation considerations serve as a driver to develop and implement SBMI. It should be acknowledged that public awareness of sustainability issues plays a crucial role in adopting SBMI. The pressure of satisfying the public demand motivates corporations to integrate sustainability into their strategy (Gong et al., 2019). A shift towards a more sustainable image can enhance a company's reputation. This leads to increased customer loyalty and a stronger market position, ultimately impacting a business bottom line positively (Homburg et al. 2013).

Aligning principles with the opportunity to proactively pursue sustainability provides an incentive for action and innovation, motivating businesses with shared values to collaboratively contribute to addressing environmental and social challenges through SBMI. (Foss & Saebi, 2016; Laasch, 2019). A foundation for a strategic focus on SBMI is provided by institutionally valuing business sustainability and embracing ambiguity, which makes SBMI an intrinsic and significant component of a corporation's strategy to accomplish its long-term goals (Bocken et al., 2020). Companies are motivated to implement SBMI by the opportunity to address enduring sustainability issues, align with societal expectations, and contribute to long-term environmental and social goals (Foss & Saebi, 2018).

The significant potential to incorporate the principles of sustainability and integrate sustainability goals into the value proposition, value creation, and value capture activities of businesses is a driver for the sustainable business model (Boons & Lüdeke-Freund, 2013).

## **2.3 Barriers to the implementation of sustainable business model innovation**

Implementing a sustainable business model is complex and managers considering this process would benefit from acknowledging barriers and challenges that arise when engaging in SBMI. A few characteristics which hinder the development of SBMs are among others heterogeneity in technological needs, products, resources, uncertainty, and difficulty in measurements (Jian et al., 2021).

The majority of businesses that want to create SBMs require a deeper understanding of global business trends and struggle to identify the fundamental elements of an SBM (Reim et al., 2022). Short-term incentives, financial performance measurements, fixed resource planning, and established innovative processes affect a company's capacity to recognize and evaluate SBMI prospects. Furthermore, SBM does not prioritize financial performance and profit maximization to fulfill shareholder needs (Bocken & Geradts, 2020).

Three research gaps concerning SBMI were identified by Geissdoerfer et al. (2018): 1) the implementation of the business model innovation process; 2) its tools; and 3) its challenges. According to these scholars, there appears to be little research in the literature reviewed on the challenges faced by managers trying to develop sustainable business model innovation and the reasons for low implementation success rates.

Despite the slowly growing literature on SBMI barriers in recent years, there is a need for a deeper understanding of the specific challenges that stand in the way of successful implementation within different industries in Germany. The literature sets its focus to a greater extent on BMI in general, given the longer history of such types of innovations. While some of the barriers can be transferred, the increased complexity of SBMI is yet to be considered in existing literature. As Bocken and Geradts (2020) suggest, further research is necessary to comprehend how different industries might be confronted with sustainability challenges to varying degrees.

## **3 Methodology**

There are three primary possibilities for conducting research within the framework of a dissertation: quantitative, qualitative methods, and mixed-methods approach (Saunders et al., 2016). For this dissertation, qualitative research methods are utilized to provide a thorough investigation into the barriers to SBMI implementation.

Qualitative research is a research methodology that focuses on understanding and interpreting the complexities of social occurrences, experiences, and social phenomena (Creswell & Poth, 2017). It is characterized by its emphasis on collecting non-numerical data, such as narratives, observations, and in-depth interviews (Saunders et al., 2016). Quantitative methods could miss the underlying meanings, viewpoints, and context-specific nuances that qualitative research aims to reveal (Creswell & Poth, 2017). For this dissertation on SBMI and the barriers to its implementation, qualitative research is a logical and advantageous choice for several reasons. Firstly, the complex and multifaceted nature of SBMI calls for an approach that can capture its complexities. Qualitative research excels at exploring complex topics, as it allows for in-depth investigation, enabling to gain a holistic understanding of the challenges faced by managers attempting to implement SBMI. Secondly, SBMI is deeply influenced by contextual factors, including organizational culture, industry dynamics, and environmental concerns. Qualitative research's focus on context and subjectivity makes it ideal for exploring how these factors impact the success or failure of sustainable business model innovations. Furthermore, this research aims to uncover the practical experiences of managers who have engaged in SBMI initiatives. Qualitative methods are well-suited for this goal, as they enable capturing the perspectives and real-world insights of the interviewees. Qualitative data can also serve as a valuable resource for deriving actionable recommendations and strategies (Babbie, 1989). In summary, the choice of qualitative research for this dissertation on SBMI is grounded in its ability to explore the complexities, contextual dependencies, and practical dimensions of the topic. This approach aligns most effectively with the goal of comprehensively exploring the barriers to SBMI implementation through in-depth interviews with experienced professionals. It enables a thorough examination of the challenges they face, helping understand if these challenges vary across industries or sectors.

### **3.1 Sample strategy**

To answer the research question, it is valuable to conduct a qualitative study, tapping into the insights of experienced professionals in the field of SBMI and exploring the barriers they encounter. By gathering knowledge from the 14 experienced individuals, the study seeks to contribute valuable perspectives that can inform future research efforts, specifically aimed at understanding how industry-specific barriers can be effectively dismantled.

