Integrating biodiversity considerations into corporate strategic decision-making

Incentives and barriers in applying Science-Based Targets for Land in agri-food corporations in European context

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Abstract

Biodiversity depletion directly impacts businesses and society by influencing ecosystem services. Despite the growing recognition of biodiversity loss as a significant crisis, many companies have not yet sufficiently integrated broader nature considerations into their strategies. The Science-Based Targets Network (SBTN) aims to facilitate nature including biodiversity target setting within corporate strategic management. However, there is a limited empirical understanding of the factors influencing companies' decisions to establish such targets. This study addresses this gap by investigating the incentives (Research Question 1) and barriers (Research Question 2) for European agri-food corporations to establish Science-Based Targets (SBTs) for Land. Data was collected through a qualitative multiple case study, involving interviews with representatives of seven agri-food corporations interested in implementing SBTs for Land, and four ecosystem actors such as consultancies, Non-Governmental Organization (NGOs), and data providers. Additionally, grey literature and sustainability reports of the seven companies were analyzed. The findings reveal that the most influential incentives for implementing SBTs for Land among agri-food corporations are policies and norms, reputation (with a focus on credibility rather than image gain), stakeholder pressure from investors, and operational risk management, while mainly not considering the significant costs of inaction within the decision. The main barriers identified include metrics capability, data availability, and implementation costs for the interviewed companies. While the results do not definitively predict the successful implementation of SBTs for Land, they provide valuable insights for corporate strategy setting, SBTN developers, and policymakers regarding solutions to current barriers and the promotion of implementation through incentives. Despite remaining barriers and uncertainties, it is recommended to initiate actions towards nature including biodiversity integration. In light of this, SBTs for Nature potentially serve as a significant framework to establish standards for setting nature targets aligned with global thresholds and bridging the gap between conservation language and corporate discourse.

Keywords: Science-Based Targets for Nature, Biodiversity loss, Agri-food corporations, Land use change, agriculture

Executive Summary

Problem Definition

Human activities have led to significant deterioration of nature despite our heavy dependence on it. Businesses and society depend on biodiversity for crucial ecosystem services like climate regulation, crop pollination, and erosion control. Consequently, the unprecedented decline in nature has emerged as a critical global concern, endangering the foundations of our global economy, livelihoods, and food systems. Corporate activities contribute significantly to the biodiversity decline through pressures on nature, particularly through land use and land use change driven by agriculture. However, many companies have not adequately integrated considerations for nature and biodiversity conservation into their strategic decision-making processes. The SBTN aims to address this gap by offering guidelines for SBTs for Nature, including the four nature realms Land, Freshwater, Ocean, and Atmosphere as well as Biodiversity (first guidelines for Land and Freshwater released in May 2023). These guidelines empower companies to align their targets with global thresholds, thereby mitigating their impact on ecosystems.

Research on nature and biodiversity degradation has predominantly been conducted within the natural sciences, with limited input from management and organizational scholars. Literature on SBTs primarily focuses on assessing whether SBTs for Carbon align with the Paris Agreement or analyzing the transformative effects of the target setting. Consequently, there is a dearth of empirical evidence regarding the factors influencing companies' decisions to establish SBTs for Nature.

Aim and Research Questions

The primary aim of this research is to deepen the understanding of the factors that influence companies' decisions to establish SBTs for Nature, focusing on European agri-food corporations in adopting SBTs for Land. By doing so, the study aims to assist companies, especially agri-food corporations, in their decision-making process regarding the implementation of SBTs for Land. Additionally, it aims to provide insights for policymakers on how they can support the acceleration of SBT adoption. Moreover, it aims to support the developers of the SBTN in refining the initial version of the guidelines.

The study addresses two main research questions:

- **Research Question (RQ) 1:** What are the incentives for agri-food corporations in Europe to establish Science-Based Targets for Land?
- **Research Question 2:** What are the barriers and challenges for agri-food corporations in Europe to establish Science-Based Targets for Land?

Research Design

This study adopts a qualitative research design, utilizing a multiple case study approach. The qualitative methodology was chosen due to its suitability for exploring a relatively new research area and for gaining initial insights into the complex phenomenon under investigation. The research process consists of two main stages. The first stage involves developing a literature-based analytical framework that represents the incentives and barriers for implementing Strategic Sustainability Targets (SSTs). This framework draws on scientific articles focusing on SBTs for Carbon, organization-centric nature targets, and biodiversity mainstreaming, complemented by grey literature on SBTs for Nature. Additionally, it integrates assumptions from the Resource-Based View (RBV) and the Institutional Theory (IT).

In the second phase of the study, semi-structured interviews were conducted with seven agri-food corporations in Europe that stated interest in implementing SBTs for Land, augmented by interviews with four ecosystem actors, including consultancies, NGOs, and data providers. These interviews yielded rich, nuanced insights and perspectives on the incentives and barriers for considering the implementation of SBTs for Land among agri-food corporations, as well as the overall perceptions from the ecosystem actors. The interviews were further supported by a document analysis, including grey literature mentioning SBTN and sustainability reports from the seven companies. The qualitative data were analyzed using thematic analysis to identify patterns and themes related to the incentives and barriers for implementing SBTs for Land, employing a deductive-inductive coding approach.

Results

The study identified several key incentives (RQ1) for agri-food corporations to adopt SBTs for Land, primarily explained by IT. This theory posits that company behavior is largely shaped by external factors from institutions rather than by the RBV, which suggests that companies change behavior to gain competitive advantage. One key incentive identified, confirming the literature on SSTs, was compliance with policies and norms, particularly the Corporate Sustainability Reporting Directive (CSRD) and voluntary guidelines such as the Taskforce for Nature-related Financial Disclosures (TNFD). Lesser influence in this regard had other nature restoration policies like the Global Biodiversity Framework or the Global Goal for Nature aiming for nature-positive outcomes. Secondly, investors are putting increasing pressures on companies to implement nature strategies with companies aiming to present the SBTN as a credible approach. Thirdly, while literature claimed reputation, credibility and image gain as significant incentive, companies in this study aimed to enhance corporate credibility, but generally did not believe that SBTs for Land would improve their image, and therefore did not see a competitive advantage in its implementation. Fourthly, operational risk management, including mitigating risks associated with supply chain disruption due to environmental degradation, was identified as a key incentive, which was not yet covered in the received academic literature as incentive. Fifthly, some of the agri-food companies aimed to align their strategic goals internally as well as with external thresholds by implementing SBTs for Land, confirming literature. Despite the immense costs of inaction, including possible higher prices for raw materials resulting from biodiversity degradation, most interviewees did not recognize it as an incentive.

Furthermore, the study identified several barriers (RQ2) for agri-food corporations in adopting SBTs for Land, primarily explained by the RBV, which emphasizes internal conflicts and the time-intensive nature of establishing new resources. Firstly, regarding internal capacity, a key barrier identified is the lack of metrics capability. Whereas existing literature only pointed out the general availability of metrics and tools, this study found out that despite numerous metrics being available to measure the state of biodiversity, there is a lack of clarity regarding their appropriate usage in various situations, posing a significant barrier for companies. Secondly, data availability poses a major barrier, with significant challenges in supply chain traceability to track the origin of products (confirming the literature), and difficulty in generating farm-specific data when primary data is necessary. Thirdly, internal stakeholder issues present two main barriers. Confirming the literature, management may lack awareness about nature and biodiversity degradation. Moreover, the study contributed to additional knowledge by highlighting that self-interest, such as bonuses tied to other indicators, could harm the attitude towards SBTs for Land by managers. Additionally, it is challenging for companies to hire employees with skills in both ecology and business, who can interpret data and handle complex multiple stakeholder projects. Fourthly, interviewees expressed concerns about high uncertainties regarding implementation costs, such as employee costs, tools and actions. However, the need to change companies' portfolios due to a reduction in material throughput

resulting from SBTs for Land is rarely discussed, despite representing a major interference in business operations. Lastly, interviewees raised concerns about the complexity and provisional nature of the guidelines. Moreover, there is a debate over whether the current required targets have the potential to foster sustainable transformation, with concerns being raised regarding social trade-offs and the incentivization of intensive agriculture through targets requiring land footprint reduction.

Conclusions and Recommendations

The findings suggest that while there are significant incentives for agri-food corporations to adopt SBTs for Land, several substantial barriers must be addressed to facilitate broader implementation. The initial guidelines for SBTs for Land mark the beginning of aligning company-centric goals with global thresholds, a task of high complexity. It is crucial to strengthen this shared understanding to align expectations regarding SBTN as an iterative process, while also spreading the word about the urgent need for action.

There is a clear call for action for companies. It is crucial for companies to engage with their nature and biodiversity strategy now. Further requirements and stakeholder pressure will inevitably arise over time, making engagement imperative for businesses, not just for short-term economic benefits but for the long-term survival of their operations. In light of this, SBTs for Land potentially serve as a significant framework to establish standards for setting nature targets aligned with global thresholds and bridging the gap between conservation language and corporate discourse. Companies should start on their supply chain traceability and build expertise on metrics and tools to measure land use, land use change and biodiversity state of nature. To convince internal stakeholders, costs of employees, tools and actions should be compared to other legal requirements such as CSRD and costs of inaction should be communicated as an incentive to work on nature degradation. Communicating the extent and complexity of targets to external stakeholders is crucial to realizing incentives like competitive advantage and reducing barriers such as accusations of greenwashing. Additionally, social justice and continued action must remain central in discussions around SBTs for Land. Companies are encouraged to join the Corporate Engagement Program of SBTN to get recent updates and best practice knowledge.

Political actors should foster a flourishing landscape to allow SBTs for Land to accelerate sustainable change. While governmental support is not inherent to SBTN, political actors should utilize their power to facilitate further development and corporate implementation of SBTs for Land. They could enhance the institutional structure that facilitates target setting as well as helping to build further knowledge to overcome the challenges such as valorization of corporate conservation efforts or metrics capability.

SBTN developers are encouraged to clarifying metric capacity in various contexts, valuing costs and competitive advantage and provide further guidance on solutions to overcome social trade-offs as well as the risk of incentivizing intensive agriculture with the land footprint target. Moreover, sectorial specific guidelines are highly demanded from the interviewees.

Further research is required to deepen the understanding of specific incentives and barriers. As this study provides a broad overview of incentives and barriers for the implementation of SBTs for Land in agri-food corporations, further research is necessary to broaden the sectoral, geographic and thematic (other SBTs for Nature) perspective. Moreover, there is the need to delve into sub-categories, gaining a deeper understanding of incentives, challenges and solutions. It is also essential to test whether actions promoted by the targets will lead to the aimed sustainable transformation.

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Abbreviations

ACT-D	Assess, Commit, Transform and Disclose
C	Company
CBD	Convention on Biological Diversity
CDP	Carbon Disclosure Project
CO_2	Carbon dioxide
CSR	Corporate Social Responsibility
CSRD	Corporate Sustainability Reporting Directive
eDNA	Environmental DNA
EA	Ecosystem Actor
E.g.	For example
ENCORE	Exploring Natural Capital Opportunities, Risks and Exposure
ESG	Environmental Social Governance
ESRS	European Sustainability Reporting Standard
EU	European Union
EUNRL	EU Nature Restoration Law
FAO	Food and Agriculture Organization
FLAG	Forest, Land and Agriculture guidance
GBF	Kunming-Montreal Global Biodiversity Framework
GDPR	General Data Protection Regulation
GHG	Greenhouse Gas
GRI	Global Reporting Initiative
IBAT	Integrated Biodiversity Assessment Tool
IFRS	International Financial Reporting Standards
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
ISSB	International Sustainability Standards Board
IT	Institutional Theory
IUCN	International Union for Conservation of Nature and Natural Resources
NBSAPs	National Biodiversity Strategy and Action Plans
NGO	Non-Governmental Organization

OECD	Organization for Economic Co-operation and Development
RBV	Resource-Based View
RQ	Research Question
SAI	Sustainable Agricultural Initiative
SBTi	Science-Based Targets initiative
SBTN	Science-Based Targets Network
SBTs	Science-Based Targets
SSTs	Strategic Sustainability Targets
STAR	Species Threat Abatement and Restoration
TCFD	Taskforce on Climate-related Financial Disclosures
TNFD	Taskforce for Nature-related Financial Disclosures
UNEP	United Nations Environmental Program
UNFCCC	United Nations Framework Convention on Climate Change
WBCSD	World Business Council for Sustainable Development
WWF	World Wide Fund for Nature

1 Introduction

1.1 Background

The pressing need to address the profound degradation of nature becomes unmistakably clear. Within the planetary boundaries stated by Steffen et al. (2015), the boundary of biodiversity loss (that is biosphere integrity) has been identified as core boundary while being "markedly exceeded" (Rockström et al., 2023, p.3) and therefore in "a zone of rapidly increasing and systemically linked risks" (Rockström et al., 2023, p.2). Moreover, scientists involved in the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services [IPBES] (2019) consider the depletion of biodiversity to be the most significant planetary overshoot. This is underpinned by their findings that roughly 25 percent of animal and plant species, with one million on the brink of extinction, are currently under threat. The relationship between ecosystems[1] and biodiversity lies in the fact that biodiversity is an integral component of nature, serving as an indicator of the well-being of a specific ecosystem (Donnelly & Marugan, 2022). Biodiversity is commonly understood as "the variability within species, between species and of ecosystems", including plants, animals, bacteria, and fungi (Business for Nature, 2023).

This biodiversity depletion has a direct impact on businesses and society as it influences ecosystem services such as climate regulation, crop pollination, erosion control, water purification and food production (Skogen et al., 2018). Broadly speaking, greater biodiversity corresponds to increased productivity, resilience, and adaptability within an ecosystem. In fact, the value of ecosystem services has been estimated by the Organisation for Economic Co-operation and Development [OECD] (2019) at US$125-140 trillion with "50% of the global economy under threat from biodiversity loss" (World Economic Forum, 2023, para.1). These facts also triggered political interest on the topic. During the 15th United Nations Biodiversity Conference, the Kunming-Montreal Global Biodiversity Framework (GBF) was adopted in December 2022, which initiates efforts aimed at stopping and reversing biodiversity loss by 2030 (Katic et al., 2023). Moreover, Biodiversity concerns are addressed in the Sustainable Development Goals 14 and 15, developed by the United Nations in 2015 (Visseren-Hamakers & Kok, 2022). Further political pressure results from corporate reporting standards requiring the disclosure of information about business impact on biodiversity, such as the International Sustainability Standards Board (ISSB) through International Financial Reporting Standards (IFRS), the Global Reporting Initiative (GRI) or the evolving European Sustainability Reporting Standard under the Corporate Sustainability Reporting Directive (CSRD).

But why is the consideration of biodiversity in corporations relevant? Based on IPBES (2019) corporate actions exacerbate the decline of biodiversity by pressures on nature such as altering the utilization of land, freshwater, and oceans, exploiting resources, and contributing to climate change, pollution, and the proliferation of invasive species. In fact, the World Economic Forum (2023) assessed that economic activities affect nearly 80% of threatened species. Herein, the evidence is clear that the agriculture sectors has been a primary catalyst of terrestrial biodiversity loss (IPBES, 2019), with 90% of recent deforestation in tropical regions driven by agriculture (Pendrill et al., 2022). Moreover, businesses "play a crucial role in the quest of sustainable development […] because of their transformative and financial power" (Krause et al., 2021, p. 741). However, when looking at companies who have a significant impact on biodiversity, McKinsey (2022) found out that while 83% of the Fortune Global 500 companies have targets in place for climate change, only 5% have targets for biodiversity loss. Going one step further, Haffar & Searcy (2018, p. 1086) emphasized that none of their assessed sustainability targets set

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[1] An ecosystem is a community of living organisms interacting with each other and their physical environment (SBTN, 2023c).

by Canadian companies made "a quantified connection to the planetary boundary framework or to any global ecological threshold". As a consequence, the broader nature aspects are currently underestimated in companies' sustainability strategies (Science-Based Targets Network [SBTN], 2023e).

To boost insufficient targets for companies' pressures on nature and consequently biodiversity, the Science-Based Targets Network (SBTN) released the first guidelines for Science-Based Targets (SBTs) for Nature in May 2023. The framework[2] enables companies to assess their impact on nature and set reduction targets in line with global mandates. The initial release of the SBTN addresses two nature ecosystems: freshwater and land. Future releases will extend to the oceanic and atmospheric realms. Hence, it broadens its focus beyond emissions reduction goals, contrasting with the Science-Based Targets initiative (SBTi), which aligns companies' goals with the Paris Agreement from the United Nations Framework Convention on Climate Change (UNFCCC) and has endorsed emission reduction targets for over 3,000 companies worldwide since 2015 (Bjørn et al., 2023).

This thesis focuses on the SBTs for Land. Whilst the SBTN is planning to release also biodiversity targets itself, its land targets are inevitably linked to biodiversity by addressing the pressures of terrestrial ecosystem use and change as well as soil pollution. Rather than purely providing specific assessment approaches itself, the SBTN framework outlines the following five-step process: Assessing biodiversity impacts and dependencies [1], prioritizing key issues [2], setting measurable targets [3], implementing actions [4], and tracking progress [5] (Katic et al., 2023). As guidelines have only been released for step 1-3, these will be the focus of this study.

1.2 Problem Definition

Although biodiversity is not adequately incorporated into business decision-making (Katic et al., 2023; Schaltegger et al., 2023), current research is constrained in identifying the underlying drivers for this negligence. Zu Ermgassen et al. (2022, p.7) highlights that there is a "vast gap between what is biophysically required to bend the curve of biodiversity loss and reduce the associated risks, and what is currently being delivered or promised through company strategies". However, research around biological diversity and ecosystem services has predominantly been led by natural sciences, which assess biodiversity loss, analyze direct drivers of the latter such as land use change, and advocate for protective measures (Panwar et al., 2023; Schaltegger et al., 2023). So far, it has "rarely entered the work of management and organization scholars in a substantive manner" (Winn & Pogutz, 2013, p.209) and "organizational researchers have been relatively silent on the role of business organizations in alleviating biodiversity loss" (Gibassier et al., 2019, p.921). The scarcely available management scholars mainly highlight the "small topical coverage of biodiversity in corporate reports and provides insight about necessities for companies to consider biodiversity" (Schaltegger et al., 2023, p.2548). A few papers are available that address corporate biodiversity mainstreaming[3] (Karlsson-Vinkhuyzen et al., 2018; Katic et al., 2023; Schaltegger et al., 2023). Schaltegger et al. (2023) highlights that company or industry case studies are especially needed in management scholars related to biodiversity.

One of the first steps to integrate sustainability aspects into companies' strategies is setting Strategic Sustainability Targets (SSTs) (see chapter 2.1.1). Unfortunately, Addison et al., (2019)

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[2] A Framework "can be thought of as a set of principles providing guidance and shaping people's thoughts on how to think about a certain topic" (UNEP et al., 2024, p.1). Guideline and framework have been used interchangeably in this Thesis.