A purposive sampling strategy was employed for this dissertation to select a diverse group of participants who possess in-depth knowledge and practical experience in implementing SBMI within the manufacturing industry in Germany. Purposive sampling is a technique used in qualitative research to identify and select information-rich cases for the most effective use of limited resources. (Patton, 2002). This involves identifying and selecting individuals or groups of individuals who have particular knowledge of or experience with the topic of interest (Cresswell & Plano Clark, 2011). The purposive sampling approach is chosen to ensure that the sample is well-suited to the research objectives, allowing for a comprehensive exploration of the complexities within various industries. The purposive strategy and criteria are closely linked, allowing participants to be selected based on specific criteria relevant to the focus of the study.

To mitigate the challenge of finding enough interview partners and ensure a comprehensive exploration of the subject, this research will incorporate convenience and snowball sampling methods alongside the purposive sampling approach.

Germany is an economic driver and holds a significant position within the global economic structure as it is the fourth largest economy in the world and the largest economy in Europe (Glunz, 2020). This indicates the necessity to understand the challenges German manufacturing companies from different industries face when engaging in SBMI to provide solutions to overcome barriers in the integration process in future research. To shape the profile of ideal interview partners, certain criteria were chosen. First and foremost, it is important that interview partners possess a substantial level of expertise and hands-on experience in the area of sustainable business model innovation. Furthermore, interview partners should represent diverse industry sectors within the manufacturing landscape in Germany. This diversity allows to capture a comprehensive perspective on the application of SBMI, revealing the unique dynamics and challenges associated with different industries. In terms of their professional background, interview partners should ideally occupy, or have previously held, positions that are directly relevant to SBMI implementation. This could include senior managers, innovation specialists, or sustainability managers who have been actively involved in the decision-making processes of their respective organizations.

To ensure a well-rounded understanding, a particular interest lies in interviewing partners who have encountered various experiences during their SBMI initiatives. This includes participants who have navigated both successful and challenging situations, as well as those who are participating in different stages of SBMI development.

In summary, these requirements for interview partners are designed to create a group of participants that collectively provides a comprehensive and nuanced insight into the challenges and strategies related to SBMI within the manufacturing landscape in Germany. By ensuring diversity and expertise, the aim is to generate a well-rounded understanding of the subject, shedding light on the complex dynamics of SBMI.

To identify potential interview partners, personal and professional networks were leveraged. The individuals selected had own experience in the field of study and were able to recommend further experts in the area. The search was also based on the social media network LinkedIn. By searching for contacts that fit the requirements and writing a targeted message, additional interviewees were willing to help with the research. This approach complemented the network-based strategy, helping to identify potential participants through both personal connections and social media through search capabilities. By using certain keywords and filters, individuals with experience were found and reached out to.

### 3.2 Data collection process

The interview structure outlined below aims to comprehensively explore the challenges and strategies associated with SBMI in manufacturing companies in Germany while allowing flexibility to adapt to the interviewee's responses and experiences. It encourages in-depth discussions on both the practical aspects and industry-specific insights, contributing to a robust understanding of the research topic. The interview guide covered 5 topics.

Category	Topics
Introduction and Background	Background and experience in SBMI
Experience with SBMI	Exploring practical experience, project details, roles, responsibilities, objectives and motivations of SBMI
Barriers of implementation	Main challenges and barriers, specific difficulties, investigation of internal and external factors
Strategies and Solutions	Strategies, approaches, best practices they employed, exploring the lessons learned
Trends and recommendations	Outlook of interviewee on possible challenges that might rise, recommendations to overcome barriers

*Table 1: Interview Guide*

*Source: Own illustration*

Open-ended questions allowed categories and topics to emerge during the interviews and served as a basis for follow-up questions in later interviews. The interviews were not conducted in person, primarily due to resource constraints and geographical disparities. For this reason, the interviews were conducted online via video conferences since this displays the most effective alternative (Gray et al. 2020). Each interview was conducted in German, it is the native language of all interviewees. The average duration of the interviews was between 30 - 45 minutes. All interviews were recorded and fully transcribed using the transcript software Amberscript.

### **3.3 Data analysis process**

In the case of this dissertation, Gioia's methodology for qualitative research will be employed due to several reasons.

Firstly, Gioia's approach is closely aligned with the research objectives, ensuring a focused and effective analysis process. This method is known for its comprehensive and robust framework, allowing for a thorough exploration of the dataset and providing rich and nuanced insights. Since the method directly addresses the common criticism of inductive research's lack of "qualitative rigor" and offers a thorough conceptual framework for a thematic analysis of qualitative research data, it is highly suited for the analysis of the data. Using this method, researchers move between the raw data and emerging concepts to enhance the understanding of new insights. This process aims to derive higher-order concepts and themes from raw data through iterative coding. The likelihood of discovering meaning and relationships is increased since the approach ensures that the analysis remains close to the collected data (Gioia et al., 2013).

Gioia and colleagues (2013) state that thematic data analysis includes multiple crucial phases in the analytical process. Open coding is the first step, when data is divided into smaller units according to its content. First-order concepts are thereby simply extracted and quoted from the participants. In order to keep the analysis grounded on the participants perspectives and maintain it close to the data, this phase is essential. During the screening of the interview transcripts, different excel spreadsheets were created in clusters.

Axial coding is the second phase of the Gioia approach. Identifying groups of commonalities, duplications, and differences to create second order themes and arrange first order concepts into theoretical categories is the essence of this step. (Gioia et al., 2013). Compared to the first-order concepts, the resulting second-order themes are more abstractly formulated and reflect the

researcher's interpretation of the data. An extensive comprehension of the research can be developed with the help of the axial coding process, which makes patterns and relationships in the data visible (Gioia et al., 2013).