[3] Biodiversity mainstreaming is 'the process of embedding biodiversity considerations into policies, strategies and practices of key public and private actors that impact or rely on biodiversity, so that biodiversity is conserved and sustainably used both locally and globally' (Karlsson-Vinkhuyzen et al., 2018, p.1).

highlight that only 5 out of the fortune 100 companies had specific, measurable, and time bound commitments on biodiversity. SBTs are a form of SSTs that are aiming to connect organization-centric company goals to global thresholds. However, Giesekam et al. (2021, p.1) findings show that despite the rapid ascent of the SBTs in public awareness, "it has received little attention to date in the academic literature" and their recent arrival means that they are understudied (Walenta, 2020). The literature around SBTs primarily examines whether the current SBTi targets align with meeting the goals of the Paris Agreement (Giesekam et al., 2021; Rekker et al., 2022; Ruiz Manuel & Blok, 2023) or delves into the methodologies underpinning SBTs (Bjørn et al., 2021; Faria & Labutong, 2019; Sá et al., 2023). Some others look at the impact of SBTs with Gifford et al. (2023), Quahe et al. (2023), and Tilsted et al. (2023) looking at the type of transformation that is promoted by SBTs. However, very limited research exists for the institutionalization of SBTs including the question, why companies may have not yet adopted SBTs. Therefore, Bjørn et al. (2022, p.66) call for "testing to understand the specific drivers, barriers, and outcomes of SBT engagement", which is in line with the research gap identified by Haffar & Searcy (2018).

1.3 Aim and Research Questions

This research aims to advance corporate environmental sustainability literature on biodiversity loss by enhancing comprehension of the factors that influence companies' decisions to establish SBTs for Nature – focusing on Land targets. This will be achieved by investigating the drivers and barriers[4] involved in the target setting process. This way, the study aims to make a threefold contribution. Firstly, it should support decision-makers at agri-food companies that seek to integrate biodiversity measurement and targets into their strategic decision-making. Moreover, the generated knowledge should have the potential to guide political decision-makers in assessing whether a mandatory implementation of SBTs would be a feasible tool to encourage business initiatives in biodiversity conservation. Lastly, the proposed study aims at supporting SBTN developers to revise and update the guidelines.

> **Research Question 1:** What are the incentives for agri-food corporations in Europe to establish Science-Based Targets for Land?
> **Research Question 2**: What are the barriers and challenges for agri-food corporations in Europe to establish Science-Based Targets for Land?

1.4 Scope and Delimitations

The overall scope of this thesis is limited by four elements, the industry sector, the nature ecosystem, the geographic scope and the temporal scope.

Firstly, agri-food has been selected as an industry case study (7 companies) as it is a key driver for biodiversity loss. According to the International Union for Conservation of Nature and Natural Resources [IUCN] et al. (2020) "agriculture is currently one of the major threats to planetary boundaries". Unsustainable farming practices are linked to biodiversity loss, driven by the conversion of natural habitats, the intensification of land use and pollution resulting from increased application of agrochemicals. In fact, a study of Boston Consulting Group (2022) has unveiled that farming is responsible for 27% of the biodiversity loss. This will even exacerbate as the demand for agricultural products will increase by 2050 at least by 50% driven by population growth (Food and Agriculture Organization [FAO], 2018). At the same time, the agri-food sector is also recognized as one of the primary possible catalysts for promoting a nature-positive transformation (Roe et al., 2019). Flipping it around, it is also obvious that the

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[4] In this document, barriers are defined as obstacles that hinder progress. However, they may also be construed as challenges, signifying obstacles that are surmountable.

agri-food sector heavily relies on land and biodiversity through soil fertility and crop pollination. Therefore, it should be their interest to preserve ecosystems and implement sustainable farming practices to ensure long-term food security.

Secondly, of the two released guidelines for freshwater and land, the latter has been selected as a focus of this study. This decision is driven by the significant relationship between agriculture and land, as evidenced by the allocation of 37% of the world's land area for agricultural purposes (IUCN et al., 2020). The primary focus of the initial land SBTs is to address the mitigation of land use change, which stands out as the leading direct cause of terrestrial biodiversity depletion (IPBES, 2019; Jaureguiberry et al., 2022). Overarching environmental challenges and their multiple facets have been expressed by the nine planetary boundaries (Steffen et al., 2015). By focusing on the realm of land, this study specifically touches upon the boundaries of land system change, biogeochemical flows, and their impact on biosphere integrity (biodiversity loss), recognizing that all of the boundaries are interconnected. The focus on the land guidelines is represented by the studied corporations as they are either piloting the land guidelines or are interested in implementing them. The title of the study implies that it examines the integration of biodiversity into strategic decision-making. However, it should be noted that not all aspects of this integration are fully explored in this study. Firstly, while land use and land use change are significant pressures leading to biodiversity degradation, the focus on SBTs for Land does not provide a comprehensive picture of biodiversity within organizational strategies. Secondly, biodiversity constitutes only one aspect of land targets, and land targets represent only one facet of integrating biodiversity into strategic decision-making.

Thirdly, the geographical scope has been limited to corporations headquartered in Europe. A significant number of large agri-food corporations are headquartered in Europe, making it a crucial hub for industry analysis and research. Furthermore, at present, 17 companies are participating in the initial pilot and are expected to finalize their targets by mid-2024, according to SBTN (Gambetta, 2023), the majority of which are based in Europe. The geographical focus ensures a regional coherence, acknowledging the potential influence of regional factors such as regulations from the European Union (EU) like the CSRD. The geographic extent of the production and sourcing locations of the companies remains unrestricted, as companies are required to establish targets for their entire operations. Consequently, their responses cannot be delineated by specific locations.

Fourthly, looking at the temporal scope, the data collected is a snapshot of interviewee opinions in March and April 2024. Their opinion might change with evolving knowledge in the field. However, by emphasizing core theories and methodologies, the thesis seeks to establish a solid model that can withstand the rapid pace of change within the field.

1.5 Ethical Considerations

This thesis project was conceived and executed autonomously, without reliance on any external funding and no connection of the researcher to the interviewed organizations that could have influenced the integrity of the research process and the outcomes of the study (Creswell & Creswell, 2018). Independence and integrity are ensured by including the perspectives of different companies in the study. The findings were impartially presented, reflecting the participants' statements and conclusions of the study in an objective manner.

Before initiating the qualitative interviews, every participant was provided with and acknowledged an informed consent and participation document (Appendix 1). The consent form explicitly detailed the research project, its objectives, the benefits for participating, and the voluntary aspect of participation. Additionally, it delineated safeguards for maintaining the privacy and confidentiality of participants' personal data. The document also communicated the

option for participants to access their respective data throughout the research process and the ability to withdraw participation up to a specified deadline (20. April 2024) (Creswell & Creswell, 2018). Engagement in the study was voluntary, and participants readily consented to responding to questions and, where possible, to being recorded. To ensure the privacy of participants and safeguard them against any potential harm that may arise from their involvement, the names of the interview participants were anonymized. During the interview process, only essential personal data such as email addresses were collected, and these were managed in accordance with Article 5 of the EU's General Data Protection Regulation (GDPR). Subsequently, it will be deleted after maximum 10 years or as on request of the participant. The data utilized for this research was securely stored in a password-protected drive dedicated solely to this study.

A potential misapplication of the study findings may occur when companies unwilling to participate in biodiversity conservation use the identified barriers, which are published with the thesis, as a rationale for their stance. To counteract this, the thesis conclusion emphasizes the significant responsibility and role that companies carry. Finally, an assessment of Lund University's criteria for research revealed no indication necessitating a statement from the ethics committee for this research.

1.6 Audience

The outcomes of this study are anticipated to provide value to the academic research community in the intersection of biodiversity and management scholars including SBTs. As research in this nexus is still nascent, this thesis seeks to contribute to the evolving discussions, particularly by crafting a novel analytical framework. This contribution seeks to inspire forthcoming management and accounting research to delve deeper into barriers, identify potent catalysts, and cultivate practical management and accounting strategies that appeal to businesses, fostering their involvement in crafting corporate initiatives aimed at safeguarding and restoring biodiversity.

The primary audience for this research comprises decision-makers within agri-food companies. They are the change agents who can leverage the findings to promote the adoption of SBTs in their organizations, thereby emphasizing a commitment to reducing the environmental impact of their activities. The incentives presented may motivate companies to initially contemplate target setting, while the identified barriers and challenges, along with their corresponding countermeasures, can facilitate a more seamless and efficient implementation.

The third audience consists of policymakers operating at various governance levels, primarily at the national and EU levels, engaged in facilitating a nature-positive transition for businesses. The thesis findings can support the decision whether and how mandatory land targets are feasible for corporations. Moreover, identifying distinct drivers and barriers encountered by agri-food corporations in implementing SBTs may reveal areas where policymaking can play a significant role in alleviating specific requirements or providing incentives.

Fourthly, the findings are valuable for the developers of the SBTs for Nature. As the current published guidelines will be reviewed after the pilot process (mid 2024), the input can support the enhancement of the framework.

1.7 Disposition

Chapter 1 (Introduction): This chapter begins by introducing the practical background of the research topic which is then translated into a scientific research problem, aim and research questions. It then justifies the scope of the study and outlines ethical considerations and the addressed audience.

Chapter 2 (Literature Review): This chapter initially situates SBTs within the area of corporate strategic management. It then offers a background on SBTs for Nature, beginning with a broad overview of the nature-positive movement, followed by the position of SBTN within this landscape, and an overview of the assessed guidelines for SBTs for Land. Thereafter, it provides a summary of the incentives and barriers to implement SSTs including organization-centric nature targets, SBTS for Carbon and SBTs for Nature resulting in an analytical framework.

Chapter 3 (Research Design and Methodology): This chapter delineates the research design of the study, detailing the methods employed for data collection and analysis.

Chapter 4 (Findings): This chapter presents the findings derived from the collected data to address the research questions of this study.

Chapter 5 (Discussion): This chapter explores the main findings of the study within the context of existing literature resulting into a model of answering the research questions. It also examines the methodological choices, generalizability, and the limitations of the study.

Chapter 6 (Conclusion): The final chapter summarizes the main conclusions and highlights practical recommendations for the addressed audience, as well as potential pathways for future research.

2 Literature review

2.1 The position of Science-Based Targets in the business sustainability transformation

2.1.1 Setting strategic targets as one stage of the business transformation

Shifting an organization to actively support the broader sustainability transformation entails a business transformation performed in different steps, which have been captured in diverse frameworks (see figure 2-1). One framework that summarizes these steps is the Strategic Management process outlined by Kabeyi (2019): Strategic planning, implementation, and evaluation. Strategic Management is defined as the "science of formulating, implementing, and evaluating cross-functional decisions that enable an organization to achieve its objectives" (Kabeyi, 2019, p. 27). Moreover, looking at currently used non-academic frameworks to support business action on nature, the World Business Council for Sustainable Development (WBCSD), SBTN, Taskforce for Nature-related Financial Disclosures (TNFD), the World Economic Forum and Capitals Coalition established a high level framework including the steps Assess, Commit, Transform and Disclose (ACT-D) (Business for Nature, 2023a).
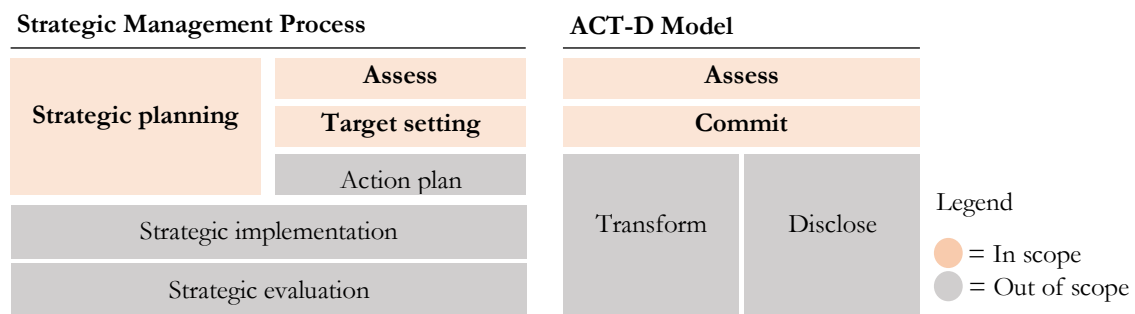
Figure 2-1 Different frameworks outlining the steps of a business transformation

Source: Author based on (Business for Nature, 2023a; Kabeyi, 2019)

'Strategic planning', as a first step, is described as the procedure through which organizational leaders assess the present circumstances, define their future aspirations through Strategic Targets, and determine on how to attain those desired levels with an action plan (Kabeyi, 2019). Therefore, this step is also connected to strategic decision-making which are "long-term decisions of an organization, which regard its direction" (Kozioł-Nadolna & Beyer, 2021, p.2376). Within the ACT-D model, 'assess' is the measurement, valuation and prioritization of impacts and dependencies on nature. In a further step, companies 'commit' by setting "transparent, time-bound, specific, science-based targets" (Business for Nature, 2023a, para.2).

The process of planning is then followed by 'strategic implementation' which includes the execution of the plan by carrying out the activities planned. Further, 'strategic evaluation' corresponds to monitoring the outcomes and then implementing lessons learned. This whole process is represented by 'transform' and 'disclose' in the ACT-D model. Transformative actions towards sustainability include fostering collaborations across landscapes, altering business models, championing ambitious policies, and integrating the strategy into corporate governance (Business for Nature, 2023a).

This study focuses exclusively on the initial three stages of the SBTN framework - assessment, prioritization, and target setting-, which correspond to the element 'strategic planning' excluding

a concrete action plan. Thus, the implementation of actions and evaluation of the process fall outside of the scope of this investigation. Therefore, it is not looking at barriers, challenges and incentives of specific actions to take for a sustainable agri-food supply chain for instance reducing food loss, switching to alternative proteins or implementing regenerative agriculture (WBCSD, 2023a). Nevertheless, it is relevant to highlight that executing actions to achieve the set targets is a critical subsequent phase by changes in operations, business portfolios, and organizational structures. The significance of a detailed transition plan is immense, encompassing substantial challenges and complexity.

2.1.2 From organization-centric to Science-Based Targets

One form of SSTs are organization-centric sustainability targets[5] (see in figure 2-2), a commonly utilized concept, that directly connects to internal governance decisions rooted in market logics such as economic efficiency and cost-benefit analyses (Walenta, 2020). While organization-centric targets allow the promotion of incremental efficiency gains, "in the absence of context, any sustainability improvements achieved based on such organization-centric targets may not necessarily be leading to wider, ecological sustainability improvements" and only be applied as a symbolic gesture towards sustainability (Haffar & Searcy, 2018, p.12). Therefore, it cannot be considered as a resilience-based target. This is supported by Grabs & Garrett (2023, p. 469) who emphasized that companies pursuing private governance through goals have more flexibility in their strategies to achieve those goals compared to ruled-based governance, "with companies' legitimacy and performance being evaluated on to what extent they achieve their goal, rather than whether they adhere to collectively set rules".
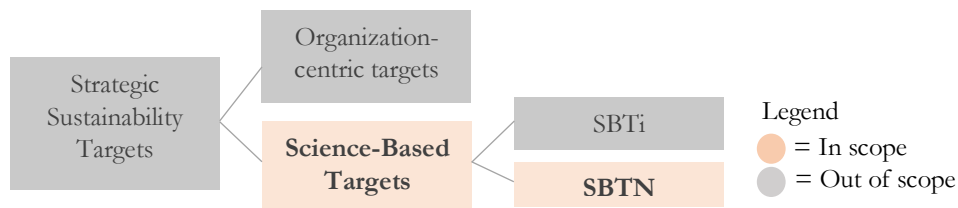
Figure 2-2 The relation of Strategic Sustainability Targets, Organization-centric targets and Science-Based Targets

Source: Own illustration

This is emphasizing the importance of SBTs, which consider boundary conditions to avoid ecological overshoot or social undershoot. Walenta (2020, p.4) argues that this way, SBTs "combine competing interests and produce certain socio-environmental responses". The adoption of SBTs by larger, more prominent companies in high-income nations has gained momentum through SBTi (Bjørn et al., 2022). But even though SBTs have been "proposed as new quantitative tools to mobilize corporate action" against environmental change by Walenta (2020, p.1), the effectiveness of SBTs to achieve these goals need to be discovered with most studies in recent literature arguing that SBTi is not fostering a pathway towards the Paris Agreement (Sá et al., 2023). The 'Corporate Climate Responsibility Monitor 2024' reveals a notable disparity between company targets validated by SBTi and the scientifically necessary actions, based on an analysis of 51 leading global corporations (New Climate Institute, 2024). However, they still argue that "SBTi, as the largest and most influential validator of corporate

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[5] While they are also described with other terms for example 'non-science targets' (Freiberg et al., 2021) or 'internal targets' (Bjørn et al., 2022), this thesis is utilizing the term 'organization-centric targets'.

climate targets, plays a crucial role in the current accountability system on credible corporate climate action" (New Climate Institute, 2024, p.25).

2.2 Background of Science-Based Targets for Nature

2.2.1 From a net zero to a nature-positive narrative

The term 'nature-positive' was first mainstreamed by Rockström et al. (2020) in their paper "A Nature-Positive World: The Global Goal for Nature", where they advocated for the adaptation of a Nature-Positive Global Goal for Nature. They emphasized achieving "Zero Net Loss of Nature from 2020, Net Positive by 2030, and Full Recovery by 2050". These concepts were then also captured in the mission statement of the GBF in 2022 (WBCSD, 2023a). Acknowledging biodiversity as a subset of nature, the concept extends beyond mere biodiversity conservation, encompassing the ecosystems land, freshwater, oceans, and the atmosphere.

The term 'nature-positive' has witnessed increasing usage in recent years, although there is no evident consensus among businesses, governments, and civil society regarding its precise definition (WBCSD, 2023a; zu Ermgassen et al., 2022). Nevertheless, it is speculated that the term will gain importance in political and business discussions same as the prominence of "net zero[6]" in climate action discussions (Carbon Pulse, 2024). Associations such as the Nature-positive Initiative try to drive alignment around the use of the term (Nature-positive initiative, 2023). The EU Business and Biodiversity Platform (2022b) tried to contribute to that by defining 10 principles of what nature-positive means for businesses. They emphasized the near impossibility of achieving nature-positive status across the entirety of a company's value chain for all elements of nature. Therefore, the goal for companies should be to contribute to nature-positive rather than to be nature-positive. Consequently, focusing on nature-positive goals at the landscape level, rather than the individual site level, is more sensible and aligned with the intended purpose.

2.2.2 Science-Based Targets for Nature in the landscape of global initiatives

Increasing commitment to the nature-positive concept and established policy goals have stimulated a range of international frameworks, reporting standards, implementation initiatives and impact assessment tools[7] (see figure 2-3) (zu Ermgassen et al., 2022). The GBF established by the Convention on Biological Diversity (CBD) with support of IPBES in 2022 is regarded as nature's equivalent to the Paris Agreement of the UNFCCC which was supported by the Intergovernmental Panel on Climate Change (Carbon Disclosure Project [CDP], 2023). The established objectives encompass the widely discussed "30x30 target" designed to guarantee that by 2030, a minimum of 30% of terrestrial, inland water, coastal, and marine ecosystems are adequately conserved.

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[6] Achieving 'net-zero' signifies that global greenhouse gas emissions from human activities are balanced out by reductions in emissions (World Economic Forum, 2021).

[7] Tools in this thesis are referred to as analytical tools for business decision-making which transform raw data into actionable insights by processing, analyzing and interpreting it (Finnveden & Moberg, 2005).
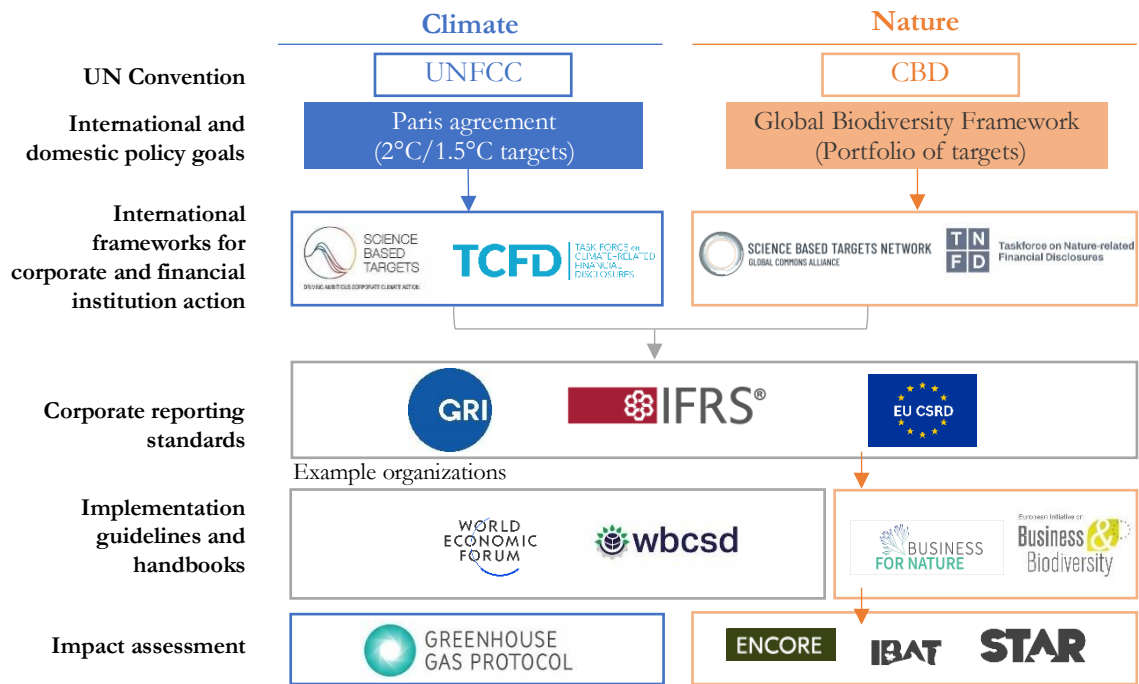
Figure 2-3 How policy goals are broken down into international frameworks, reporting standards, guidelines and measurement tools

Source: Author based on (SBTN, 2024b; TNFD, 2023)

These global goals are translated into international frameworks. The SBTi, which aligns companies' goals with the Paris Agreement has endorsed emission reduction targets for over 3,000 companies worldwide since 2015 (Bjørn et al., 2023). Similarly, the SBTs for Nature (further details to be found in 2.2.3) serve as a vital mechanism for companies to put the global nature deal of the GBF into action. This includes a particular emphasis on Target 15, which addresses the role of businesses in both managing and disclosing their impact on nature. Even though the SBTi targets are only measuring Greenhouse Gas (GHG) emissions, it is worth mentioning that the SBTi Forest, Land and Agriculture guidance (FLAG) is also looking at land use and that some of the data generated for GHG emissions could also be used for broader nature targets. One framework closely related to the SBTN is the TNFD which is the equivalent to the Taskforce on Climate-related Financial Disclosures (TCFD). While the SBTN is providing a framework for setting Science-Based Targets, TNFD is a disclosure framework to understand the financial impacts and dependencies of a company on nature to inform stakeholders and investors. By doing that, it refers to the methods used by the SBTN. While both SBTN and TNFD are still voluntary (April 2024), TNFD "could quickly become a market standard, much like the TCFD became the global baseline for corporate climate disclosure" (MSCI, 2023b, para. 4).

Moreover, Corporate reporting standards are already integrating requirements for disclosing information about business impact on nature including biodiversity. The ISSB, who is the developer of IFRS standards suggested the possibility of mandating companies to offer increased transparency concerning the effects and risks associated with natural ecosystems. Several regulatory bodies have expressed their intention to adopt ISSB standards and enforce their mandatory compliance in the coming times (WBCSD, 2023b). Moreover, the GRI promotes the progress and comparability of sustainability information for organization engaged in crop cultivation, animal production, aquaculture and fishing in their standard GRI 13 2022 (WBCSD, 2023a). Also, they are working on renewing their biodiversity standard (GRI, 2023).

The European Sustainability Reporting Standard (ESRS) under the CSRD requires all large companies[8] to regularly report on their environmental and social impact activities first time in the financial year 2024 (European Commission, 2024a). According to Boston Consulting Group (2022) it requires the disclosure of "all major environmental factors, including their impacts and dependencies on climate, air, land, water and biodiversity". It makes reference to and depends on principles of the TNFD and SBTN frameworks with related topical standards such as ESRS E2 Pollution, ESRS E3 Water and marine resources, ESRS E4 Biodiversity and Ecosystems (I Care, 2024).

Apart from these international frameworks, different research institutions and coalitions are preparing industry guidelines for the implementation of nature-positive strategies. Examples are the 'Roadmap to nature-positive' including specific guidelines for the agri-food system by WBCSD (2023a), the 'Nature Strategy Handbook' by Business for Nature (2023b) or the 'Biodiversity measurement approaches for businesses and financial institutions' by EU Business and Biodiversity Platform (2022a). While there is no global standard for measuring nature pressures and biodiversity as there is for GHG emissions with the Greenhouse Gas Protocol, there are different measurement tools for biodiversity available. One is the Integrated Biodiversity Assessment Tool (IBAT) which provides an indication of how far a location is away from protected areas or the occurrence of threatened species via the Species Threat Abatement and Restoration (STAR) metric. Exploring Natural Capital Opportunities, Risks and Exposure (ENCORE) is a further dataset which reflects "a high-level understanding of impacts at a 'global' or non-spatially explicit level and are expressed as a 'sectoral average' or typical impact profile of a company in the given sector" (SBTN, 2023b, p. 48).

2.2.3 Science-Based Targets for Land and their connection to biodiversity

SBTN is a key component of the Global Commons Alliance, a distinctive partnership of over 50 innovative organizations spanning philanthropy, science, business, and advocacy (SBTN, 2023a). Whereas the scientific synthesis is being done by the so-called Earth Commission, an international team of scientists, there are several renown members in the network such as the Stockholm Resilience Centre or WBCSD (SBTN, 2024d).

Rather than purely providing specific assessment approaches, the SBTN framework "prescribes a process for assessing biodiversity impacts and dependencies, interpreting and prioritizing key issues, setting and measuring specific targets, undertaking action to avoid, reduce, regenerate, restore, and transform, and track progress towards targets" (Katic et al., 2023, p.5). The recent release in May 2023 covered all the three steps of asses, prioritize and target setting only for the realms of land and freshwater but with clear connections to biodiversity (Katic et al., 2023). At the time of this study, 17 companies are in the first pilot and about to finalize their targets according to the SBTN in summer 2024. Moreover, over 200 companies are in the Corporate Engagement Program and thereby show interest in the targets setting process (SBTN, 2024a).

Figure 2-4 shows the environmental impacts that are addressed in the SBTN Land guidelines and how they are connected. Based on IPBES (2019) the SBTN framework is assessing nature pressures on different levels: Land/water/see use change, Resource use, Climate Change, Pollution, and Invasive Species. The focus of this study is on the SBTN guidelines looking at

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[8] Businesses currently under the purview of the Non-Financial Reporting Directive (NFRD), in addition to those surpassing the thresholds of 500 employees, a turnover of EUR 50 million, or a balance sheet totaling EUR 25 million (I Care, 2024).

the land realm[9] (see right side of figure 2-4), which directly addresses the pressures of land use and land use change as well as indirectly soil pollutants, as companies with significant influence in this area are required to establish land targets (SBTN, 2023c). Since biodiversity indicators including ecosystem integrity and species extinction risk are incorporated into the prioritization process, companies will gain insight into which initial targets can effectively mitigate their most substantial adverse effects on biodiversity and enhance their capacity for positive impacts (SBTN, 2023c). The guideline only covers upstream and direct impacts.
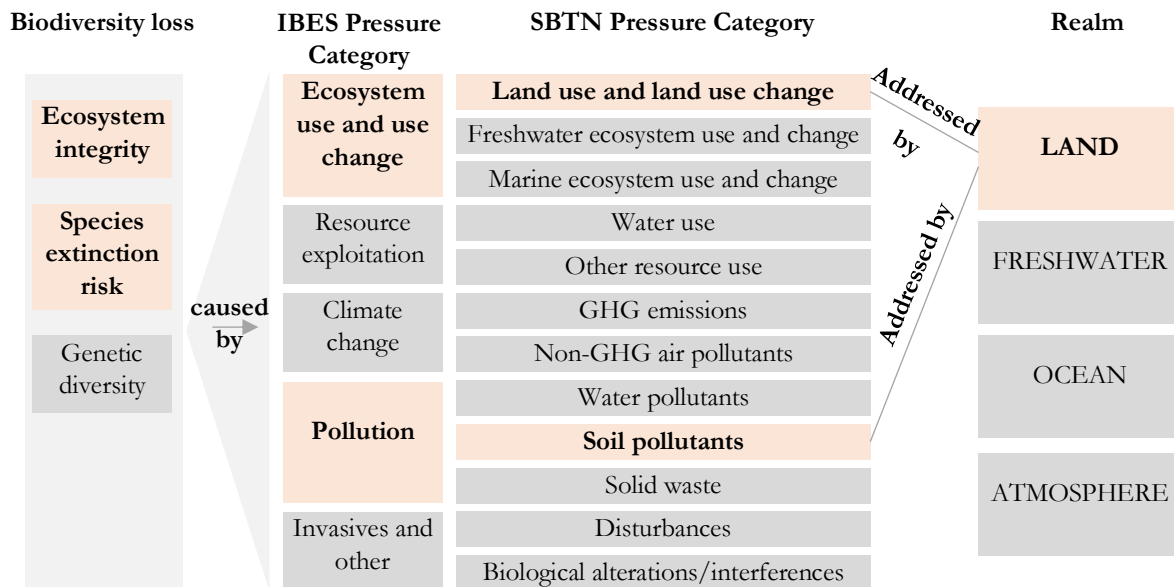
Figure 2-4 Environmental impacts addressed by the SBTN Land guidelines

Source: Author based on (SBTN, 2023b)

Figure 2-5 shows the flows between the different steps. Step 1 (assess) aims to help companies to focus the scope of their targets. Therefore, an initial materiality high level screening based on economic activities is performed. Thereafter, the value chain is assessed which requires three activities. Firstly, the sourcing location data (what kind of activities in which locations) need to be determined via observations or modelling. Thereafter, pressures are estimated followed by the biodiversity state of nature estimation. For the pure assessment of the impacts, SBTN recommends existing tools such as IBAT or ENCORE. All this needs to be assessed at least on national level for the upstream activities and on location level for the direct operations (see further details for step 1 in Appendix 2). Step 2 begins with setting target boundaries, which are "the spatial extent of companies' pressure footprints managed through SBTs" (SBTN, 2023d, p.15). They are preferably accurate locations but could also be estimated with the requirement to further improve traceability in the target period. Thereafter, pressure-specific index values and state of nature data are combined to rank and prioritize the locations. Lastly, the land targets that are set in step 3 include three targets: No Conversion of Natural Ecosystem, Land Footprint reduction and Landscape Engagement (see details in Appendix 3).

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[9] Whenever reverring to SBTN land guidelines, it is referred to the following versions: Step 1 - Assess = Version 1 October 2023, step 2 – Prioritize = Version 1 October 2023, step 3 – Target setting = Version 0.3 May 2023
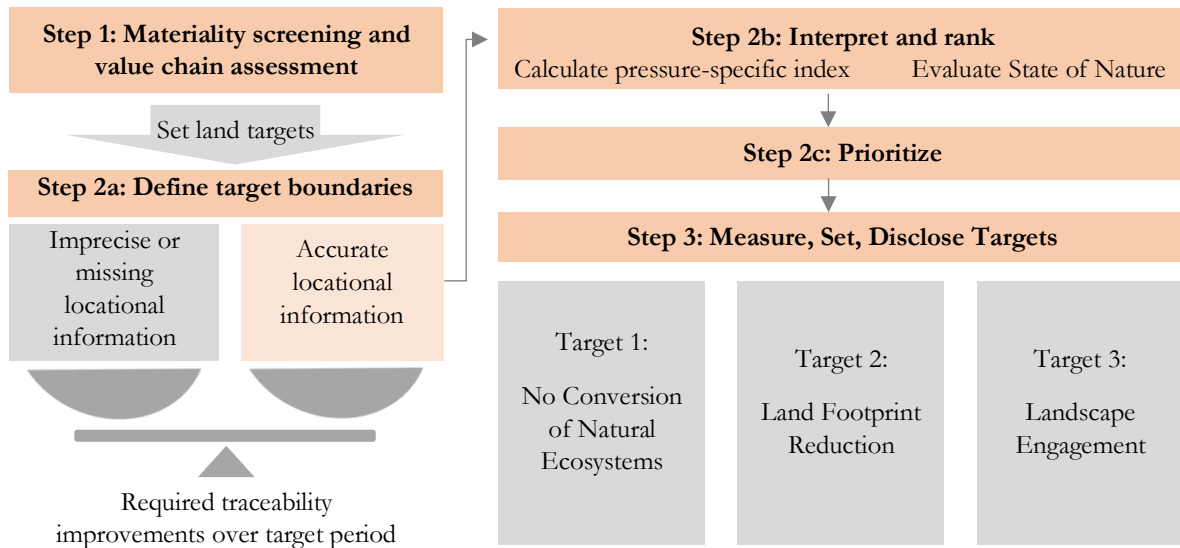
Figure 2-5 Overview of SBTN land guideline steps 1-3

Source: Author based on (SBTN, 2023c)

2.3 Incentives and Barriers to implement Strategic Sustainability Targets

2.3.1 Institutional Theory and Resource-Based View

As "strategic decisions are long-term decisions of an organization, which regard its direction" (Kozioł-Nadolna & Beyer, 2021, p.2376), the integration of SBTs for Land can be seen as a strategic choice within the transition towards a nature-positive future. Examining strategic decisions reveals the connection between how organizations operate and their achievements, while also gaining insights into the behavioral patterns of various incumbent firms (Cambridge dictionary, 2023; Van Mossel et al., 2018). As organizational theory delves into these phenomena, the target setting was analyzed by referencing the barriers and incentives hypothesized by organizational theory. Within the search for an applicable organizational theory, theories with a main emphasis on managerial investigations into the efficient and effective management of firms such as leadership theories or transaction costs economics have been excluded as they do not cover firms' behavior in a transition or in other words the organizational change model (Ransom & Lober, 1999). Various theories and concepts come with their distinct assumptions regarding the behavior of firms. Therefore, Fernando & Lawrence (2014, p.170) believe that it is "inadequate to use a single theory for a theoretical framework to explain organizational behaviors of [Corporate Social Responsibility[10]] CSR practice" which led to the decision to use Resource-Based View (RBV) and Institutional Theory (IT) in this study. In the past six decades, the relationship between strategic management and CSR has evolved from opposition to convergence (Roszkowska-Menkes, 2020). The concept of CSR has shifted from an isolated moral standpoint to one of holistic stewardship, incorporating social and environmental factors into business strategy, and evolving into the concept of sustainable strategic management (Rok, 2019).

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[10] CSR implies the voluntary integration of social and environmental concerns into firms decision-making, operations and interactions with stakeholders (Branco & Rodrigues, 2006).

IT has emerged as one of the foremost theoretical frameworks for examining CSR (Risi et al., 2023) and according to Campbell (2007), it has the inherent ability to shed light on how companies comply with CSR. However, other voices such as Kenworthy & Verbeke (2015, p.186) criticize that IT "does not sufficiently explain how and why some organizations resist external institutionalization influences" especially in the context of multinational corporations. Therefore, RBV is applied in addition as it becomes increasingly important in CSR studies (Branco & Rodrigues, 2006).

RBV and IT examine the conduct of businesses from various, complementing perspectives; the RBV perceives the firm as a compilation of assets, with its behavior predominantly influenced by internal factors, while the IT views the firm as a unified entity, with its conduct primarily shaped by external factors from institutions (Van Mossel et al., 2018).

Institutional theory captures the external factors to which companies are responding

As per IT, organizations are subject to diverse influences from institutions that prompt them to embrace CSR practices (Fernando & Lawrence, 2014), suggesting that the same could hold for SBTs targeting nature, as they fall within the broader scope of CSR. Institutions are defined by Scott and Meyer (1994, p.68) as "symbolic and behavioral systems containing representational, constitutive, and normative rules together with regulatory mechanisms that define a common meaning system" and thereby shape behavior, perception, and choices.

Rather than purely striving for profit maximization, companies react to institutional pressure of change, because "they are rewarded for doing so through increased legitimacy, resources, and survival capabilities" (Scott, 1987, p. 498). Suchman (1995, p. 574) describes legitimacy as the "generalized perception or assumption that [their] actions […] are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions". This legitimacy might also result in business benefits (Haffar & Searcy, 2018).

The main concept of IT is isomorphism which assumes that all companies become the same over time or adopt the same strategies. There are three different isomorphism processes: coercive, mimetic, and normative isomorphism. Coercive isomorphism relates to pressures from critical stakeholders including employee influence and governmental laws and regulations (Dragomir et al., 2023). Within mimetic isomorphism, companies copy successful competitor strategies often driven by uncertainty (Ransom & Lober, 1999). Fernando & Lawrence (2014) contend that CSR reporting might represent an innovative practice that other firms adopt through mimetic isomorphism. Both Van Mossel et al. (2018) and Haffar & Searcy (2018) argue that based on IT, strategic behavior is triggered when the degree of institutional demand is low or uncertain. However, Haffar & Searcy (2018, p.1089) also alert that in the absence of internal and relatively low external normative stakeholder pressures, "companies have been shown to be more likely to adopt symbolic rather than substantive sustainability strategies". The third process being normative isomorphism relates to the pressures emerging from common values within societies and workspaces (Fernando & Lawrence, 2014).

The Resource-Based View connects firms' decisions to the strategic deployment of resources

Kenworthy & Verbeke (2015) contend that the primary objectives of business firms typically revolve around survival, profitability, and growth, rather than solely catering to the demands of legitimacy, with the overarching aim of value creation. This perspective aligns with the RBV, which posits that firms possess capabilities enabling them to strategically leverage their resources to generate value (Van Mossel et al., 2018). However, this operational framework also imposes constraints on companies in making strategic decisions, as the development of new resources is

a time-intensive process and is influenced by strong path dependencies, given that the resources and capabilities a firm can cultivate in the future hinge on the complementarity of its existing resources. Consequently, firms only nurture dynamic capabilities that yield discernible benefits, as per the findings of Van Mossel et al. (2018). According to the RBV, incumbent firms venture into niche markets to exploit emerging opportunities. Contrary to many other theories, which posit that moving into niches is primarily driven by external factors beyond the firm's control, the RBV considers this transition into niches as a deliberate firm-level decision. Hence, within the RBV, companies adopt CSR because they believe it provides them with a certain type of competitive advantage (Branco & Rodrigues, 2006). The propensity for firms to remain inert is elucidated within the RBV framework by internal factors such as internal conflicts and the absence of dynamic capabilities (Van Mossel et al., 2018).