Using selective coding, second-order themes were allocated into aggregated dimensions in the last step. As a result, contributions can be made to the theory in the researched area since the aggregated dimensions serve as a basis for creating a theoretical model from the gathered data and illustrate the high-level concepts of the data (Gioia et al., 2013).

## 4 Findings

Table 2 represents the analysis process visually and provides the reader with the ability to comprehend the origin of the synthesized findings contained in the data.

First-Order Concepts	Second Order Themes	Aggregate Dimensions
"What is particularly hindering is the mindset, as many colleagues have been with the company for a long time and do not see the need for such major changes." (I2)	Lack of awareness, established norms and beliefs	1. Human-centric challenges: Mindset, cultural beliefs and shareholder pressure
"The questions is, how I motivate people to follow. The human factor should not be underestimated." (I5)		
"Unfortunately, many people think that what we do is just a drop in the ocean. Many of our colleagues wonder whether what we are doing is really making a difference." (I6)		
"If I want to change processes, I have to approach people first and foremost. In some cases, employees have internalized the processes for their entire working life and cannot imagine it any other way." (I7)		
"Employees are socialized differently and implement desired processes with varying degrees of enthusiasm and self-image." (I8)		
"To generate sustainability awareness, measures are needed to enhance knowledge and understanding, encouraging a shift away from established processes towards sustainable practices." (I9)		
"It is a huge challenge to make people realize that they have to behave accordingly in the future out of their own motivation." (I12)		
"Employees have no incentive to share ideas and be invested in the topic because the mentality is lacking." (I14)	Lack of global understanding of sustainability	
"We try to understand and manage the complexity of global supply chains. Especially because of how differently sustainability is understood in different parts of the world" (I1)		
"Knowledge is often lacking. You really have to explain sustainability first. People in different parts of the world understand sustainability in completely different ways." (I7)		
"Sustainability is perceived differently internationally. In Europe, it is everywhere. In the Middle East and China, less emphasis is placed on it. Customers and partners are therefore also less interested in sustainable factors." (I8)		
It is not only the case with our suppliers, but also with our employees worldwide, that they do not even see the need for action due to their cultural background. (I12)		
"Especially when you look at other regions in the world it is even more difficult to change the mindset of some colleagues, as sustainability is not seen as relevant." (I14)		
"One of the main problems is the balance between short-term financial goals and long-term sustainable practices. The challenge is to communicate and convince shareholder of the long-term benefits." (I2)	Difficulty to maximize shareholder-value and	
"We feel much pressure from our shareholders because we struggle to meet the short-term financial targets." (I3)		

"Some shareholders are not happy at all with us trying to implement a sustainable model." (I5)	long-term sustainability efforts	
"The requirement of our shareholders to also make sustainable business models profitable immediately makes the implementation even more complicated." (I8)		
"Our management changes quite often so they tend to focus on short-term results." (I9)		
"I have the feeling that our shareholders become dissatisfied with us becoming more sustainable because sustainability does not deliver the desired financial figures." (I10)		
"There is a lot of resistance and conflict with short-term financial goals. The successful implementation of sustainability is associated with large and risky investments over many years, which can also fail." (I11)		
"We're working to go completely circular, but it takes a lot of time, skills and capabilities. We have big problems finding people who are passionate about sustainability and have superior knowledge in fashion management." (I1)	Lack of skills and motivation	2. Resource constraints: Skills, time and money challenges
"We need more talented people who are passionate about sustainability, willing to constantly develop themselves and are communicative, extroverted and culturally aware. It is extremely difficult to find the right candidates." (I7)		
"We don't have enough people with expertise and experience in this area." (I12)		
"A key bottleneck on our path to sustainability is the lack of specialized skills and resources allocated specifically to environmental efforts due to other focus points." (I2)	Limited capacity due to other areas of focus	
"The biggest challenge is that there is no dedicated team for sustainability projects. As we have limited personnel and our main focus is still on the core functions, there are delays in the integration of sustainable practices." (I4)		
"Not having enough capabilities is our main bottleneck at the moment." (5)		
"The problem is that no one is assigned to just this one project. Because the priority is to build cars, becoming more sustainable comes second. That's why development and implementation is taking so long." (I6)		
"Since the success of the implementation is so uncertain, we tend to focus on other aspects where success is more secure." (I9)		
"As a relatively small company, we first have to ensure our financial profitability, so an ambitious sustainability strategy cannot be our focus." (I11)		
"Sustainability is important to us but unfortunately we can't put all our resources into it." (I13)		
"Converting to organic materials is a lengthy and costly process. During this period, farmers follow more expensive organic practices without receiving the organic label, resulting in them getting conventional prices for their cotton." (I1)	Implementation is costly and time-consuming	
"We have limited resources, time and money wise." (I3)		
"We started working on sustainability 5 years ago and cannot foresee where it will end. It is an ongoing, long-term process leading to high costs." (I4)		
"Introducing the circular economy is very expensive. A lot of resources are invested in the preliminary work, which takes up a lot of time and money." (I6)		
"In many ways, you have to be able to afford sustainability as a company, as investments are often higher at the beginning and only pay off over time, if at all. Only a profitable company can live sustainability." (I8)		
"The implementation is very time-consuming and costly. There is no standardized path that you can follow." (I9)		

"We are often unsure whether what we want to do and invest makes sense. We lack a sustainability formula that we can stick to. This would ensure that the high amount we invest is worth it." (I14)		
"It's not enough simply having sustainability teams. It has to reach every single employee and partner in the organization." (I1)	Difficulty to establish sustainability across the whole organization	3. Organizational challenges: Fostering a holistic culture, coordinating departments and enhancing processes
"We have seen that it doesn't help if we have great sustainability-expertise in the headquarter but don't get it established in other locations. This is a major challenge." (I2)		
"Regardless of legislation, we try to embed sustainability in our company's DNA through its strategy and vision to ensure that every employee embraces it in their actions." (I3)		
"Together with specialized people and departments, the processes, structures and tools must be created in order to be able to implement it company-wide. Sadly, we are not that far yet." (I12)		
"We struggle to figure out how we can really establish it in a complex, decentralized company structure so that the people who are supposed to implement it don't have a conflict because they receive different instructions?" (I5)	Challenge of organizational theory	
"It is very challenging to coordinate and balance the different departments because of different focus points." (I7)		
"The transformation towards sustainability is a cross-functional challenge that requires coordinated collaboration across different departments within the company." (I12)		
"Bureaucracy also plays a major role because a lot of working time is spent on it." (I3)	Established processes and bureaucracy hinder implementing SBMI	
"Bureaucracy is also a big problem. There is a lot of it, for example in the creation of data sheets, which then have to be approved. That makes implementation extremely slow." (I6)		
"Our procedures are so established and difficult to change, that it takes very long to implement an innovation. (...) Bureaucratic process play a big role here." (I9)		
"We need to build new ecosystems, which require cross-industry collaboration." (I2)	Lack of cooperation among different companies leads to missed opportunities	4. Dynamic market challenges: Collaborative innovation and economically driven consumer decisions
"Currently, I don't think companies really collaborate. But this is key to get to good end results as sustainable innovation in the long run will be way less expensive." (I10)		
"Implementation is challenging because there is no collaboration with other players in the industry. We could be much further if we collaborate, but no one is taking the first step." (I13)		
"If sustainable commitment is not valued, then we as a company lose out to the competition because we have higher costs." (I1)	Market-driven influences on pricing and consumers' reluctance to pay more for a sustainable product	
"It takes some time before the willingness to pay is there so we can scale our sustainable solutions and offer them in a way that covers costs. This is a long process, and it can be very tricky and dangerous." (I4)		
"We have realized through many conversations that a sustainable product is bought if it costs the same and has the same quality as a conventional one. Achieving this is a challenge." (I5)		
"One problem is that customers publicly state that they are pursuing sustainable goals but are not prepared to pay a little more for more sustainable products." (I7)		
"The consumer also represents an obstacle in some cases. The willingness to pay more for a sustainable product is not always there." (I8)		
"Competition influences willingness to pay through the market prices that can be achieved for a product." (I11)		

"I think the government should have clearer regulations. This will give companies confidence to invest, and it also lets the market punish bad behavior." (I3)	Insufficient and unclear regulations in Germany	5. Regulatory challenges: Inadequate regulations in Germany and on a global scale
"Environmental protection has unfortunately not yet been seen as a locational advantage and an opportunity in Germany, which is why the government has not yet set sufficient guidelines." (I5)		
"Politics does not create incentives to implement sustainability in business processes. Certain laws even prevent greater sustainability." (I8)		
"Regulations become more complex and change quickly while they're still not enough." (I11)		
"Laws are not taken far enough. We need to have stricter regulations." (I13)		
"Accompanying policy measures and regulations would certainly help and make it easier to communicate the need for sustainability to partners globally." (I6)	Lack of global regulations complicate collaboration with partners	
"Especially since the topic is not yet established worldwide and a relatively small number of companies, mainly from Germany, are making certain sustainability demands, global regulations to support sustainability efforts are needed." (I7)		
"Convincing global partners of sustainability's importance is a challenge due to the lack of universal guidelines and a common understanding." (I13)		
"The 'Supply Chain Diligence Act' is a German solo effort; there is a lack of understanding worldwide as to why a German law must be adhered to." (I14)		
"Our suppliers are the crucial link in maintaining a fair supply chain. They must ensure transparency, collect data on climate and social impacts and improve data systems." (I1)	Importance of long-term, transparent partnerships	6. Supply Chain Challenges: Partner criteria, transparency barriers, and resource demands
"We insist on open relationships with our partners and suppliers because being environmentally and socially responsible can only be achieved through partnerships." (I2)		
"We have certain standards like only partnering with others that follow the same standards and account the climate footprint of the materials." (I4)		
"We focus on establishing long-term relationships with our partners." (I7)		
"We see great importance to open relationships with our partners and suppliers. Because only together can we begin to change the system." (I10)		
"We have difficulties as not all suppliers align their processes with our sustainability goals. Finding new partners we trust is challenging." (I3)	Difficulty to find partners that fulfill sustainability requirements	
"There is still a lack of transparency and the ability to access certain information to check whether the partners are fully sustainable, not just the materials." (I6)		
"Unfortunately, not all suppliers are prepared for the desired sustainability within their processes." (I8)		
"With some partners it is easier to understand how sustainable they are, the smaller the supplier, the more difficult it is to understand because there is a lack of transparency." (I14)		
"Building transparent and traceable supply chains requires perseverance and time." (I1)		
"Establishing a reliable and also accountable supply chain is a journey that demands a lot of persistence." (I9)		