2.3.2 Incentives to implement Strategic Sustainability Targets

Due to the limited literature on SBTs for Land, the review of existing literature on incentives and barriers has been expanded to encompass articles covering broader SSTs including organization-centric nature targets (Grabs & Garrett, 2023; Krause et al., 2021), SBTs for carbon (SBTi) (Bjørn et al., 2022; Bolton & Kacperczyk, 2023; Freiberg et al., 2021; Piper & Longhurst, 2021; Romito et al., 2023; Walenta, 2020), or compare organization-centric nature targets with resilience-based targets (an equivalent to SBTs) (Haffar & Searcy, 2018; zu Ermgassen et al., 2022). Moreover, incentives emphasized in SBTN material have been analyzed. These findings are then used to establish an analytical framework for incentives and barriers for SSTs (chapter 2.4). As SBTs for Nature are one advanced form of SSTs (see chapter 2.1.2) with clear linkage to SBTi and organization-centric nature targets, it can be argued that the incentives and barriers for their implementation might be similar.

Firstly, it is contended within scholarly discourse that companies establish SSTs in response to prevailing **policies and norms**, although certain studies cast doubt upon the robustness of this assertion. Zu Ermgassen et al. (2022) posit that governmental strides towards mandating disclosures of biodiversity impacts and dependencies could serve as a catalyst for target establishment. However, Bjørn et al. (2022, p.60) temper this perspective by asserting that "surely, there is some relationship between corporate target setting and national policy, but this finding offers only weak evidence". Bolton & Kacperczyk (2023) advance the notion that companies might experience pressure to demonstrate alignment with governmental agendas yet may face reduced pressure to formalize commitments once governments enact more definitive measures. Besides the academic literature, SBTN (2023b) claims that SBTs for Nature are a key mechanism for companies to operationalize the GBF.

Secondly, in addition to regulatory frameworks, **stakeholder pressures** exert influence on companies' decisions to establish nature targets (Krause et al., 2021). Grabs and Garrett (2023) contend that goal setting often occurs in response to pressures from civil society, a viewpoint supported by Romito et al. (2023), who posit that companies perceive setting SBTis to convey credible signals of commitment and address the concerns of stakeholders. Haffar & Searcy (2018) conclude that companies face growing "external normative stakeholder pressure" because of increased attention in society towards resilience-based sustainability. Moreover, companies may extend their rationale for target setting to encompass considerations of the interconnectedness between natural ecosystems and the health implications for both employees and consumers (Krause et al., 2021).

Thirdly, in the context of stakeholder pressures, firms have expressed a desire to enhance their **reputation**[11] through the adoption of SSTs. Making a connection between nature targets and reputation is supported by findings from Grabs and Garrett (2023), who note that civil society observers regularly formulate rankings to distinguish between exemplary and deficient performers. While Piper & Longhurst (2021) identify credibility and reputation as primary drivers for the establishment of SBTs, Krause et al. (2021) conclude that companies might commit to act against nature degradation for communication and image gains. Additionally, they underscore that concerns regarding public scrutiny and the prospect of facing allegations of greenwashing did not exert a notable influence on the level of engagement. Further investigation is warranted to elucidate the extent to which customers and investors discern between symbolic (corporate-centric) and substantive (resilience-based) sustainability targets (Haffar & Searcy, 2018). The focus of companies on reputation as a driver for setting SBTs, is broadly criticized for example from Freiberg et al. (2021) who express apprehension regarding the possibility that companies may adopt SBTs primarily as symbolic acts to confer legitimacy upon pre-existing initiatives.

Fourthly, two additional significant factors influencing companies' adoption of SSTs are the **beliefs and attitudes** of internal stakeholders, alongside **strategic management** rationales. Krause et al. (2021, p. 750) underscore the role of managers' pro-environmental motivations in target-setting, asserting that "the strongest predictor for voluntary engagement in nature conservation is a favorable attitude". Regarding strategic management considerations, Piper & Longhurst (2021) identify goal harmonization in the form of standardization as a primary impetus for establishing SBTs, as it aligns individual initiatives with cohesive measures and facilitates benchmarking against other firms. Moreover, resilience-based targets aid companies in assessing the extent to which their corporate sustainability endeavors contribute to ecological sustainability (Haffar & Searcy, 2018). Quahe et al. (2023) emphasize the role of SBTs as boundary objects that facilitate collaboration among diverse transnational multi-actor governance networks. Whereas the reviewed academic literature does not emphasize on it, several reports considered SBTs for Nature as a tool for physical risk reduction (PwC, 2023; University of Cambridge, 2021). According to University of Cambridge (2021, p.18) physical risks "can arise when ecosystem equilibria are damaged, causing ecosystem services on which the economy depends to degrade". This also is emphasized by SBTN (2023e) claiming that SBTs for Nature will help to drive long-term resilience for business.

Finally, companies are significantly motivated by economic considerations and therefore endeavor to establish correlations between SSTs and their **economic performance.** According to findings from the study conducted by Piper & Longhurst (2021), companies acknowledge that their decisions regarding SBTi are primarily influenced by economic factors rather than concerns related to climate change. In connection to an increased reputation companies may yield a competitive advantage, particularly among environmentally conscious consumers, thereby potentially increasing product sales, as suggested by Ransom and Lober (1999) in the context of SSTs. Additionally, the adoption of resilience-based approaches (such as SBTs) is posited to foster a perception of leading sustainability performance, consequently augmenting business value, as discussed by Haffar and Searcy (2018) and Krause et al. (2021). However, Karlsson-Vinkhuyzen et al. (2018, p.137) question this notion as "values in support of sustainability may be subsumed under finding the lowest prices". Furthermore, Krause et al. (2021) and Freiberg et al. (2021) highlight the possibility for companies to draw connections

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[11] Reputation refers to the collective perception of an organization whereas image is an "immediate mental picture that individuals conceive of an organization (Helm, 2011, p.9). Organizational credibility is the extend of which an organizationn is "perceived as trustworthly and reliable" (Jamal & Abu Bakar, 2016, p.1). As image and credibility can influence overall reputation, they have been treated as sub-categories of reputation in this document.

between environmental degradation and potential higher (procurement) costs and insurance claims, serving as a motivator to establish targets aimed at curbing such degradation. Another pertinent economic aspect is the improved and simplified access to capital for companies implementing SBTs, as underscored by Haffar and Searcy (2018) "since targets are based on what is required to mitigate the impacts of climate change rather than what feels practicable" (Piper & Longhurst, 2021, p.4). Moreover, it is acknowledged that investors may transition from an incrementalism-focused perspective to one centered on genuine sustainability concerns, as noted by A. White (2013), thereby fostering a positive disposition among investors towards companies embracing SBTs.

2.3.3 Barriers to set Strategic Sustainability Targets

This chapter investigates the barriers and challenges associated with establishing SSTs, drawing upon the literature on SSTs referenced in the preceding chapter. Furthermore, papers addressing biodiversity mainstreaming[12] are integrated in the review (Karlsson-Vinkhuyzen et al., 2018; Katic et al., 2023; Schaltegger et al., 2023; T. B. White et al., 2023). Given the pivotal role of strategic implementation in attaining the set targets (see chapter 2.1.1), it is contended that companies must also consider barriers that could arise during the strategy implementation process within their decision for SBTs. Therefore, addressing barriers of biodiversity mainstreaming was assessed as valuable for this review.

Firstly, literature has identified several challenges in **strategic management** pertaining to the occurrence of ambiguity during the integration of SBTs. One such challenge involves aligning organization-centric targets with the broader system-level priorities outlined in SBT frameworks (Haffar & Searcy, 2018). Moreover, tensions may arise with social goals if strategies to attain environmental objectives fail to consider principles of social justice and equity. Grabs and Garrett (2023) compare goal-based governance with rule-based governance and stress that the former may present more ethical challenges, such as ensuring the inclusion of smallholders and promoting community development within governance frameworks.

Secondly, internal **beliefs and mindsets** have emerged as harming factors influencing the establishment of SSTs. Managers may hold the belief that adopting a nature or biodiversity strategy is unnecessary, of limited business relevance, or beyond their scope of responsibility due to its wide-reaching implications extending beyond organizational boundaries (Karlsson-Vinkhuyzen et al., 2018; Schaltegger et al., 2023). The prevailing short-term orientation of many managers, constrained by cost-benefit timeframes, often inhibits their inclination towards making long-term investments in conservation efforts (Karlsson-Vinkhuyzen et al., 2018). Furthermore, Karlsson-Vinkhuyzen et al. (2018) reveal that the endorsement of a biodiversity strategy frequently hinges upon positional leadership. Concerning the implementation of SBTs, internal institutional pressures may pose opposition, striving to "maintain the status quo of a corporate-centric approach to sustainability" (Haffar & Searcy, 2018, p.1089). Therefore, zu Ermgassen et al. (2022) advocate for the essential buy-in and proactive engagement of employees throughout the organization, including at the board level, as crucial elements in the successful implementation of nature-positive strategies.

Thirdly, a pivotal aspect in assessing environmental impact, which represents the foundational step preceding target establishment (see chapter 2.1.1), pertains to **internal capacity,**

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[12] Biodiversity mainstreaming is "the process of embedding biodiversity considerations into policies, strategies and practices of key public and private actors that impact or rely on biodiversity, so that biodiversity is conserved and sustainably used both locally and globally" (Karlsson-Vinkhuyzen et al., 2018, p.1).

encompassing **data[13] availability, metric[14] and tool accessibility**. Prior to conducting impact analyses, it is imperative to ascertain the provenance of products. According to zu Ermgassen et al. (2022) and Grabs and Garrett (2023), many companies encounter challenges in comprehending and addressing their supply chain impacts due to the absence of upstream traceability. This deficiency may stem from variability in sourcing information resulting from embedded or transformed commodities. Nevertheless, zu Ermgassen et al. (2022) posit an optimistic outlook, noting the increasing availability of high-resolution supply chain data.

Moreover, the availability of metrics and tools is essential for data collection and analysis. They need to be able to "capture positive and negative biodiversity impacts along the whole value chain, based on high-quality spatially-explicit data on biodiversity" (zu Ermgassen et al., 2022, p.8). Specific challenges arise in obtaining metrics related to nature, including biodiversity. Unlike carbon, the impact of activities on nature and biodiversity is highly context-specific due to the dynamic and systemic nature of biodiversity and ecosystems (Grabs & Garrett, 2023; Schaltegger et al., 2023; zu Ermgassen et al., 2022). The effect of emitting a ton of Carbon dioxide (CO_2) equivalents remains uniform across locations, whereas the consequences of extracting a liter of water or clearing a hectare of forest vary based on the unique conditions and contexts. Consequently, assessing biodiversity and ecosystems is inherently complex and cannot be reduced to a single metric (Schaltegger et al., 2023; zu Ermgassen et al., 2022). Moreover, nature lacks a universally recognized and functional global assessment framework such as the Greenhouse Gas Protocol for Carbon. Another challenge is the issue of shared natural resources. With spillover or leakage, whereby actions in one location may lead to impacts elsewhere, supply chain impacts could be either underestimated or overestimated (zu Ermgassen et al., 2022). Katic et al. (2023) and zu Ermgassen et al., (2022) argue that even though harmonization among biodiversity measurement approaches still needs to be enhanced, it is evident that diverse tools are available for it (for example (e.g.) IBAT, STAR, ENCORE). Therefore, zu Ermgassen et al. (2022, p.8) conclude that "a lack of metrics should no longer be an excuse for businesses to delay taking ambitious action to measure and address their biodiversity impacts and dependencies".

Fourthly, **skilled employees** are indispensable for data analysis. Numerous studies indicate that a key impediment to the adoption of biodiversity initiatives within firms is a dearth of employee skills or capacity (zu Ermgassen et al., 2022). Walenta (2020) highlights that implementing SBTs necessitates specialized expertise. While the guidance itself may be comprehensible to a non-specialist audience, utilizing the aforementioned tools may require specific expertise (Katic et al., 2023).

Lastly, looking at **economic barriers** to implement SSTs for nature including biodiversity, Karlsson-Vinkhuyzen et al. (2018) lament the occasional absence of compelling economic evidence to support a clear business case for conservation efforts. The implementation of targets necessitates a significant investment of time, resulting in additional costs for employees (Katic et al., 2023). Moreover, the execution of an environmental strategy entails substantial associated costs (Krause et al., 2021). Moreover, zu Ermgassen et al. (2022) point out that the trajectory towards achieving nature-positive outcomes, which are supported by SBTs for Nature, necessitates a reduction in material throughput. A critical aspect of reducing material consumption by businesses involves abstaining from activities that are incompatible with achieving nature-positive outcomes, potentially leading to diminished revenues. Moreover, as

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[13] Data consists of raw facts, figures, and observations and therefore forms the basis for generating metrics and insights (Bladt & Filbin, 2013).

[14] A metric is a quantifiable measure that is used to track and assess performance (Bladt & Filbin, 2013). In this thesis it is used interchangeably with the term 'indicator'. Metrics can be generated through tools.

long as biodiversity is considered an externality, there are "limited opportunity to address the issue without sacrificing profits" (T. B. White et al., 2023, p.4721).

2.4 Development of an analytical framework

An analytical framework categorizes theoretical knowledge to facilitate data analysis and "provide an invaluable shortcut to someone structuring a problem" (Garrette et al., 2018, p. 96). It was developed to answer the research questions and guide the research in three ways. It informed the formulation of the questionnaire during the data collection phase, influenced the coding process in data analysis, and played a role in facilitating a systematic analysis of the findings and subsequent discussion.

As seen in Section 2.3. and 2.4., researchers have identified common incentives and barriers for companies to implement SSTs, specifically related to SBTi, SBTN, organization-centric nature targets and biodiversity mainstreaming. Nevertheless, the disparate elements within the literature lack a unified structure, making them difficult to operationalize. To bridge this gap, the proposed framework organizes and consolidates these diverse inputs (see table 2-1). The Institutional Theory is reflected by the category of institutional structure, encompassing sub-categories such as policies and norms, reputation, and stakeholder pressure, representing incentives for SSTs. The internal perspective, represented here by the RBV theory, is summarized in three categories. Firstly, strategic management includes goal harmonization (both as an incentive and a barrier), operational risk management (as an incentive), and social trade-offs (as a barrier). Secondly, internal capacity covers beliefs and mindsets of internal stakeholders (as both an incentive and a barrier), data availability (as a barrier), metrics and tool availability (as a barrier), and available skill sets (as a barrier). Thirdly, factors related to economic performance have been identified, including competitive advantage (as an incentive), costs (as both an incentive and a barrier), portfolio changes (as a barrier), and capital attraction (as an incentive).

Table 2-1 Analytical framework of incentives and barriers for Strategic Sustainability Targets

Theory	Category	Sub-category	Incentives	Barriers
Institutional Theory	Institutional structure	Policies and norms	X	
		Reputation	X	
		Stakeholder pressure	X	
Resource-Based View	Strategic Management	Goal harmonization	X	X
		Operational risk management	X	
		Social trade-offs		X
	Internal capacity	Beliefs and mindsets	X	X
		Data availability		X
		Metrics/tool availability		X
		Skill set availability		X
	Economic performance	Competitive advantage	X	
		Costs	X	X
		Change of portfolio		X
		Capital attraction	X	

Source: Author

3 Research Design, Materials and Methods

3.1 Research Design

In this section, the research design choices are outlined and justified, emphasizing the analytical framework role throughout the research process. Firstly, in accordance with Creswell & Creswell (2018,p.162), when a topic "is 'immature' due to a conspicuous lack of theory and previous research," a qualitative research design is recommended. Given that the concept of nature and biodiversity target implementation and SBTN is still in its nascent stage, a qualitative design was selected. The SBTN guidelines were in the development stage and undergoing a pilot phase during the research period, restricting the availability of publicly accessible documents related to it. Moreover, the literature review showed that academic research on science-based sustainability targets tends to focus on the conceptual design of the guidelines or the provoked transformative and environmental impacts, rather than the implementation process of those targets in corporations. Compared to quantitative research, a qualitative approach is more adept at capturing the nuances and multidimensionality of a research phenomenon (Creswell & Creswell, 2018).

Secondly, the study was structured as a multiple-case study, examining seven agri-food corporations in Europe. A case study "investigates a contemporary phenomenon within its real-life context" (Yin, 2018, p. 114). Flyvbjerg (2006) underscores the significance of case studies in producing contextually relevant and practically applicable knowledge within a holistic picture, opposed to abstract generalizations. Case studies commonly involve gathering information from various sources and employing multiple methods (Yin, 2018). Therefore, the sustainability reports of the seven agri-food corporations for the year 2023 were examined with respect to how they address SBTN. To ensure a holistic picture on the phenomenon, this study collected respondents' opinions not only from the agri-food corporations itself, but also from four ecosystem actors, who collect the knowledge and best practices from a range of companies. Moreover, numerous multi-stakeholder initiatives have published reports outlining strategies for incorporating biodiversity into business decision-making, including barriers, challenges, and incentives of target setting. Those have also been integrated in the study. Capturing different perspectives from diverse sources resulting in triangulation enhances the credibility and therefore the practical relevance of the research outcomes (Ivonna S. Lincoln & Norman K. Denzin, 1998).

The emphasis of qualitative research on exploring and interpreting the complexities of human experiences is aligned with the author's pragmatic worldview underlying the research. Pragmatism asserts that reality is complex and constantly evolving, shaped by the actions and interactions of individuals (Kaushik & Walsh, 2019). The researcher's academic and professional background, coupled with their personal values and worldview, may impact both the research process and its result (Creswell & Creswell, 2018). According to Creswell and Creswell (2018, p.44) a worldview is a "general philosophical orientation about the world and the nature of research that a researcher brings to a study". In accordance with the definition of pragmatism presented by Kaushik & Walsh (2019), this study was oriented towards resolving a practical problem in the real world.

The study's research process can be found in figure 3-1, which is applicable for answering all two Research Questions (RQ). Central to the process was an analytical framework (see step 2 in figure 3-1) of barriers and incentives for companies to implement SSTs. The analytical framework was developed by drawing insights from existing literature about these barriers and incentives specifically for SBTs for Carbon, SBTs for Nature, organization-centric nature targets and biodiversity mainstreaming. Moreover, considerations made by firms in general transformations based on the Resource-Based View and Institutional Theory were consulted.