"It's so difficult to have a transparent supply chain. Establishing it takes a lot of time and resources in general." (I13)	Establishing a sustainable supply chain takes time and resources	
"Especially in connection with partners, it is very difficult to find a reporting system & software that fits our and their processes and captures exactly the data we need." (I1)	Difficulty to find compatible technology for impact measurement	7. Challenges in impact measurement: Software, metrics and reporting structures
"At the moment we try to implement modern technologies for data collection to be able to report transparently to all of our stakeholders. This is so difficult because we can't find the software that fits for us and our partners."(I2)		
"We have a large, global supply chain and unfortunately do not yet have the corresponding technologies to check every supplier." (I7)		
"Impact is difficult to scale and measure. Implementing a reporting system is our main challenge." (I3)	Challenge of finding metrics to measure impact	
"A major challenge for us is measuring the impact. It's difficult because we need key figures, which are difficult to abstract, to determine the ecological footprint for example." (I4)		
"It's difficult to measure non-financial performances and give stakeholders the transparency they need. Finding the right metrics for measurement is a real challenge." (I5)		
"I see the biggest challenge in measurability because it's difficult to obtain the necessary information for impact reporting. Who gives it to us? What kind of information can we get and use? We are still at the very beginning because our corporate structure is not prepared for it." (I7)	Challenge of establishing an integrated impact measurement due to organizational structure	
"We need to work in interdisciplinary teams and pursue integrated management of financial and sustainability indicators, that we don't have yet. Reporting is difficult if we do not have an integrated, interdisciplinary reporting structure." (I11)		

*Table 2: Data Analysis*

*Source: Own illustration; based on the qualitative content methodology of Gioia (2013)*

## **4.1 Human-centric challenges: Mindset, cultural beliefs and shareholder pressure**

The success of implementation is critically influenced by the human factor, encompassing all people involved in the organization. In order to successfully implement SBMI company-wide, evidence seems to suggest that employee motivation is relevant for a successful change process. Long-term employees may be resistant to significant change due to long-established practices, creating a barrier to the adoption of sustainable models, as reflected by the statement of I7: "If I want to change processes, I have to approach people first and foremost. In some cases, employees have internalized the processes for their entire working life and cannot imagine it any other way.". The findings suggest that motivating and shifting the mindsets is of importance, as employees might question the impact of sustainability efforts and struggle to see their relevance (I5, I6, I12, I14). Cultural diversity across global supply chains adds complexity, because of various perceptions of sustainability: "We try to understand and manage the complexity of global supply chains. Especially because of how differently sustainability is understood in different parts of the world." (I1). The challenge is to improve understanding of sustainability, particularly in regions where it is less emphasized. This diversity extends to shareholders, who may have conflicting perspectives on the balance between short-term financial goals and long-term sustainability. Some interviewees expressed this challenge, for instance I3: "We feel much pressure from our shareholders because we struggle to meet the short-term financial targets.". Shareholders' resistance, driven by a focus on immediate financial returns, creates tension and complicates the implementation of sustainable models (I8, I10, I11). Meeting short-term targets while balancing long-term investments can be challenging due to aligning financial objectives with sustainability goals.

In conclusion, these findings highlight the complex interplay of individual mindsets, global perspectives, and the challenge of aligning short-term financial objectives with sustainable practices. A widespread commitment to sustainability leading to an efficient implementation of SBMI is needed, but difficult to achieve. Overcoming these complex barriers requires a joint effort to shift attitudes and navigate diverse cultural landscapes and financial expectations.

## **4.2 Resource constraints: Skills, time and financial challenges**

A recurring issue is the scarcity of skills and the difficulty in finding people with a passion for sustainability and the necessary expertise in their respective fields (I1, I2, I7, I12). The

constraints become more prominent with limited personnel and a lack of dedicated teams for sustainability projects, leading to delays in integrating sustainable practices, as I4 states: "The biggest challenge is that there is no dedicated team for sustainability projects. As we have limited personnel and our main focus is still on the core functions, there are delays in the integration of sustainable practices." (I4). The challenges of allocating resources to sustainability efforts when outcomes are uncertain are stressed by the prioritization of core functions, as noted in I6 and I9. Financial considerations also emerge as a significant barrier. The challenge of balancing financial profitability with ambitious sustainability goals is indicated by the evidence collected. The process is resource-intensive, combined with uncertainties and the absence of a standardized path (I9), making implementation both time-consuming and costly. I14 highlights the lack of a clear sustainability formula to guide decision-making.

All in all, limited resources in terms of skills, capabilities and capital hinder companies in their SBMI implementation efforts. Especially long-term commitment of resources with no certain outcome results in a cautious approach towards sustainability.

### **4.3 Organizational challenges: Fostering a holistic culture, coordinating departments and enhancing processes**

In addition to human-centric challenges and resource constraints, there are organizational elements that can also add challenges to implementing SBMI. Interviewees emphasized the need for a comprehensive integration of mission and vision throughout the whole organization. Although participants referred to their companies establishing sustainability teams, the challenge lies in integrating the mission throughout the entire organization. Sustainability efforts should reach every employee and partner in the organization: "It's not enough simply having sustainability teams. It has to reach every single employee and partner in the organization." (I1). This can be difficult due to the decentralized nature of many companies, as I5 emphasized: " We struggle to figure out how we can really establish it in a complex, decentralized company structure so that the people who are supposed to implement it don't have a conflict because they receive different instructions?".