As SBTs for Land are one form of strategic sustainability targets, the barriers and incentives for the latter have been determined as appropriate to build an analytical framework for this research. It informed the formulation of the questionnaire during the data collection phase, influenced the coding process in data analysis, and played a role in facilitating a systematic analysis of the findings and subsequent discussion.
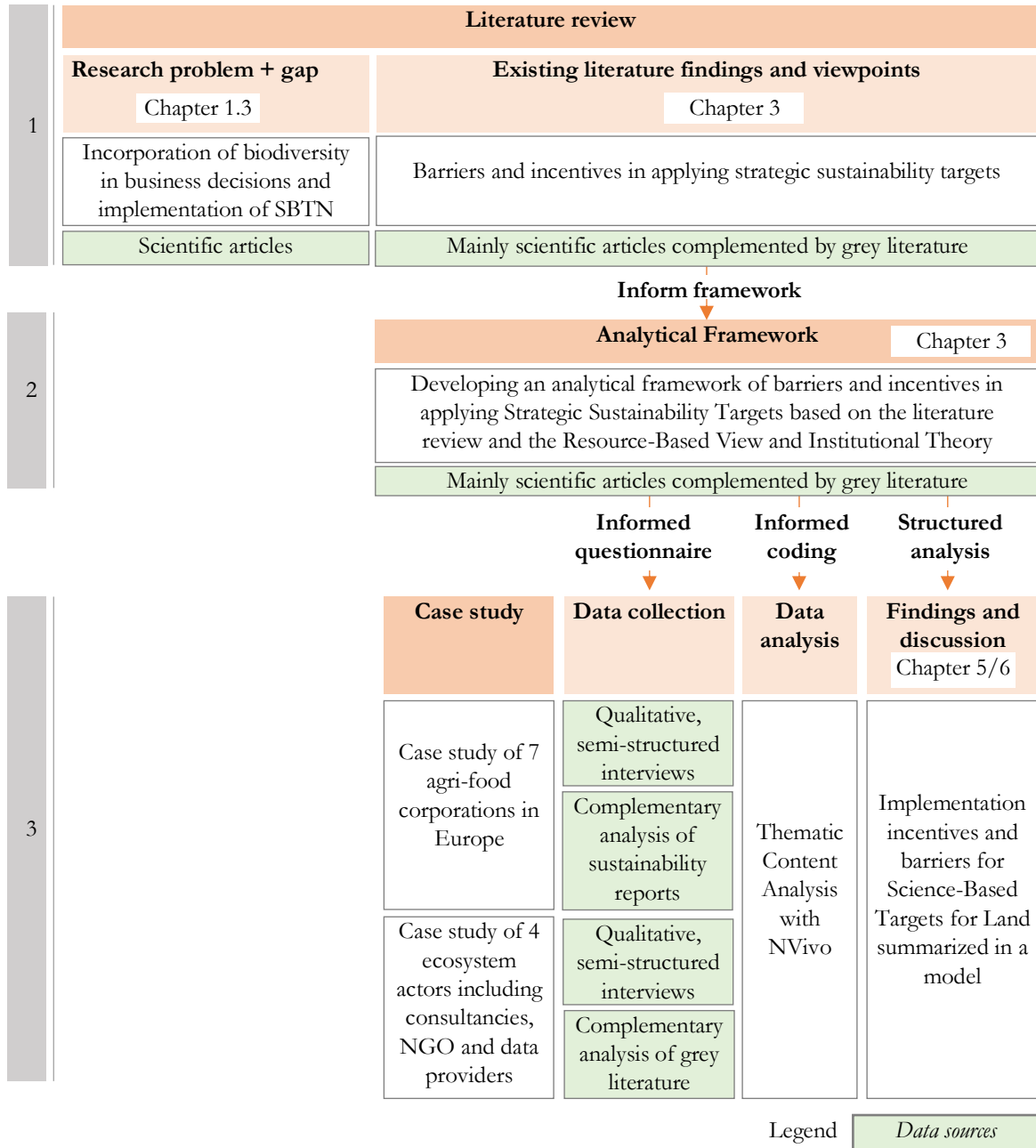
Figure 3-1 Visualization of research design

Source: Own illustration

3.2 Methods for data collection and materials collected

3.2.1 Case study selection

To ensure the selection of a representative sample of case study organizations, specific criteria were formulated (illustrated in table 3-1). These criteria were designed to streamline the sample

size while maintaining a commitment to rigorous and transparent case study selection procedures (Creswell & Creswell, 2018).

The selection of case study companies (see outcome in table 3-2) was limited to the agri-food corporations that are within the pilot program for SBTs for Land or members of the SBTN Corporate Engagement Program. This program encompasses about 200 companies that have expressed interest in establishing SBTs for Nature, thereof 19 being agri-food corporations (March 2024) (SBTN, 2024a). This selection criterion ensured a basic level of familiarity with the SBTN guidelines among the interviewed companies and therefore "give some general understanding of the phenomenon" (Herron & Quinn, 2016, p. 13). The type of sampling selection can be classified generally as a nonprobability sample as the cases have been selected based on their response to the interview request (Creswell & Creswell, 2018). Therefore, the approach can be classified as 'typical case selection'. A representative from each of the 19 companies was contacted either via LinkedIn message or email to establish communication with the individual responsible for SBTN. These individuals were identified through a LinkedIn search using the following search criteria: a) company name + SBTN, b) company name + biodiversity, and c) company name + sustainability. If no results were found using criterion a), criterion b) was applied, and finally criterion c) was used if neither a) nor b) yielded results. In some instances, the contacted individual referred to another person within the company.

Another criterion was the sector of economic activity of the companies. Agri-food companies are involved in the production, processing, distribution, or trade of food and agricultural products. Even though actors across the whole value chain were contacted, only production and processing companies confirmed interviews. Agri-food systems can be categorized into land-based (crop, livestock, and forest) and water-based (fisheries and aquaculture) (FAO, 2019). The interviewed companies focus on crops, livestock, or both.

Table 3-1 Selection criteria for case study organizations

Case Study selection criteria	
7 Companies	1. Current SBTN pilot company or showing interest in target setting process (being signed up in the SBTN Corporate Engagement Program) 2. Headquartered in Europe 3. Agri-food sector 4. Involved in the production/ processing of crop products, livestock or both
4 Ecosystem actors	1. One of the objectives is to encourage authentic business initiatives aimed at reducing biodiversity degradation 2. Engaged in Europe 3. Agri-food sector is encompassed within the collaborating companies 4. Mentioning SBTN, biodiversity measurement or biodiversity target setting in any publication

Source: Own illustration

In identifying ecosystem actors (see outcome in table 3-3) that can significantly contribute to the study, they needed to fulfil certain criteria. Firstly, one of their main goals must be the promotion of genuine business involvement in reducing biodiversity degradation. To demonstrate expertise in the domains covered by the SBTN framework, ecosystem actors have either published materials related to SBTN, biodiversity measurement, or biodiversity target setting in corporations. Consequently, it was presumed that there are experts within these areas and possess a comprehensive understanding of the existing barriers, challenges, and incentives. Aligning with the research scope, the ecosystem actors needed to be actively involved in Europe and include the agri-food sector among their collaborating companies. This criterion resulted in three different categories being NGOs, consultancies and biodiversity measurement experts.

Table 3-2 Overview agri-food companies' interviewees

Companies	Number of employees 2023	Interviewee's position in the organization	Date of interview
C1	> 10,000	Global Sustainability Lead	14.03.2024
C2	<2000	Senior Sustainability Specialist	21.03.2024
C3	> 10,000	Global Biodiversity Manager	29.03.2024
C4	> 10,000	Former Head of Nature	29.03.2024
C5	<2000	Sustainability Manager	03.04.2024
C6	> 10,000	Environmental Manager	08.04.2024
C7	> 10,000	Biodiversity Specialist	16.04.2024

Source: Own illustration

Table 3-3 Overview ecosystem actor interviewees

Ecosystem actors	Organization category	Description of organization	Date of interview
EA 1	Consultancy	**Arcadis:** Sustainability services from engineering, over project management to consulting	19.03.2024
	Measurement	**EU Business & Biodiversity platform:** A network for sharing best practices for biodiversity considerations in business, primary focus = natural capital accounting and in particular methods for corporate biodiversity impact measurement	
EA 2	NGO	Global association supporting sustainable development	22.03.2024
EA 3	Consultancy	Consultancy focused on biodiversity	22.03.2024
EA 4	Measurement	Nature data and intelligence; environmental DNA; Earth Observation and advanced data science and AI	04.04.2024

Source: Own illustration

3.2.2 Qualitative, semi-structured expert interviews

Qualitative interviews were chosen as an appropriate data collection method due to their recognition as one of the foremost sources of evidence in case studies (Yin, 2018). Furthermore, they enable the collection of information and perspectives that extend beyond publicly available materials as the type of data generated is respondents' opinions. The decision to utilize semi-structured qualitative interviews stemmed from their capacity to align data collection with a standardized questionnaire across interviews, ensuring comparability (Yin, 2018). Concurrently, the semi-structured format offered participants the opportunity to elaborate on their viewpoints and therefore enabled the researcher to capture nuanced perspectives (Qu & Dumay, 2011). The pre-developed interview guide was structured in accordance with the four categories of the analytical framework (see Appendix 4) and mainly incorporated open ended questions to allow the elaboration of participants' perspectives.

Qualitative interviews come with a range of limitations, such as the indirect nature of information filtered through interviewees' perspectives, a setting often removed from natural environments, potential bias due to the researcher's presence, and variations in participants' communication abilities and perceptiveness (Creswell & Creswell, 2018). Moreover, Qu & Dumay (2011) raise awareness that misunderstandings can arise in communication when researcher and interviewee have different worldviews. To account for these limitations and address potential data gaps, a supplementary document analysis was undertaken (see chapter 3.2.3) alongside with interviews with ecosystem actors to ensure triangulation.

Ultimately, a total of 11 semi-structured online interviews were carried out from 14th March 2024 to 16th April 2024. The interview duration ranged from 45 to 60 minutes, and the sessions were conducted utilizing the online conferencing tool Zoom. Following the recommendation from Creswell & Creswell (2018, p. 150) to "avoid exploitation of participants", the final thesis as well as an executive summary in form of a presentation is shared with the participants.

3.2.3 Document analysis

A supplementary examination of documents was conducted to enhance the insights gathered from qualitative interviews. According to Bowen (2009, p. 27), document analysis is a "procedure for reviewing or evaluating documents – both printed and electronic", often integrated with qualitative research methods like interviews. The additional document analysis aimed to gather extra information on aspects not adequately addressed in the interview data, ensuring a holistic exploration of the various dimensions and elements of the derived model. While document analysis can involve various document types (Creswell & Creswell, 2018), this study focused specifically on official reports from organizations assessing biodiversity and nature strategies within organizations including targets setting. Moreover, sustainability reports 2023 from the interviewed companies were analyzed.

3.3 Methods used to process information

After every interview, the audio recordings underwent transcription via the transcription function of Microsoft Word Version 2404. Subsequently, each transcript underwent immediate manual review for errors and redundant words. For qualitative data analysis, NVivo 14 software was utilized, offering features for coding interviews and qualitative data.

All collected data was analyzed using thematic analysis, which entails examining a dataset to identify recurring patterns of significance (Braun & Clarke, 2006). It was selected for this study due to its provision of slightly greater flexibility compared to content analysis, which typically concentrates on a more granular level, thereby enabling the generation of quantitative outcomes. A theme "captures something important about the data in relation to the research question, and represents some level of patterned response or meaning within the data set" (Braun & Clarke, 2006, p. 82). Braun & Clarke (2006) outline a six-step approach for thematic analysis to ensure scientific rigor: "Familiarizing yourself with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, producing the report" (Braun & Clarke, 2006, p. 87). Ensuring close alignment with the research questions, the thematic analysis method diligently identified all pertinent data to address each question as comprehensively as feasible on a detailed level.

The analysis employed a blended approach that incorporated both deductive and inductive elements. The deductive element was using the sub-categories of the analytical framework. According to Braun & Clarke (2006, p. 83) an inductive approach "means the themes identified are strongly linked to the data themselves" and there is no attempt to force them into a pre-existing coding framework. The inductive aspect involved consistently introducing new codes and themes to the coding structure as they emerge during the analysis. This approach ensured that fresh insights from experts are appropriately integrated into the analysis. At the end of a full coding round, all transcripts were checked again for their validity resulting in the merge of some codes. The coding structure with description can be found in Appendix 5.

With the final coding structure on hand, a synthesis matrix was established in Excel where it was tracked if interviewees agreed, disagreed, or did not mention the specific incentives and barriers in the coding structure. This allowed the establishment of a model including the relevance of each incentive and barrier. The documents have been analyzed in a synthesis matrix in Excel using the same final coding structure.

4 Findings

4.1 Incentives and barriers for Science-Based Targets for Land resulting from institutional structures

4.1.1 Policy and norms

Two primary EU legislations could impact companies' choices regarding the adoption of SBTs for Nature. The first one covers obligations to disclose companies' environmental impact. The ESRS under the CSRD requires all large companies to regularly report on their environmental and social impact activities starting in the financial year of 2024 (European Commission, 2024a). ESRS E4 is specifically looking at biodiversity and ecosystems with one of the three components required being metrics and targets. CSRD explicitly recommends referencing ecological thresholds by setting targets based on the guidance provided by SBTN (EU Business and Biodiversity Platform, 2024; I Care, 2024). Therefore, The Biodiversity Consultancy (2024) concludes that the SBTN framework will enable companies to meet parts of the disclosure regulations. The other one being the EU Nature Restoration Law (EUNRL) which has been freshly adopted in February 2024 (European Parliament, 2024b). This legislation forms a component of the EU nature restoration plan under the EU biodiversity strategy for 2030 which is part of the European Green Deal (European Parliament, 2024a). The recent legislation establishes a goal for the EU "to restore at least 20% of the EU's land and sea areas by 2030 and all ecosystems in need of restoration by 2050" (European Parliament, 2024b, para.1). This also includes targets on agriculture ecosystems.

Among the seven companies surveyed, four indicated that SBTN[15] aids them in meeting certain **reporting requirements**. The remaining companies did not cite it as a factor motivating their adoption of SBTs for Land. C7 expressed their objective to synchronize reporting and legal frameworks with SBTN to streamline their internal strategic processes. They also noted that the legal obligations from CSRD regarding biodiversity and ecosystem reporting serve as leverage to initiate the SBTN process within management. Additionally, C6 found that SBTN assists them in delineating specific indicators and goals for reporting obligations. C1 also indicated that the nature transition plan that is expected in CSRD was one of the drivers to explore SBTs for Nature further. Regarding **nature restoration policies** like the GBF or the EUNRL, most companies interviewed did not prioritize SBTs because they contribute to these objectives. Only three out of the seven companies drew a connection. Despite C7's current uncertainty about EUNRL's requirements for companies, they are exploring alignment with their SBTN initiatives. C4 stood out by explicitly linking their decision to explore SBTN to the Nagoya Protocol[16] under the United Nation CBD, marking a clear regulatory entry point. C1 mentioned their engagement in SBTN as an answer of the GBF. Furthermore, EA1 emphasized the potential role of National Biodiversity Strategy and Action Plans (NBSAPs) in expediting SBTN adoption by establishing regional-specific nature quality targets, thereby facilitating the process for companies to understand local contexts better. However, NBSAPs might be realistic for Western European countries but might not be established in other parts of the world (EA1).

In addition to compulsory regulations and standards, there exist **voluntary frameworks** like TNFD and SBTi that serve as potential avenues for companies to explore SBTs for Nature. Three companies (C1, C5, C7) and two ecosystem actors (EA1, EA3) confirmed that SBTN is

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[15] In case respondents spoke about aspect related to general SBTs for Nature, it is referred to as SBTs for Nature or SBTN. Otherwise, SBTs for Land will be outlined.

[16] It promotes fair and equitable sharing of benefits arising from the utilization of genetic resources, while also ensuring the conservation and sustainable use of biodiversity. It entered into force in 2014 (Convention on Biological Diversity, 2024).

aligned with TNFD. EA3 illuminated that if you are following SBTN guidelines, you're automatically aligned with some of the requirements of TNFD. This is supported by the EU Business and Biodiversity Platform (2024) who highlight that TNFD is recommending companies to follow SBTN guidance for setting nature-related targets. Moreover, TNFD and SBTN claim to continue with aligning the approaches "through ongoing technical collaboration and exchange as knowledge partners" (TNFD & SBTN, 2023, p. 5). Five companies (C3, C4, C5, C6, C7) indicated that integrating SBTN was a logical progression for them due to their existing involvement with SBTi. Furthermore, C4 underscored the significance of SBTN in persuading management about the importance of nature as "SBTN is as a little sister of SBTi, and it supported the increase of awareness on nature within the company". However, C7 presented a counterpoint, expressing concerns from internal stakeholders about meeting ambitious climate targets set via SBTi, which acts as a deterrent to establishing similar targets for Nature.

Ultimately, companies may recognize their role in **contributing to nature degradation** and thus consider SBTN as a **responsible course of action**. For instance, C3 identified the IPBES (2019) report as a significant entry point, prompting an understanding of the urgency and the acknowledgment that biodiversity loss stems from five human-driven factors, including their own operations. This is also confirmed in their annual report 2023 stating that they look at SBTN to combat biodiversity loss and promote regeneration. Additionally, C5 acknowledged that addressing global warming is inseparable from reversing biodiversity loss in nature, citing this as one of their primary motivations for exploring SBTN. They asserted that sustainability has been ingrained in their organizational DNA since their foundation.

Similarly, EA2 suggested that companies might seek to align with the **Global Goal for Nature**, which defines nature positivity, by integrating SBTN into their strategies. This sentiment was echoed by EA3, noting that many customers approach them with aspirations to align with or contribute to a nature-positive future. Furthermore, EA4 expressed that SBTs for Nature could aid in setting objectives within a nature-positive strategy, provided that the targets consider ecosystem implications beyond company borders. In fact, the SBTN also claims that the land targets "are in line with a nature-positive future" (SBTN, 2023c, p.20). While all interviewed companies acknowledged that achieving nature positivity individually might be unattainable, they saw potential in contributing to it. Both C3 and C7 explicitly acknowledged that the SBTN process could help them gauge their proximity to nature positivity. Moreover, a connection between SBTN and nature-positive was drawn in the annual report 2023 of C4. Aligned with that, EA3 stressed that SBTN is about "how companies can credibly communicate that they are contributing towards a nature-positive future". However, four interviewees (C3, C6, EA4, EA3, EA2) stressed the complexity of the concept of nature-positive, indicating a lack of full understanding. EA2 assigned this discrepancy to the fact that there is no functional unit for nature like CO_2 equivalents. With biodiversity and soil health being impossible to add up, nature-positive is more a "concept than an accounting target". Consequently, the precise link between SBTN and nature positivity remains undefined. EA3 emphasized the need for clarification on how SBTN contributes to nature positivity, highlighting the challenge in attributing individual products created under SBTN as nature-positive due to the lack of measurement of methods and practices per product. Despite this, EA3 noted that the GBF implicitly aligns with principles of a nature-positive future, and since SBTN aligns with it, there exists a connection between nature positivity and SBTN. However, EA1 emphasized that there needs to be more guidance from SBTN how to "behave on a landscape level [..] to contribute in a meaningful way to nature-positive".

Although not explicitly cited as a barrier to SBTs for Land, interviewees noted the importance of clearly defining terms and concepts within the realm of corporate nature and biodiversity

strategies (C4, C7, EA2, EA3). Specifically, they highlighted the interchangeable use of biodiversity and nature. Whereas nature represents the big picture of all realms, biodiversity is a key indicator. EA2 cautioned that conflating the two terms "is really confusing and potentially damaging for the whole space".

4.1.2 Stakeholder pressures

Amidst stakeholder pressures, the query revolves around whether particular stakeholder groups are urging companies to establish SBTs for Land, thereby prompting them to explore this avenue. Moreover, companies could indirectly be requested to establish SBTs for Land as stakeholders are requesting them to establish a substantiated nature strategy which could include requests for principles like responsible sourcing, regenerative agriculture, or nature conservation. Five stakeholder groups have been identified to be relevant: *End-consumer[17], customer[18], investors, employees, and business coalitions.*

The interviewed companies generally rejected the notion that *end-consumers* are exerting pressure on them to adopt SBTs for Land. Five companies explicitly disagreed, while two others did not mention end-consumers as a stakeholder exerting pressure in this regard. One rationale for this was proposed by EA4, who suggested that most people are unaware of SBTs for Nature, as it is primarily a framework for specialists rather than a tool for socialization. Therefore, end-consumers are inherently not positioned to compel companies to implement it. However, SBTs for Land may enhance their reputation among end-consumers, which will be discussed in section 4.1.3.