Achieving consistency in sustainability practices across different locations is challenging. The struggle to establish sustainability in a complex, decentralized structure is compounded by the potential for conflicts occurring from differing instructions. Bureaucracy emerges as a significant obstacle (I3, I6) and is identified as a major role player in slowing down the

implementation process. The bureaucratic hurdles involved contribute to the slow pace of implementing innovation.

In conclusion, embedding sustainability throughout the corporate structure is a major challenge and hinders effective implementation. The problems range from the need for far-reaching integration to cross-functional coordination hurdles and bureaucratic obstacles, all of which contribute to the slow pace of innovation and adoption of sustainability.

#### **4.4 Dynamic market challenges: Collaborative innovation and economically driven consumer decisions**

The next finding of this study suggests a notable challenge resulting from customers expressing sustainability goals but hesitating to pay more for sustainable products. The customers' misalignment between stated values and purchasing behavior presents a significant barrier. This is reflected by the statement of I7: "One problem is that customers publicly state that they are pursuing sustainable goals but are not prepared to pay a little more for more sustainable products.". This evidence suggests that companies might find it difficult to justify investments in sustainable practices without a clear economic incentive. Three interviewees mentioned a perceived lack of collaborative efforts and cross-industry cooperation (I2, I10, I13). The absence of collaboration is seen as a barrier since possible opportunities are not taken advantage of. This is highlighted by the following statement: "Implementation is challenging because there is no collaboration with other players in the industry. We could be much further if we collaborate, but no one is taking the first step." (I13). Additionally, the role of market forces is highlighted by the impact of competition on consumer willingness to pay (I11): "Competition influences willingness to pay through the market prices that can be achieved for a product.". Implementing sustainability measures can be challenging for companies, especially if competitive pressures result in pricing strategies that discourage consumers from choosing sustainable options.

To sum it up, external market challenges put pressure on a company when implementing SBMs. The adoption of sustainable measures is complicated by the perceived lack of collaboration and the influence of market forces, particularly competition, which affects consumer willingness to pay.

#### **4.5 Regulatory challenges: Inadequate regulations in Germany and on a global scale**

Evidence collected suggests that regulation plays a major role in the area of sustainable business model innovation as it either drives or hinders the implementation. Interviewees broadly agree that existing regulation lacks clarity and is insufficient to drive meaningful change (I3, I5, I11, I13). The perceived lack of locational advantages for environmental protection in Germany, linked with insufficient guidelines, highlights a systemic problem: "Environmental protection has unfortunately not yet been seen as a locational advantage and an opportunity in Germany (...)." (I5). This opinion is further reinforced by the statement: "Politics does not create incentives to implement sustainability in business processes. Certain laws even prevent greater sustainability." (I8).

As mentioned above, sustainability is seen of different levels of importance globally. Therefore, it is important to establish global regulations. The lack of global regulations complicated persuading global partners without universal guidelines (I6, I7, I13).

Overall, these insights reveal a barrier resulting from insufficient and unclear regulatory frameworks worldwide and in Germany. Interviewees suggest that stricter, clearer, and global regulations could contribute to successfully integrate sustainability into their operations.

#### **4.6 Supply Chain Challenges: Partner criteria, transparency barriers, and resource demands**

This finding illustrates the critical role of fostering long-term partnerships, with a particular focus on maintaining sustainable relationships with suppliers. The importance of suppliers in maintaining a fair supply chain, ensuring transparency, and collecting data on climate and social impacts is emphasized. One interviewee (I1) highlights the dependence on external partners for sustainable practices: "Our suppliers are the crucial link in maintaining a fair supply chain. They must ensure transparency, collect data on climate and social impacts and improve data systems.". Furthermore, this implies a barrier where achieving sustainability goals requires alignment and cooperation not only within the company but also with external stakeholders. The difficulty in ensuring a fully transparent and sustainable supply chain is underlined by the acknowledgment of challenges in transparency and accessing information about the sustainability practices of partners, particularly smaller suppliers (I14). Interviewee I6 further

explained: "There is still a lack of transparency and the ability to access certain information to check whether the partners are fully sustainable, not just the materials." Three interviewees collectively imply that building transparent and traceable supply chains demands perseverance and time, indicating that the journey towards more sustainable processes involves overcoming persistent challenges (I1, I9, I13).

In summary, companies encounter difficulties in finding partners who share their sustainability goals, establishing a transparent supply chain, and overcoming persistent obstacles.

#### **4.7 Challenges in impact measurement: Software, metrics and reporting structures**

The final finding of this study highlights the significant challenge companies face in measuring impact, including issues related to technology compatibility, metric identification, and system establishment. Effectively tracking and measuring impact is an essential step in validating positive outcomes or reduced negative effects. The need for an adaptable technological solution is stated in the following. As I1 expressed: "Especially in connection with partners, it is very difficult to find a reporting system & software that fits our and their processes and captures exactly the data we need.". This highlights a barrier in finding a reporting system and software that aligns with both internal and external partner processes. Similarly, the difficulty in implementing modern technologies for data collection due to the lack of suitable software suggests a hurdle in integrating technology for transparent sustainability reporting (I2). One interviewee (I4) explained: "A major challenge for us is measuring the impact. It's difficult because we need key figures, which are difficult to abstract, to determine the ecological footprint for example.". Another quote highlights the difficulties in scaling and measuring impact, demonstrating challenges in developing metrics and frameworks for accurately quantifying ecological and social impacts (I3). Identifying difficulties in measuring non-financial performance and providing stakeholders with necessary transparency is a complex challenge that requires appropriate metrics and transparent reporting (I5). I11 indicates an organizational barrier to effective reporting, requesting interdisciplinary teams.