When considering requests to adopt SBTs for Land from *customers*, the scenario mirrors that of end-consumers. Five companies explicitly disagreed. C1 noted that the leverage effect for nature differs from that for carbon. Regarding carbon, customers are asking for SBTi targets to reduce their scope 3 supply chain emissions, with the potential consequence of not purchasing products. However, as C1 stated, "this type of conversation, you are not going to get with nature". Additionally, C5 highlighted a reverse dynamic, indicating that they are leading the way in pioneering the concept and encouraging their customers to follow suit. They underscored the advantage of both producers and retailers having targets, facilitating the exchange of feedback and best practices, thereby strengthening partnerships. However, two companies (C2, C6) pointed out that their customers are requesting a nature strategy, indirectly pressuring them to implement SBTs for Nature. The objective is to address aspects of their requests concerning responsible sourcing or environmental questionnaires by establishing SBTs for Nature.

A different perspective emerged regarding pressure from *investors*. Two companies explicitly stated that investors are requesting them to implement SBTs for Nature (C4, C5). C5 noted that investor interest in SBTN was sparked by the SBT Campaign initiated by the (CDP, 2024). C4 acknowledged the presence of a group of investors showing greater interest in nature by advocating for SBTN. However, C7 disclosed insights from a rating agency indicating that they are not interested in targets set by companies because "it is the ambition of the company, it is not actually saying what the company is doing," and "proprietary data can sometimes be somehow skewed in favor of the company". This is supported by the research insights from MSCI (2023a), which only include SBTN in the checklist of integrating biodiversity into investment decisions within the context of market initiatives to pursue. This perspective is also supported by insights from EA3, with their finance team noting that major investment banks and organizations are currently not assessing whether a company is aligned with SBTN.

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[17] Consumers of the end product are from here on named 'end-consumers'.

[18] The customers of the interviewed production and processing companies are distributors and traders.

However, C7, drawing from prior experience in Environmental, Social and Governance (ESG), highlighted that SBTN might be included in the rating agency's criteria, allowing companies to fulfill certain requirements. Nonetheless, reaching this conclusion necessitates a comprehensive analysis of the ESG process. However, six companies acknowledged that investors are increasingly inquiring about their nature strategy, and SBTs for Nature serve as a credible means to address this. C7 referred to biodiversity as a prominent topic within the investment community. C3 mentioned that "investors are really reaching out sometimes with very specific questions about our biodiversity management strategy and what our plans are". Although investors do not specifically ask for SBTN, primarily focusing on TNFD, they understand the alignment between the two. However, putting this increased interest into context, C6 emphasized that while investors have begun to inquire, their focus remains predominantly on the economic aspects.

Employees have only been identified as a pressure point by one company (C3), noting their growing tendency to inquire about nature conservation and biodiversity information. Regarding *business coalitions,* only one company (C6) acknowledged the requirements of the coalition it belongs to, which includes NGOs like the World Wide Fund for Nature (WWF), for reporting on nature and biodiversity strategies. They find that insights from SBTN assist them in meeting these requirements. Moreover, EA3 mentioned that peer pressure within the markets could be relevant, but they were the only ones mentioning that.

4.1.3 Reputation

This chapter explores whether companies are aiming to increase their reputation by implementing SBTs for Land, meaning the collective perception of an organization. As image, being the "immediate mental picture that individual conceive of an organization" (Helm, 2011, p.9) and organizational credibility, being the extent of which an organization is "perceived as trustworthy and reliable" (Jamal & Abu Bakar, 2016, p.1) both can influence overall reputation. Therefore, they have been treated as sub-categories of reputation. This section does not cover if this reputation leads to the end-consumers' or customers' decision to buy more or pay more for a product. This investigation is made in chapter 4.4.1 'competitive advantage'.

The statements provided by the interviewees can be clearly categorized into two main areas: **credibility and enhanced image**. The analysis of the data suggests a disconnect in the logical progression, as while some interviewees explicitly mentioned that SBTN is bolstering their credibility (four companies and four ecosystem actors), this does not necessarily translate into an improved image for them. In fact, five companies expressed doubts about whether SBTN would enhance their image in the eyes of end-consumers and customers, with two of them acknowledging its potential to positively impact their image with investors. This notion is also mirrored in the approach of mentioning SBTN in the companies' sustainability reports. Six out of seven mentioned SBTN but only very briefly. If they would do it for image gains, one would think that they might emphasize more on their efforts. But this can also be due to the early stage of target setting. Only one company expressed confidence that their image would indeed improve with the implementation of SBTs for Land.

When assessing the **credibility** aspect, companies acknowledged that SBTN currently represents the primary approach for establishing standardized targets in a complex area like nature. Additionally, EA1 conceded that "when you can say that you are compliant to Science-Based Targets for Nature you have the highest credibility". It's necessary to convince your stakeholders that you are working in a science-based way. Exploring the reasons behind SBTN's credibility, EA2 points out that the body behind SBTN has already garnered credibility from the climate sector. They noted that across various stakeholder groups, including the financial community and environmental activists, SBTN holds more weight than just the methodologies

of individual companies or industry associations. Furthermore, EA4 acknowledged that SBTN's credibility stems from its multi-stakeholder, consultative, and collaborative approach. However, EA3 raised concern regarding the credibility of SBTN, pointing out that it is not feasible to conduct a comprehensive nature impact assessment using a "one-size-fits-all" method, which is the current approach adopted by SBTN.

Examining the potential enhancement of **image among customers and end-consumers** reveals three significant considerations. Firstly, if customers and end-consumers generally show little **concern for nature and biodiversity**, then there might not be a direct correlation between SBTN and an improved image. Various interviewees have expressed doubts regarding the level of concern among customers and end-consumers (C7, C1). C1 and C5 emphasized the ongoing struggle for end-consumers to grasp the implications of climate change, indicating an even greater challenge in understanding the consequences of broader nature degradation. This sentiment is echoed by C5 and C7, who highlight that end-consumers prioritize factors such as health, taste, and affordability over sustainability. However, C7 also saw potential in linking regenerative agriculture with health benefits as a means to gain end-consumer attention. Nonetheless, further research is needed to explore this connection in specific contexts.

Secondly, for customers and end-consumers to **associate SBTN with the sustainability performance** of an organization, there is a concern that SBTN is too abstract and lacks concrete understanding among end-consumers and customers. C7 revealed the outcome of company's own end-consumer studies indicating difficulty by end-consumers in conceptualizing terms like biodiversity, although they can relate to specific aspects such as the decline of pollinators. Therefore, breaking down the concept of biodiversity regeneration into more tangible specifics appears to resonate better with end-consumers. However, C6 suggested that this simplification is not captured by the complexity of SBTN. Additionally, EA4's argument resurfaced, highlighting that SBTN is primarily a tool for specialists and not commonly used for communication in society, thus receives limited end-consumer awareness.

Thirdly, customers and end-consumers often form opinions about organizations by **comparing them to competitors**. C6 suggested that SBTN might aid in performing better in assessments conducted by customers, where sustainability questions are asked and schemes like Ecovadis are used to rate suppliers. However, C3 raised concerns that SBTs for Nature may not serve this purpose effectively due to their local and context-specific nature, such as the sourcing of crops or the distribution of sourcing locations. This conclusion aligns with C4's statement that comparing "pears to apples" is not feasible, suggesting a need for a sectorization approach within SBTN to facilitate comparison.

When considering the potential improvement of **image among investors**, C1 and C6 asserted that SBTN enhances their standing with investors. They believe that by setting SBTN targets, their ESG ratings will improve, thereby enhancing their reputation with investors. However, according to C7, this potential reputational advantage may be hindered by internal misalignment between the ESG, investor relations, and sustainability departments. The investor relations team may not fully grasp the benefits of SBTN and the associated internal efforts, leading to ineffective marketing of SBTN towards investors. Conversely, the ESG and sustainability departments may not always possess a comprehensive understanding of finance, making it challenging for them to present compelling arguments to investors.

To conclude the findings around reputation, it is important to underscore how the **fear of greenwashing accusation** could hinder companies from considering the implementation of SBTs for Land. The perspectives from the interviewees on this matter were contradictory. EA3 emphasized that companies perceive a reputational risk in publicly committing to ambitious

goals that they may not be able to fulfill. This sentiment aligns with the statements from C1 and C2, who expressed that there could be a fear in the sector about facing accusations of greenwashing. Consequently, they prefer to develop a substantiated roadmap outlining how they will achieve the targets before making any public commitments. On the other hand, EA1 and EA2 held a contrasting viewpoint, asserting that SBTN provides a credible standardized approach that mitigates the risk of being accused of greenwashing. EA1 argued that companies would not utilize SBTN for greenwashing purposes due to the rigorous nature of the process. Similarly, C5 and C6 advocated for initiating the SBTN process even without a complete understanding of its implications. They view SBTN as a mobilization process that can be undertaken gradually, without the need for perfection from the outset. C6 encouraged proactive engagement, stating, "you will be behind your competitors if you just wait and see until everything is established". To address concerns about greenwashing, C6 advocated for transparently communicating to stakeholders that progress will be made incrementally and that efforts will become more concrete over time. Waiting, they argued, is not a viable solution. Moreover, starting with the process does not bind you to set the targets publicly.

4.2 Incentives and barriers for Science-Based Targets for Land from a strategic management perspective

4.2.1 Operational risk management

Operational risk "refers to the risk of loss resulting from inadequate or failed internal processes, systems, people, or external events"(Coleman, 2011, p.1). One type of operational risk is supply chain risk which involves disruptions or failures in the supply chain (Lockamy & Mccormack, 2009). To investigate the relationship between supply chain resilience and SBTs for Land, it is necessary to clarify their approach towards impacts, dependencies, and risks. SBTs for Land evaluate business impacts on nature by assessing pressure on land use, land use change, soil pollution, and the state of nature (see figure 2-4). However, since SBTN primarily focuses on targets supporting the management of business impacts on nature, its guidance on assessment and target setting does not currently include dependencies. Nevertheless, companies can incorporate information on dependencies when selecting priority locations for target setting and action (Step 2) (United Nations Environmental Program [UNEP] et al., 2024). Furthermore, by evaluating companies' impact, SBTN supports two out of five steps in determining business dependency: Measuring impact drivers from the business's own activities and assessing the state of nature supporting ecosystem services (UNEP et al., 2024). This helps companies understand "how their impact drivers could be affecting the ecosystem services upon which they depend" (UNEP et al., 2024, p.36). On the other hand, risk refers to specific events that may occur and have a negative impact on a business (Lockamy & Mccormack, 2009). SBTN does not explicitly address governance or risk in its guidance (UNEP et al., 2024).

From the interviews it can be concluded that setting SBTs on impacts can be a risk management approach for physical risks. EA2 made a clear connection between impacts and dependencies stating that what a company impacts and what it depends on often connect directly and always indirectly. They saw it as "a bit of a false binary" between impacts and dependencies and consider it an "artificial distinction". This aligns with the perspective of C4, who considered these two factors closely together, stating that "if we are dependent, then we are responsible for its maintenance, so we can still use it".

The majority of the companies agreed (5 agreed, 2 no statement) that supply chain resilience has been an important factor for them to consider the establishment of SBTs for Land. Three out of four ecosystem actors also shared this sentiment. C7 and C5 underscored the critical dependence of the agri-food sector on biodiversity, emphasizing the necessity to ensure the continuity of the supply chain. According to C1, "the biggest reason why we would set targets

is initially at least to be resilient in our supply chain". They stressed the importance of managing nature-related risks effectively. Furthermore, C3 concurred that the assessment and prioritization within the SBTN process aid in identifying key areas within the value chain where action is most crucial. According to them, despite the existence of projects specifically focused on supply chain resilience, SBTN provides clarity on where interventions would be most impactful. This is also in line with statements from C5 saying that with the results they obtained, they started to refine their sustainability strategy based on the high risk areas that they spotted to then improve and mitigate this risk.

4.2.2 Goal harmonization

Two interviewees concurred that implementing SBTs for Nature improves the **internal alignment of the company's strategic goals** (C2, C7). Before adopting SBTs for Land (C7), the data they gathered was qualitative and thus "not really decision friendly". SBTs offer a quantitative approach that is considered more "mature and complete". They also emphasized that various departments, from sustainable sourcing to ESG and climate, have distinct internal objectives and incentives. A unified goal like SBTs for Land helped "provide focus internally", partly by bridging the connection between Climate and Nature. Within their annual report 2023 C6 also mentioned that they are using the targets to align the strategy and targets for nature and biodiversity.

Moreover, three companies agreed that they are looking into SBTs for Land to **align their organization-centric goals with global thresholds**. In this context, it is not because they aim to gain reputation with the term "science-based", but rather to steer internally toward a global threshold. C2 emphasized their goal of assessing their alignment with SBTs, while also considering setting internal targets in the future instead of strictly following the SBTN guidance. C5 also expressed, "what we were doing was already good, but we really wanted to have a science-based approach to be able to really know that where we are acting is the right place and the right moments". They explicitly stated their intention to scale up SBTs for Land for their entire brand level in order "to add a science-based layer to our strategy". While not mentioning it in the interview, C1 claimed in their annual report 2023 that they are implementing the SBTN approach to determine ecological thresholds. EA1 asserted that companies could potentially set their targets internally with common sense, but the crucial aspect is knowing how much to reduce certain indicators. For him, it is "fairly difficult [...] to set quantitative targets", and SBTs for Land provide this information, making them a good approach to follow.

4.2.3 Alignment of organization-centric goals and Science-Based Targets

Depending on the maturity of their internal nature and biodiversity strategy, interviewees identified challenges with aligning existing organization-centric efforts and goals with the requirement of SBTs for Land. These challenges are twofold. Firstly, it can be difficult to **align the tools and methods**. Secondly, some companies expressed doubts about whether the SBTN approach would provide **additional value compared to their existing internal targets**. Specific criticisms of the guidelines themselves will be discussed in chapter 4.5.

EA2 and EA3 emphasized that conducting a new investigation to **compare companies' current approaches against the new methods** from SBTN and rethinking them is highly time-consuming and costly. EA3 stated, it "becomes quite a frustration for companies who consider themselves to be very advanced in their understanding of their impacts or their dependencies, or ones that have spent a lot of time and money over the last few years understanding this more, but then when it comes to SBTN, none of their previous work fits within the framework or the guidance, so they are still starting from square one". This sentiment

is echoed by C1, who sees challenges in attempting to fit their existing efforts, which they believe are accurate, into a new framework. Regarding the alignment of specific tools and methods, EA3 also emphasized that companies have invested time and effort in establishing environmental DNA (eDNA) data across their landscapes. However, this method is currently not mentioned in the guidelines, presenting a barrier for them. Conversely, C3 and C5 did not perceive any clash between their internal tools and methods and those presented by SBTN. However, C6 and C7 highlighted that these ambiguities may become more evident once the SBTN guidelines are revised to be more specific. C6, working with the Sustainable Agricultural Initiative (SAI), anticipated that some work will be needed to align it with SBTN, but they are awaiting further guidelines from SBTN on this matter. In this regard, C7 also pointed out that SAI is using connectivity as a metric for habitat assessment, whereas this is not in line with SBTN land guidelines.

Two companies expressed doubts that the SBTN approach would **be more accurate than their internal approach**. According to C1, "for us we believe that we are already doing the right things". They believed that implementing SBTs for Land would not necessitate starting new or additional projects, as they have already established several. Similarly, C2 questioned the accuracy of the SBTN approach compared to their internal one. On the other hand, C3 has several established programs in place, including alignment with SAI. But those projects primarily concentrate on carbon and water so SBTN would suit to further improve the land and biodiversity angle. Also, EA4 generally disagreed with the claim that companies already have accurate internal targets. They argued that projects are generally done in isolation with a risk management perspective rather than applying a holistic impact management approach. They believed that organization-centric goals have not achieved a "no harm" perspective, and further efforts are needed.

4.2.4 Social considerations

When considering SBTs for Land, tension may arise with social goals if the rights of farmers are not considered and if the burden of increased requirements such as changed farming practices or data collection is imposed without compensation. In general, it is concluded that the social dimension is highly significant in agri-food supply chains due to the high interdependencies between human and natural resources (C4). Additionally, ensuring a just transition is a challenge "everyone is struggling with across the whole sector" (EA2).

Three companies and three ecosystem actors mentioned that the **social trade-off serves as a barrier** for companies to implement SBTs for Land. According to C1, the most conflict arises with the land footprint target, which aims for higher productivity. To achieve this objective, they must change sourcing locations from areas with lower productivity to those with higher productivity, necessitating a change of vendors. They claimed that this inhibits them from setting the targets because it does not actually create the impact they want to achieve. Another challenge related to changing vendors to achieve the targets can occur when companies use exclusion criteria or certification schemes to select their vendors (EA1, C6). Moreover, C1, EA2, and EA4 acknowledged that farmers need monetary incentives when they are required to change their agricultural approaches and establish data management systems. However, based on other interviews, agri-food corporations might not be willing to pay farmers for changed practices. One company revealed that they try to handle negotiations in a way that they come out neutral, even though the farmers implement certain certifications that include biodiversity criteria. EA4 strongly criticized this approach, as ultimately, the agri-food corporations are the beneficiaries, as they want their reporting and reputation to be enhanced. EA2 raised concerns regarding the possibility that SBTN may leave the responsibility for addressing the social justice aspect of the transformation solely with companies, without providing specific guidance. SBTN's requirement for targets to be reached in a socially just manner may not offer concrete directives.

In their view, SBTN may simply urge companies to utilize their budgets, research and development, and innovation to devise solutions. Furthermore, one consultancy interviewed indicated that they are solely engaged in conducting the environmental assessment and prioritization. This underscores a broader concern when environmental assessment and social considerations are treated separately that it could lead to misalignment.

Conversely, interviews underscored that regenerative agriculture practices have the potential to **enhance the long-term profitability of farmers**. For instance, intercropping allows farmers to diversify their income streams, thereby increasing resilience (C1). Additionally, C1 noted cost efficiencies when farmers require less fertilizer for the same output. Both EA1 and C1 were convinced that while costs may initially increase, regenerative farming practices will ultimately lead to higher profits in the long run. EA1 also emphasized that "local communities have many benefits from natural restoration". Furthermore, EA4 asserted that they "cannot see that there would be any social trade-offs for delivering on environmental targets", as both social and environmental outcomes can collectively improve.

4.3 Incentives and barriers for Science-Based Targets for Land resulting from internal capacity

4.3.1 Beliefs and mindsets

To comprehend the determinants underlying a company's decision to adopt SBTs for Land, it is imperative to investigate the internal stakeholders who are either facilitating or impeding this process.

Commencing with the individuals or departments typically *instigating companies to explore SBTs for Land* and potentially integrate them, it was universally acknowledged that the initial impetus for establishing SBTs often stemmed from a *sustainability professional*. Frequently, it was driven by a single person within the sustainability department. This observation is supported by EA4, who questioned whether non-specialists in sustainability, including the board, possess adequate knowledge and understanding of the framework to champion it within the organization. Within this context, EA2 shed light on the specific sustainability expert who might advocate for the topic, indicating that it could be either a nature or climate expert involved in carbon target setting, depending on the company's staffing. Furthermore, three companies mentioned that a push from the *board level* complemented the efforts of the sustainability department. This aligns with findings from EA3, which noted that companies often seek assistance from them in exploring SBTN due to board directives. Therefore, for them, sustainability professionals are not always able to justify the company's decision to consider SBTs for Land. In addition to sustainability professionals and board-level involvement, *finance, procurement, and operations* were identified as drivers of SBTN in different companies. In the case of C1, finance played a role in the process due to its responsibility for CSRD, while the procurement team advocated for SBTN within C3, and the operations team supported it within C4.

According to the interviews conducted, the *individuals or departments opposed to SBTs for Land* have not been clearly identified. This lack of clarity primarily arises from the absence of visible business implications of target setting for internal stakeholders, which is why they are not yet advocating against setting SBTs for Land. This is supported by the statement of C6 that people are "not yet challenging that we go in this direction, but I think the challenges will come when we understand the economic implications". Moreover, C7 emphasized that they are not assuming any opposition from employees as people focus on executing their tasks and generally appreciate having a globally approved direction, such as a target-setting framework, which provides clarity and often ensures funding allocation from top management. Currently, apart from the sustainability department, discussions regarding SBTs for Land primarily occur at the

strategic and top management levels. Many managers feel uncomfortable to "take responsibility for things they have actually not internalized before" (EA4). Besides the unknown business implications, such as costs (which will be addressed in chapter 4.4.2), two other phenomena were mentioned that could lead to top management hindering the implementation: Lack of awareness regarding the consequences of inaction and self-interest of internal stakeholders.

For C4, inaction is attributed to **management's failure to recognize the connection between their actions and nature degradatio**n, as evidenced by their assertion that SBTs for Land "do not create value". This indicates a misunderstanding of the critical importance, with discussions focusing on the wrong aspects rather than acknowledging the potential consequences of inaction, as highlighted by C4 and EA4. It is a step-by-step process: Before implementing SBTs, internal stakeholders must first understand concepts such as biodiversity and nature's importance and relevance to the company (C3, C5). C4 and C5 suggested that adopting a risk perspective can help persuade internal stakeholders, while exploring SBTN can raise internal awareness of the connection between nature degradation and business activities, facilitating an "internal shifting process" (C7) and aiding in internal defense of a nature strategy (C6).

Linked to **stakeholders' self-interest**, one interviewee noted that many executives' bonuses are tied to climate performance, discouraging the addition of complexity to strategic targets. However, in the future they see potential for SBTN being the body to provide clearer metrics enabling the integration of broader nature aspects into executives' bonuses.

4.3.2 Metrics capability

Before knowing which data is required, companies need to have a clear picture of which metrics they are supposed to measure. Here it needs to be distinguished between the level of pressures (e.g. land use change) and biodiversity state of nature indicators (e.g. ecosystem integrity/condition and species extinction risk) (see figure 2-4). Evaluating the condition of an ecosystem at a specific location involves integrating various measures of relevant ecosystem characteristics through a variety of indicators, which are combined to assess the overall condition (Czúcz et al., 2021). The Align project, funded by the European Commission and spearheaded by UNEP World Conservation Monitoring Centre, delineated an optimal methodology for assessing the biotic elements of condition pertaining to characteristics across the three core dimensions of composition, structure, and function (European Commission Align project, 2022). Composition denotes species richness by assessing the species present in the species assemblage as a whole and their relative abundances within an ecosystem. Structure aggregates the biophysical properties of ecosystems (that is vegetation heights) and encompasses landscape-scale fragmentation and connectivity. Functional indicators, such as nutrient dispersal or water filtration, gauge the processes completed by the ecosystem or reflect its capacity to perform these functions.

It has been observed across multiple interviews that there is **confusion regarding the exact metrics** to be used to measure biodiversity state of nature, given the abundance of available options (C1, C2, C4, C7, EA1, EA3, EA4). C7 emphasized that the main challenge with SBTN currently is the lack of identified metrics for ground-level measurement, as noted by various pilot companies. This sentiment is echoed by EA4, who stated that "companies are overwhelmed by just the number of options they have and the lack of informed guidance". Consequently, C7 has employed a dedicated researcher to investigate biodiversity metrics applicable to their activities. As a result of the missing guidance, the informativeness of target realization is limited. C1 stressed that if companies use different indicators, the baseline and required actions to meet the target will vary. To illustrate the complexity of condensing the biodiversity state of nature into limited indicators, C7 highlighted the challenge of understanding

ecosystem connectivity. The research institute they are collaborating with has approximately 35 doctoral students working on this specific topic, which raises doubts about the feasibility when such terms are used in very general frameworks aimed at farmers.

EA4 advocated for a focused discussion on determining the appropriate question to ask. They argue that the maintenance of a specific species in a particular environment is not necessarily indicative of ecosystem health and function or its long-term productivity. Their solution would be measuring ecosystem conditions with not more than ten indicators. Additionally, EA4 emphasized the necessity for specific guidance tailored to various ecosystems and types of land use.

4.3.3 Data availability

The "foundation of any kind of nature strategy will be about data collection" (C7). This also provokes that the SBTN project can look like a reporting project, which necessitates careful management by the company to avert stakeholder rejection (C5). The interview outcomes suggest that the obstacles to establishing SBTs for Land associated with data availability can be delineated into three stages. Firstly, identifying the origins of raw materials in a product (supply chain traceability). Secondly, generating data on location-specific impacts. Thirdly, ensuring the availability of this data in a database to facilitate its utilization by companies.

Before looking at the different steps, it needs to be assessed how interviewees evaluate the **necessity to investigate location data**. Within the interviewees there is still non-conformity about this debate. Three ecosystem actors emphasized the importance to have location specific data in order to determine the real company impacts and have a valid nature strategy. EA1 emphasized that you need to bring clarity into your supply chain and "only then you can start measuring your impacts, your dependencies, your risks, opportunities, otherwise not". This is supported by EA4 who advocated that companies who are trying to define their impacts and dependencies really do need to understand the location data. For them, to see whether an ecosystem is healthy or not you need to get into the details. However, only two companies stated that having precise location data is what they are aiming for (C3, C5). For C5 it was given that they need to follow impacts on ground and specific farming practices because between global, regional, and local measures there are significant gaps. On the other side, four other companies emphasized that for them having farm level data seems not possible as they are already struggling with country and regional level data (C1, C2, C4, C6). C1 stated that while they are willing to gather data on a project basis, currently it seems unrealistic to claim on a highly aggregated corporate level that they will restore a specific amount of land or biodiversity as they would "need to track the full globe". EA1 addressed this concern by emphasizing the need to begin with a high-level screening, allowing for the identification of priority locations for efforts. However, this slightly contradicts the earlier notion that location data is necessary to determine the real baseline, suggesting that there is not a real consensus yet on how to overcome this dilemma and case specific conditions need to be assessed. As a solution, C6 suggested that working with suppliers and not directly with farmers is a feasible option for them that they are aiming for. They consider getting involved in "projects that support biodiversity and nature linked to your own value chain, but not necessarily specifically that you can trace it to your products". A similar pragmatic approach was chosen by C4, who established initiatives to invest in restoration which was not necessarily directly associated to their sites but within a 50-kilometer radius so that certain level of attribution was ensured.

However, when the intention of working with location-specific data was given, all interviewees identified **supply chain traceability as a challenge**. For EA1, supply chain traceability represents one of the "biggest problems for the agri-food sector". For C1, it poses an inherent challenge due to the rapid evolution of their supply chain, where they anticipate sourcing

products from different farms every year. Therefore, it is challenging to set an appropriate baseline. It is undoubtedly a demanding process, requiring companies to engage with traders, cooperatives, suppliers, and farmers, and to collaborate across different departments such as procurement (C5, C3). This also implies a dependency on these stakeholders. Therefore, EA1 emphasized that many of the companies they are engaging with are currently setting targets and will spend the next few years navigating through their various supplier tiers.

When the origin is identified, **gathering data about the impact of specific locations can be challenging**. However, before delving into the specific challenges, it is essential to clarify which data needs to be obtained directly from farmers and which data can be generated remotely through secondary data and modeling. Interviewees noted that land use change can generally be tracked using remote sensing. However, EA2 highlighted that the availability of geospatial data fluctuates across regions and countries. On the other side, data such as fertilizer application rates or soil quality need to be provided by farmers. Therefore, there needs to be a distinct discussion about the specific pressure and state of nature indicators for which farm-level data is necessary and feasible. This aspect cannot be fully addressed in this thesis. Also, EA2 emphasized that within the evolvement of the target guidelines, they expect clearer guidance to what extent secondary proxy data can be used versus primary data.

Nevertheless, EA4 underscored that much of the data still relies on farm-level reporting. Different measurement methods have been mentioned by the interviewees. Based on NatureMetrics (2024), those have been gathered in figure 4-1 according to the different types of ecosystem conditions (composition, structure, function) (see 4.3.2).

Ecosystem condition		
Composition (e.g. Species richness)	**Structure** (e.g. Connectivity)	**Function** (e.g. nutrient dispersal)
eDNA	Remote sensing (satellites)	
Bioacoustics		eDNA
Cameras		

(METHODS on left side, spanning the method rows)

Figure 4-1 Measurement methods for ecosystem conditions

Source: Own illustration based on (European Commission Align project, 2022; NatureMetrics, 2024)

The method of eDNA has been mentioned which supports the measurement of the composition and function of ecosystem conditions. EDNA analysis utilizes a non-invasive genetic method to monitor species presence/absence and distribution by detecting small fragments of genetic material deposited in the environment by organisms (NatureMetrics & The Biodiversity Consultancy, 2021). EA4 appreciated the method for its ability to characterize a significant portion of the ecosystem. However, they express concerns about its current feasibility at scale due to the need for laboratory sampling. Additionally, they emphasized that the composition identified with eDNA should not be considered in isolation from the structure and function of the ecosystem. Furthermore, EA1 identified challenges in its compatibility with modeled approaches, such as comparing it to mean species abundance[19] scores ranging from zero to one. Furthermore, bioacoustics[20] and cameras have been highlighted for supporting

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[19] Mean species abundance is the average number of individuals per species within a given area or ecosystem (PRé, 2023).

[20] Bioaucustics as a measurement tool refers to the detection of animals base on their acoustic signals for communication and orientation (Obrist et al., 2010).

composition measurement, along with remote sensing via satellites, which aids in measuring ecosystem structure and function.

EA4 raised concerns that if farmers lack financial support, technical know-how, or time, it can become a significant bottleneck for them to report the data. Even though some data may already be required from other stakeholders like municipalities for regulatory purposes, EA2 emphasized that "asking the same question from a slightly different perspective is not a tick box exercise", as it necessitates additional work for farmers to translate one metric into another and input it into a web portal. Therefore, it is crucial for agri-food companies to support farmers in this process (EA4). Looking into solutions, C3 highlighted that mapping out players in specific areas to collaborate with helps gather data at the farm level. This is supported by EA1 who recommends companies to connect to local partners and universities on landscape level. For C4, following the SBTN guidelines enabled a deep screening of data management and internal engagement.

As a final step, **data must be openly shared** to become available for companies. EA4 affirmed the necessity of gathering data into platforms to democratize and make it more accessible for the industry. This would enable the aggregation of data, incorporating environmental variables, species data, and habitat data, and provide more sophisticated tools for monitoring over time. This is supported by C4, who raised concerns that there is limited historical data points available for land use, biodiversity and ecosystem services. EA3 also highlighted the challenge of data licensing for consultancies, as they need to search for open-source data suitable for commercial use, which is often limited.

4.3.4 Tool availability

When the data is made available there need to be tools available that generate metrics by processing, analyzing, and interpreting the data. In general, tools can be based on the actual location data or modelled data. This section reviews the tools which are used by the interviewees and limitations raised by them. These included only tools based on modelled data. However, it cannot be viewed as an extensive overview and analysis of tools available to analyze nature pressures and biodiversity.

In general interviewees agreed that many tools are available (EA3, C3). However, most of them are very high level (EA1). Most of the companies are currently testing several tools for their usability. For C1 none of the tools recommended by SBTN gave them "more insights than the data and tools [they] already have". They emphasized that with these high-level tools, everything is assigned to be a risk and red, but that this does not necessarily help to tackle the problem.

The *STAR metrics* from IBAT (see chapter 2.2.2) have been referenced by three companies and three ecosystem actors, with the latter elaborating on the limitations of the tool. IBAT provides a general indication of proximity to protected areas or whether activities are within protected areas. However, EA1 found this information insufficient as it does not indicate the specific impact of activities on species and habitats. Regarding the STAR metrics, EA1 criticized that companies are left with lengthy lists of protected or red-listed species without clear guidance on how to address them, as they cannot establish a connection between their activities and the list. This sentiment was echoed by EA4, who suggests that the STAR metric is useful only up to a certain point, as it provides an aggregated score at a landscape level, making it difficult to distinguish between neighboring farms. In contrast, EA3 held a more positive view, considering the STAR metrics "very, very good" and "the world's best metric for species significance" attributing this to its refined and granular nature. They emphasized that the metrics provide a high score for species with limited spatial ranges, making it an effective tool for assessing species significance.

The *WWF risk filter* was referenced by three companies and one ecosystem actor. According to EA1, the tool's various layers could aid in prioritizing a list of sites when systematically applied by companies. C4 also appreciated the tool, stating that it is "built on a reliable data set, data point, and data author that is already combined", thus alleviating the need for additional work. However, C1 also pointed out its limitations for certain commodities, noting that for specific ones, all indicators may show as red, which does not contribute to problem-solving.

Other tools that have been mentioned to be in use are *ENCORE* (C1,C3,C6), lifecycle assessment (C2, C3), the high impact commodity list provided by SBTN (C1), responsible sourcing tools (C4), a tool provided by the Union of Ethical Biotrade (C4), TRASE (C6), UN Biodiversity Lab (C6), species distribution models (EA4) and other innovative local measurement (C5). Moreover, companies mentioned to work together with HowGood (C6) and CrowtherLab (C7).

A common challenge encountered across the tools, stemming from the aggregation level, is the **impact problem**, which refers to ensuring that measurements are not influenced by external factors such as practices from other farms. Within the SBTN target boundary A, where measurements can be taken on a subnational level, the average includes the impact of others (C2). However, most interviewees generally acknowledged this problem but have not thoroughly investigated it (C2, C4, C5, EA4). This sentiment is summarized by C5, who stated that "we are all facing this kind of impact problem, but we are often not aware of it". EA3 also noted that this issue is currently not well addressed in the SBTN guidance.

4.3.5 Skills

Establishing and maintaining a suitable skillset within a company for SBTN target setting and subsequent monitoring seems to present a significant challenge. This sentiment was shared by four companies (C1, C3, C5, C6) and all ecosystem stakeholders, with only one company (C2) indicating that target-setting would rely on the available workforce.

Firstly, it is imperative to **ascertain the specific skill sets required** for the task. From the interviews conducted, it can be inferred that a combination of business and ecology skills is necessary, with the latter often being insufficiently represented within corporate environments. Four of the companies (C1, C3, C5, C6) and all ecosystem actors acknowledged the importance of incorporating *scientists and ecologists* into the process, as they possess an understanding of nature's risks from various perspectives, which is deemed "quite important to be credible and draw the right conclusions" (C5). These individuals must comprehend the interplay between human activities and the environment and possess the capacity for rational analysis to identify priorities (EA4). EA1, EA3, and C6 specifically recognized the need for ecologists to accurately interpret data. While mapping, loading, unloading data, and calculating indicators are skills that can be acquired, according to EA3, the interpretation of data and understanding the limitations of each indicator require scientific expertise. Merely providing access to data is insufficient; training and knowledge are necessary to comprehend data, indicators, and their implications (C6). However, C1 also emphasized that employees do not need to possess full knowledge from the outset, as much of the process relies on rational thinking. This aligns with the observation that most individuals responsible for SBTN in the interviewed companies (with two exceptions) had backgrounds in business and are now making efforts to understand the ecological aspects.

Additionally, two companies (C3, C5) and one ecosystem actor (EA4) underscored the significance of *business management and soft skills* in establishing SBTs for Nature. Convincing stakeholders of the urgency of sustainability issues requires individuals with "storytelling skills" who can communicate sustainability concepts in simple terms tailored to various stakeholders (C3, C5). Furthermore, C5 emphasized the importance of project and people management skills.

Employees tasked with SBTN responsibilities must collaborate with a diverse range of internal and external stakeholders to gather data or develop strategies together.

"It is challenging to consolidate all necessary skills within a company", as articulated by EA4, due to the predominant background of individuals with experience in nature and biodiversity primarily being in NGOs or academia. Acquiring suitable employees poses a "huge barrier" particularly given that sustainability departments are often understaffed (EA3). Providing them with the necessary time and resources to understand these topics thoroughly presents a challenge, as it adds to their existing workload (EA2). According to EA4, large companies are beginning to recruit biodiversity specialists or heads of nature, but this does not necessarily guarantee the presence of the requisite skill set. Additionally, EA2 emphasized the distinction between biodiversity and nature expertise. While many companies may have experts in biodiversity, regenerative agriculture, or water management, integrating these fields into comprehensive sets of targets that encompass aspects such as land use change and landscape engagement presents a challenge, as each requires specialized knowledge and research expertise (EA2).

Regarding the strategy for leveraging these skills, C5 and EA4 proposed hiring business professionals specialized in environmental management and recruiting ecologists who are adaptable and eager to learn. C3 indicated that they would wait until they have a clear understanding of the targets and company direction before deciding on hiring needs, although they acknowledged the likely necessity of external consultants. This perspective was echoed by C1. However, they cautioned that consultants may lack specific expertise as well. On a positive note, EA2 expressed optimism, believing that experts at the intersection of ecology and business will emerge over time, similar to the evolution observed in the climate space. Initially, there were climate scientists and accountants, which evolved into individuals skilled in GHG accounting. They anticipated that the system will develop organically, eventually yielding a workforce capable of establishing and monitor SBTs for Nature.

4.4 Incentives and barriers for Science-Based Targets for Land from an economic performance perspective

4.4.1 Competitive advantage

As discussed in Section 4.1.3, the interviewed companies generally do not perceive SBTs for Nature as enhancing their image with customers and end-consumers. Consequently, it is natural that interviewees concur on their current inability to predict whether SBTN would result in a higher price or increased demand for their products. According to C7, "it is hard to say how much value you can capture from SBTs for Nature". While they hope end-consumers will make a connection between their brand, SBTs for Nature, and the product, this association remains uncertain. C5 also mentions the bottleneck that currently exists, making it a challenge for them to valorize the act of establishing targets. For C2 and C1, the motivation to investigate targets did not result from the belief that setting targets would give them a competitive advantage. C1 held the belief that sustainability is a hygiene factor for their end-consumers, only resulting in non-purchase if the standard norms are not met. Furthermore, C4 emphasized that a competitive advantage in terms of market differentiation results from the positive impact of activities, rather than from target setting, which is more a performance indicator than a change indicator. Additionally, for them, SBTi and SBTN do not justify an increase in the price of their product.

4.4.2 Costs

In all interviews, there is a consensus regarding the barrier posed by costs in the implementation

of SBTs for Land. One reason for this barrier is that SBTs for Nature cannot be considered in isolation as they compete for funding with numerous other projects within the company (C3). Furthermore, it is frustrating for companies to allocate funds towards aligning existing efforts, which were already costly, with the requirements of SBTN (EA3). However, two companies (C2, C6) and two ecosystem actors (EA3, EA4) acknowledged that the total costs associated with target setting and implementing corresponding actions are not yet fully determined. This prevailing uncertainty serves as a significant barrier for C6, as management needs to grasp some understanding of the financial implications before committing to setting SBTs for Nature. This observation aligns with insights from EA4, indicating that much of the resistance to sustainability initiatives stems from the overarching company objectives of cost efficiency. Given this landscape of company objectives, the sustainability department must be able to estimate costs before conducting a precise analysis (C6). Consequently, C6 concluded that targets need to be established "without knowing everything but trying to explain that people take it stepwise and become more creative and concrete over time".