Essentially, the numerous challenges in technology compatibility, metric identification, and organizational preparedness collectively hinder companies from effectively measuring their impact and implementing robust, unified reporting systems.

## 5 Discussion

This study aimed to understand the challenges of implementing sustainable business model innovation in the manufacturing industry in Germany. Comparing the literature review and this study highlights both confirmation of previous findings as well as new perspectives.

### 5.1 Theoretical and managerial contributions

The first finding revealed a substantial human-centric challenge, highlighting the critical role of the human factor in implementation success. The study confirms existing literature that SBMI suffers from focusing on maximizing profits to satisfy shareholder needs (Bocken & Geradts, 2020). Therefore, engaging shareholders in the long-term benefits of sustainability could mitigate conflicting perspectives. Existing research requires further analysis about the nuanced human-centric barriers. In particular, the literature does not explicitly address the impact of different norms, values, and beliefs on implementation. The study highlights that different perceptions of sustainability, arising from cultural diversity in global supply chains, pose a significant challenge. Establishing a unified mindset among employees, especially in regions where sustainability is less emphasized, becomes a complex task manager need to address.

The second finding of this study resonates with existing literature on the challenges of SBMI. The identified scarcity of skills, particularly the difficulty in finding individuals with sustainability expertise, is consistent with the broader literature that recognizes a skills gap in understanding global business trends (Reim et al., 2022). The study's emphasis on limited resources, including skills, capabilities, and capital, reinforces existing research on the challenges of resource allocation and balancing financial profitability with sustainability goals (Bocken & Geradts, 2020). The findings also reflect the literature on the lack of clear sustainability guidelines and frameworks, as highlighted by Geissdoerfer et al.'s (2018) research gaps.

The literature supports the third findings regarding the significant role of established processes and bureaucracy as a barrier to rapid implementation of sustainability initiatives. Bureaucratic hurdles that impede innovation, as observed in the study, are consistent with existing research highlighting the negative impact of established processes on the agility required for SBMI (Geissdoerfer et al., 2018). For managers, this finding underlines the need for a more coherent

and streamlined approach that promotes cross-functional coordination and efficient deployment of sustainability efforts across different layers of the organization.

The fourth finding contributes to the literature by highlighting external market challenges to sustainable business model innovation. It underlines the impact of economic conditions on resource allocation and the struggle to align consumer behavior with sustainability goals. Market prices and competition were mainly named as economic conditions in the findings. This suggests navigating competitive pressures to overcome external challenges.

In the fifth finding, the challenges identified in existing regulations underscore a critical gap in the literature. While existing work adequately highlights the importance of regulation in promoting sustainability, this study addresses a gap created by the lack of a comprehensive and globally harmonized regulatory framework for SBMI. Existing discussions often focus on regulations at the national level, whereas this research highlights the requirement for global considerations to effectively support and guide companies in adopting sustainable business models on a global scale. This highlights the need for a transnational regulatory framework that takes into account the unique challenges and opportunities of SBMIs in different international contexts. Recognizing this gap allows managers to advocate for clearer regulatory guidelines. Companies can actively engage with policy makers.

Finding six, highlighting the critical role of facilitating long-term partnerships, reveals a nuanced aspect of SBMI that is not explicitly addressed in existing literature. The emphasis on the importance of suppliers in maintaining a fair and transparent supply chain adds a layer of complexity to the challenges faced by companies pursuing sustainability goals. The need for alignment and collaboration not only within the organization, but also with external stakeholders, emphasizes the interconnected aspects of sustainability efforts. Managers should invest in strategies that enhance the transparency and traceability of their supply chains, acknowledging the critical role that external stakeholders play in achieving sustainability goals. The final finding of this study confirms that the challenges of impact measurement are consistent with existing literature that emphasizes the need for standardized metrics and reporting structures for effective sustainability measurement (Jian et al., 2021). Still, the novel insights of the need to find the right technology fitting the company as well as all its partner and further insights, give a nuanced understanding of the complexity of impact measurement. Therefore, managers are suggested to educate themselves on the topic on a continuous basis and invest in technology and software that enables measurement.

## 5.2 Limitations and future research

This study provides valuable theoretical insights into the barriers when implementing sustainable business models, nevertheless the limitations of this study must be recognized to showcase areas for future research.

Firstly, this study focused primarily on the perspectives of sustainability experts. While this approach provided valuable insights into the challenges and opportunities of SBMI, it may not fully capture the perspectives of other relevant stakeholders, such as regulators or consumers. Further research could broaden the scope of the study by exploring different viewpoints to ensure a more holistic understanding of the dynamics influencing SBMI implementation.

Furthermore, this study is deliberately qualitative and relies on interviews and content analysis of the data collected. Although this approach allows for an in-depth and flexible exploration of the topic under study, it could be helpful to complement this study with quantitative research to verify and generalize the findings in a more comprehensive way. For this purpose, surveys or experiments that quantify the barriers to SBMI implementation could be conducted.

In addition, the topic of this study is still in its infancy, and the rapid pace of sustainable business development means that the landscape is still evolving. The findings in this study can only provide a snapshot of the current state of events and rapid improvements, for example in impact measurement technology, may imply that these findings will become less relevant over time. Therefore, continued research is needed to keep pace with these developments and to further understand the barriers.

Also, certain interviewees highlighted specific forms of sustainable business models that they intend to implement. However, due to space limitations, these details could not be included in the analysis. Further research could explore more kinds of sustainable business models and focus on identifying barriers associated with these diverse business models.

Due to time constraints in securing interviewees and conducting expert interviews, a limited number of interviews were conducted, compromising the potential for additional support for the emerging ideas raised by individual interviewees. Furthermore, although interviews were conducted across a variety of industries, giving profound insights on the differences across these industries was not possible to the extent desired. Further research can leverage the findings of this study to explore potential industry-specific associations with the barriers identified, and dive into deeper analyses of barriers companies from different industries may encounter.

Finally, a framework can be created for companies seeking to implement SBMI effectively. Due to the lack of in-depth practical guidance in this study, future researchers can create concrete strategic suggestions with that framework, supporting managers to overcome barriers.

## **6 Conclusion**

This study has provided a comprehensive understanding of the multifaceted challenges that companies face in their pursuit of sustainable business model innovation. The study has explored several dimensions, each of which reveals different hurdles that collectively contribute to the complexity of SBMI implementation.

The barriers this study identified were human-centered challenges, resource constraints, organizational hurdles, dynamic market challenges, regulatory issues, supply chain complexities, and impact measurement challenges.

This research provides substantial contributions to both theoretical frameworks and practical applications. The findings provide a nuanced understanding of the challenges that hinder the effectiveness and efficiency of SBMIs. In particular, the findings emphasize the interconnected nature of these challenges, highlighting the need for a holistic and strategic approach to overcoming barriers to SBMI implementation. The study addresses the nuances of human-centered challenges, exploring how individual mindsets, cultural diversity, and conflicting shareholder perspectives create complexity. Among others, it explores resource constraints, identifying skill shortages, difficulties in finding passionate sustainability experts, and financial challenges that hinder SBMI efforts.

For practitioners, the research underscores the need to adopt not only a comprehensive, but also a targeted and adaptive strategy to navigate the complex landscape of SBMI. The external and internal barriers identified are not independent challenges, as they often overlap and interact. This requires a sophisticated and multifaceted strategy for successful integration.

In summary, this research provides valuable insights into the multifaceted challenges of SBMI. The findings call for a holistic and strategic approach to overcome these barriers and promote sustainable practices. It serves as a foundation for further research and practical actions to guide the integration of sustainability into diverse business models.

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# Appendix

## Appendix 1: Interview participants

Interview	Industry	Role	Initials
I1	Textile manufacturer	Social Impact Manager	(AA)
I2	Building materials manufacturer	Project lead sustainability	(AM)
I3	Machine manufacturer	CEO	(ES)
I4	Packing solutions manufacturer	Sustainability Manager	(LM)
I5	Machine manufacturer	Head of quality assurance	(CH)
I6	Car manufacturer	Manager of sustainable development	(JH)
I7	Shipping container manufacturer	Supplier and sustainability manager	(IM)
I8	Watch manufacturer	CEO	(CB)
I9	Textile manufacturer	Project manager circular business models	(KK)
I10	Furniture manufacturer	Sustainability Manager	(ML)
I11	Jewelry manufacturer	CEO	(PT)
I12	Sanitary equipment manufacturer	Head of sustainable strategy	(KL)
I13	Car manufacturer	Manager corporate sustainability	(GF)
I14	Manufacturer of electrical components	Senior product manager	(RM)

## Appendix 2: Interview script

### Introduction:

Thank you for taking time to talk to me. I am currently writing my master thesis at the Católica Lisbon school of Business and Economics in Lisbon.

I am conducting a study to investigate the underlying motivations and obstacles/challenges that managers face when implementing sustainable business models within the manufacturing sector in Germany. The primary objective of this research is to identify specific challenges and establish a foundation for future research aimed at developing effective solutions to address these issues.

To ensure that no valuable insights are lost during our conversation, I kindly request your permission to record this interview. Please be assured that any direct quotations will be carefully anonymized, with no disclosure of your identity or your affiliation with the company you represent.

## Questions

1. Is it correct that you work as “position” at “company”?
2. For the purpose of this research, the definition of SBM I’m currently working with is the change in how firms operate to create positive impacts or reduce negative impacts for the environment and society. Do you agree with this definition? Would you add any characteristic?
3. Can you please provide some information on your personal experience/experiences on deciding and implementing SBM?
4. In your experience, what are some of the key motivations and barriers that the companies you worked for face when attempting to implement sustainable business model innovations?
5. Are there any specific challenges or drivers related to the German business environment, regulations, or culture that you believe impact the adoption of sustainable business models that you have experienced?
6. What internal factors such as culture, mindset, or resource allocation, can act as barriers to adopting sustainable business model innovations in your experience?
7. Are there external factors like market dynamics, competition, policies, or supply chain issues that influenced the company's ability to implement sustainable business models you worked for?
8. What are some common mistakes or pitfalls that you realized companies should avoid when trying to adopt sustainable business models?
9. Based on your expertise, what recommendations would you offer to manufacturing companies in Germany looking to overcome the barriers to sustainable business model innovation?
10. Do you have any additional insights or thoughts you would like to share regarding this topic?
11. Can you recommend anyone you know who has knowledge in that area and might be interested in helping me with this research?