The interviewees identified three main categories of costs associated with the implementation of SBTs for Nature: labor, measurement, and action. Firstly, they underscored the necessity of **compensating individuals** involved in target setting, monitoring, and working on reduction requirements (C2). These salaries would need to be factored into the budget to ensure availability. EA3 also highlighted the substantial costs associated with hiring consultants, often necessary due to limited internal skillsets (see 4.3.5).

Secondly, all ecosystem actors and two companies (C1, C4) emphasized **measurement costs** as a significant barrier to implementing SBTs for Nature. Mapping nature impacts is "inherently a resource-intensive exercise and many corporates just aren't prepared for that" (EA2). This is particularly true for ground-based measurements, where techniques are available (see 4.3.3) but "data collection is very expensive" (EA1), especially when sourcing globally (C1, C4). EA3 also noted that companies may find the licensing costs of modelled data relatively high. However, they contrasted this with the costs of other data, such as injections or agricultural yields, which are also expensive and willingly borne by companies. A similar notion is echoed by EA1 who highlighted that companies are willing to spend significant money to master financial accountability, "but for nature it should always be very cheap", which is not fair.

Thirdly, two companies (C4, C6) and EA1 highlighted the **costs associated with actions** needed to fulfill SBTs commitments as a challenge. EA1 and C6 noted that sourcing in line with SBTs for Land, such as adopting regenerative agriculture principles, can lead to higher purchasing costs for companies. EA1 mentioned possible costs related to changing suppliers to meet exclusion criteria, while C6 raised concerns about potential price impacts due to reduced yields. Although C4 did not directly mention costs, they concluded that once assessments are made, action becomes necessary, which will be costly.

To mitigate the barrier of costs, C6 proposed a governmental economic incentives program same as those for climate-related initiatives. Similar to state support for investing in renewable energy, there could be support for biodiversity actions for companies or directly for farmers.

In addition to the barriers, the **costs of inaction could serve as an incentive** to implement SBTs for Land. However, this aspect has only been identified by one company (C1) as a motivating factor for considering the establishment of SBTs. They emphasize that "if we just sit on our hands, we can probably get some profit for a couple of years but then we won't be in business in 20 years". Estimating the costs of inaction, such as the consequences on soil health and yields, becomes "so exponentially big that you are as bad as your assumptions". Nevertheless, it is evident that taking no action will ultimately lead to the company's demise.

4.4.3 Change of portfolio

As achieving the targets would necessitate a reduction in material throughput, it may lead to forced changes in product portfolios. However, none of the interviewees cited this as a barrier to their decision to establish SBTs for Land[21]. One of them believed that their current portfolio does not include high-impact commodities, and therefore, this would not affect them. Two other companies highlighted that they are already exploring alternative products, such as plant-based options, to complement their portfolio. However, reducing their main products cannot be raised as a topic internally, as this would not align with business objectives.

4.4.4 Capital attraction

In chapter 4.1.2, it was examined that interviewees perceive increased stakeholder pressure from investors to adopt nature strategies. The subsequent inquiry pertains to whether they contemplate adopting SBTs for Nature in response to this pressure or because they seek to enhance their prospects for accessing capital, thus constituting an internal economic factor. Only three companies acknowledged that they are aiming to be more attractive to generate capital with SBTs for Nature. C1 highlighted that an increased rating would make them a more interesting investment opportunity. C5 further tries to actively attract investors by showcasing that they are a pioneer in the SBTs for Nature space. Also, C6 admitted that they aim to get an improved profile towards investors.

4.5 Barriers related to the current guidelines for Science-Based Targets for Land

4.5.1 Characteristics of the targets

The critique of the specific targets may not be comprehensive, as they only reflect the immediate concerns of interviewees due to time constraints during the interview. Firstly, three interviewees raised concerns about the applicability of the *land conversion target* (target 1). One interviewee found a deforestation target sensible, given its direct relevance to their commodity. However, they perceive no added value in establishing targets for other conversions as those are not related to their commodity. Additionally, another company criticized the lack of focus on specific crop conversion, as the targets approximate the sourcing area instead. This is summarized by an ecosystem actor who criticized that the current guidelines are a 'one-size-fits-all' method without considering certain circumstances.

Secondly, much greater critique was directed towards the *land footprint target* (target 2), with two companies and two ecosystem actors expressing concerns. One company and one ecosystem actor questioned the entire concept of the target. They argued that reducing land promotes intensive agriculture, which can adversely affect soil health and water systems without promoting biodiversity. According to them, the question of what constitutes 'sustainable intensification' remains unanswered. Additionally, one of the ecosystem actors emphasized that the guidelines for target two are based on bold assumptions. One particularly significant and questionable assumption is that all land reduced from agriculture will revert to natural habitats. They argued that while landscape initiatives are required in target three, there is no requirement for these actions to take place in the same areas. Moreover, one company stated that the target is not suitable for their plant-based business. They argued that growing orchards is inherently extensive agriculture, and any attempt to reduce land would increase other indicators such as water use, as irrigation would be necessary for the orchards. This viewpoint aligns with the

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[21] *This chapter is fully anonymized because drawing conclusions about commodities could potentially enable the identification of the companies associated with the claim.*

stance of two other companies, who advocated for more flexibility and sector-specific approaches.

Thirdly, some overarching concerns regarding the guidelines were raised. One company expressed apprehension that if a company is expected to set targets, they are required to do so for all their material pressures simultaneously, such as water and land. It is challenging to allocate resources and commit to addressing all pressures simultaneously. This sentiment partly aligns with another company's comment that imposing such a requirement on the entire organization at once may not be practical. They suggested that it is necessary to start with specific areas and learn from them before expanding to other parts of the company. This issue was addressed after the public consultation process 2022-2023 by allowing a business unit approach in the beginning (SBTN, 2024c). Another issue raised is the process for updating the guidelines. When new guidance is released, companies are granted only a six-month grace period to validate their targets and methods. Consequently, if companies undertake thorough assessments, they may struggle to finalize target setting within this timeframe, rendering their efforts invalid. Validation is then based on the subsequent version of the guidelines.

4.5.2 Complexity of guidelines

Three ecosystem actors voiced concerns regarding the complexity of the guidelines. According to EA1, "many companies are hesitant to engage in SBTs due to their complexity, despite agreeing with the principle of Science-Based Targets". They highlight the substantial effort required to comprehend the guidelines, noting that they are quite intricate even for specialists. EA3 emphasized the need for greater clarity and consistent use of terminology. They noted that certain methodological steps, although discussed at a high level in the guidelines, are in fact quite complex. They view complexity as a primary barrier, which also affects consultants. Similarly, EA4 advocates for the guidelines to be more accessible. Currently, they are written for scientists by scientists and need improvement. This concern was already acknowledged by SBTN within the public consultation process and addressed by the goal to publish a Corporate Manual and additional resources such as Train the Trainer materials (SBTN, 2024c).

However, EA3 also pointed out the challenge for SBTN in achieving a balance between scientific rigor and corporate understanding, as they are the first organization to explicitly outline both what needs to be done and how to do it. This view is supported by Samuel Sinclair (2023, para. 2), the director of a consultancy specialized on biodiversity, saying that "obviously it's all still evolving, but this is where the science gets combined pragmatism to create the robust solutions we need".

4.5.3 Provisional nature of guidelines

Finally, interviewees highlighted that they are hesitant to commit to targets due to the ongoing development of the guidelines and the absence of specific SBTN guidance on biodiversity (C1, C2, C6, EA1, EA2, EA3). C1, C2, and C6 expressed their intention to await potential changes in methodology and clarification on the tools to be used after the pilot phase concludes before setting SBTs. Moreover, given the early stage of the process, companies lack good practice cases to learn from (EA1, EA3). The need for case studies and illustrative examples was also raised in the public consultation 2022-2023 (SBTN, 2024c). However, C6 suggested initiating the process despite incomplete information, deeming it "difficult, but also very interesting to be involved in the development".

5 Discussion

5.1 Discussing the results in the light of previous research

5.1.1 Institutional structure – Policies and norms

Examining the findings regarding **policies and norms** reveals consistency with the conclusion drawn by zu Ermgassen et al. (2022) that mandatory disclosure frameworks may expedite the establishment of target setting, extending this assertion particularly to SBTs for Land. Furthermore, it identifies a relatively low connection between nature restoration policies and the establishment of SBTs for Land at the time of the study. Hence, it also contributes to documenting the linkage between corporate target setting and national policy, an aspect identified as weakly supported by Bjørn et al. (2022). Whereas SBTN campaigns with the contribution of SBTs for Nature in aligning company efforts with the GBF, this was only recognized as incentive by one company.

In addition to existing findings, the study reveals that companies already adopting **SBTi** are more inclined to implement SBTs for Land. However, if SBTi faces increasing negative perception, whether justified or not, it could hinder the acceleration and acceptance of SBTs for Land. Three debates have emerged that potentially undermine SBTi's reputation. Firstly, there is growing evidence of a discrepancy between company targets validated by SBTi and scientifically necessary actions (see section 2.1.2). This does not only decrease society's perception of SBTis but also prevent management to step up additional SBT targets. Secondly, the SBTi target setting process has been criticized for its lack of transparency, with concerns raised about the absence of disclosed evidence and analysis supporting its decisions (Bjørn et al., 2023). Without such evidence, it is difficult to independently verify the scientific validity of SBTi's decisions. Thirdly, SBTi "has faced a revolt" (Financial Times, 2024, para.2) after its board revealed in April 2024 that they might allow companies use carbon offsets to meet those Scope 3 targets. Therefore, it remains uncertain if SBTi can be seen as an accelerator or rather an impediment for the acceleration of SBTs for Land.

As delineated in section 2.2.1, the ongoing discourse on the **nature-positive narrative** suggests that companies' objective should be to contribute to achieving a nature-positive outcome rather than merely claiming to be nature-positive. This perspective was widely acknowledged by the interviewed companies, and it was additionally demonstrated that some of them perceive that SBTs for Land facilitate their contribution to the Global Goal for Nature.

5.1.2 Institutional structure – External stakeholders

Examining **stakeholder pressures**, the study did not confirm a significant influence of such pressures on companies to set SBTs for Land. It only showed that investors are pushing for nature strategies, but they are mainly not specifically referring to SBTN. This finding contradicts the observation by Grabs and Garrett (2023) that goal setting for nature-related aspects often arises in response to pressures from civil society (see chapter 2.3.2). However, this study also elucidates reasons why such pressure might not yet exist specifically for SBTs for Land, highlighting that end-consumers may be unaware of the concept and lack understanding of its complexities. Furthermore, supply chain pressure mechanisms, such as those seen in the net zero movement (e.g., scope 3 emissions), do not appear to be effective for SBTs for Land thus far. However, further investigation into this matter is required.

From the perspective of **reputation**, prior research (refer to section 2.3.2) has indicated that credibility and image enhancement are significant motivators for SBT adoption (Piper & Longhurst, 2021) and commitments to mitigate nature degradation (Krause et al., 2021).

However, this study uncovers a disconnection between credibility and image gains, as companies establish SBTs for Land primarily for credibility purposes, but do not generally believe it would enhance their image among customers and end-consumers, only among investors. This finding aligns with assumptions from Institutional Theory, suggesting that companies respond to institutional pressures to gain legitimacy rather than solely pursuing profit maximization (refer to chapter 2.3.1). Furthermore, the study identifies influencing factors for this disconnection, including limited end-consumer and customer concerns for nature and biodiversity, as well as the perception of SBTs for Land as linked to improved sustainability performance. This implies that end-consumers and customers may currently struggle to differentiate between symbolic (corporate-centric) and substantive (science-based) sustainability targets from the perspective of the interviewed companies, a gap that has also been identified by Haffar & Searcy (2018).

While Krause et al. (2021) did not identify **public scrutiny fear** as a barrier to companies' commitment to reducing nature degradation, this study revealed that some companies are concerned about reputational risks when publicly committing to ambitious targets they may not be able to fulfill. Consequently, they prioritize developing a substantiated strategy before making commitments. However, there were also early adopters who recognized the importance of initiating the SBTN process promptly, viewing it as a mobilization process. Although SBTs for Land are highly ambitious and voluntary, as confirmed by several interviewees, end-consumers may not fully grasp the underlying concept. Consequently, greenwashing could still occur, even though it may not be rational.

5.1.3 Strategic management

The study confirmed the **goal harmonization** of organization-centric nature goals with global thresholds identified in the literature as an incentive to implement SBTs. When examining the barrier of harmonizing company-centric goals and SBTs, the study distinguished between a challenge to align the tools, metrics, and measurement methods used, as well as companies that generally question the value of SBTs versus organization-centric targets. However, those two were not confirmed as being highly influential barriers. This might be because of the maturity of companies' nature strategy and the consequential non-existence of organization-centric targets.

There is no clear conclusion of the study on the view of the **social trade-offs** related to target setting highlighted by Grabs and Garrett (2023). Generally, it is recognized by interviewees that the social dimension is highly significant when implementing environmental measures in agri-food supply chains. However, interviewees expressed three perspectives regarding the relation of social trade-offs and the implementation of SBTs for Land. Some stakeholders acknowledge the presence of social trade-offs but are uncertain about how to solve them, indicating it as a barrier to implement SBTs for Land. Others believe that social trade-offs can be addressed through monetary incentives for farmers. Some did not draw a direct connection between SBTs for Land and social trade-offs. There is further investigation needed to identify specific trade-offs and potential solutions.

In addition to the drivers and barriers already delineated in the existing academic literature, this study confirmed the findings from grey literature by identifying **supply chain resilience** as a principal strategic impetus for the adoption of SBTs for Land. However, it became clear that the connection between corporate physical risks and SBTs for Land, that address impacts, are not yet clearly defined.

5.1.4 Internal capacity – stakeholders and resources

In terms of **beliefs and mindsets**, the study partially corroborated the findings of Krause et al. (2021, p. 750), which suggest that "the strongest predictor for voluntary engagement in nature conservation is a favorable attitude", as well as the conclusions drawn by Karlsson-Vinkhuyzen et al. (2018), indicating that the endorsement of a biodiversity strategy often depends on positional leadership. This observation is supported by the individuals identified as drivers for SBTs for Land within the organization, primarily being sustainability professionals or board level actors. The literature's suggestion that a nature and biodiversity strategy might be deemed unnecessary, has been confirmed to have a moderate influence in the study and was justified with limited awareness and self-interest.

The current literature suggests that **metrics and tools** are available for measuring nature and biodiversity aspects (Katic et al., 2023; zu Ermgassen et al., 2022). However, this study delved deeper into this assumption and identified that while numerous metrics exist to measure the biodiversity state of nature, there is a lack of clarity regarding their appropriate usage. There is a lack of precise guidance from SBTN, and not all companies may have the expertise internally to address this issue. This underscores the need for future research to build on the taxonomy proposed by the Align project (composition, structure, and function) or similar work to release guidelines tailored to specific ecosystems. Furthermore, the measurement of data for these metrics poses a significant barrier even though there remains inconsistency regarding which data is necessary to generate from primary location data.

This study revealed a dilemma: While most interviewees agree that establishing a solid baseline and target that can be justified with a strategy requires farm-level data, many consider this unrealistic, even in the future. Some companies are endeavoring to find pragmatic solutions, while others fear potential accusations of not meeting publicly committed targets. There is an argument that prioritizing locations and focusing efforts where the most impact is observed could be a solution. However, this approach slightly contradicts the earlier notion that location data is necessary to determine the true baseline, indicating a lack of consensus on how to overcome this dilemma. Case-specific conditions need to be assessed, suggesting the necessity for a middle ground.

Furthermore, the debate over metrics and location data becomes irrelevant in the absence of supply chain transparency. For many companies, setting a target to enhance supply chain transparency is likely to be ambitious. Some companies may use the excuse of "too many metrics, not enough data" while remaining unaware of the origins of their products.

Examining the influence of **skill availability** on the decision to implement SBTs for Land, findings from the literature confirming this as a barrier have been substantiated. The challenge of skill availability has also been mentioned in the SBTN public consultations 2022-2023 by highlighting a "capacity gap between the expertise required in order to set Science-Based Targets for an entire company, and the level of expertise currently held within companies' sustainability teams" including consultancies (SBTN, 2024c, p.11). However, a mismatch can be identified between EA, who all agreed to this barrier, and only three companies agreeing with one company disagreeing. This might be due to the early stage of the target development process.

Moreover, it can be reflected that discussions often culminate at a high level, such as the assertion that there is a lack of available skills. Consequently, stakeholders tend to criticize companies, viewing this claim as a mere justification for inaction. Thus, there is a pressing need for a distinct discussion. While there are indeed significant challenges for companies, such as the need for ecologists or individuals with the expertise to integrate various skills, similar to challenges observed in the climate space (e.g., accountants versus scientists in GHG

accounting), it takes time to align these skillsets. Therefore, it is imperative to communicate this to stakeholders while simultaneously making concerted efforts to build this expertise.

Additionally, it should be recognized that no single individual can possess all the necessary skills, and typically, there are few individuals working on nature-related initiatives within corporations. Thus, companies need to acknowledge this limitation, and in the interim, individuals involved in nature and biodiversity initiatives within organizations should demonstrate a willingness to learn, collaborate, and exchange knowledge with others.

5.1.5 Economic performance

In the literature, there was uncertainty regarding whether resilience-based approaches, such as SBTs, foster **competitive advantage**. This uncertainty was also identified as a challenge for companies, as they struggled to incorporate it into the valuation of target setting.

The study further confirmed that implementing targets entails significant **costs** for companies. However, it is imperative to compare these costs to those that would be incurred anyway due to regulatory requirements, such as supply chain traceability or mandatory disclosure frameworks (e.g., CSRD). Moreover, it is almost certain that starting with it proactively with internal staff will be more cost efficient than hiring consultants when realizing that regulations are coming in the short term.

Moreover, only a minority of companies mentioned that they considered the **costs of inaction** in their decision-making process for SBTs for Land. Given that this is a major underlying argument which supersedes all other considerations when companies focus on long-term effects, it should be emphasized more and could serve to convince stakeholders. There are studies available that could be presented to board members and decision-makers to support this argument. Such as the annual market value of animal pollinated crops being identified at an annual value of USD 235-577 billion by OECD (2019) or the estimated EUR 5.5-10.5 trillion per year from land degradation (European Commission, 2020). The uncertainty regarding competitive advantage and implementation costs presents a significant challenge, particularly as it contradicts with other company objectives such as cost-saving programs.

The limited consideration of costs of inaction also highlights a contradiction in companies' incentives for implementing SBTs for Land. While they have recognized physical supply chain risks (resilience) as a significant incentive (see 5.1.3), they have not yet linked these risks to the possible costs incurred by inaction. To decrease the cost and uncertainty, SBTN considered dependencies as additional consideration of financial materiality in Step 2 as these "help companies to define value in the protection of ecosystems" (SBTN, 2024c, p.10).

As emphasized by zu Ermgassen et al. (2022), SBTs for Nature necessitate a **reduction in material throughput**, likely requiring companies to make changes to their product portfolio. Although this would entail a shift in the business model and could potentially lead to reduced revenues, surprisingly, this aspect did not emerge as a barrier for companies to implement SBTs. This appears to be driven by internal constraints that discourage discussions on topics not directly aligned with business perspectives. With employees concerned about job security, it seems that this inhibits internal discussions on crucial topics. Therefore, the lack of discussion about possible forced changes in the portfolio is not because it is deemed unimportant, but rather because it is not openly addressed within the organization.

This situation raises questions about whether SBTs are capable of promoting the necessary steps towards achieving nature-positive outcomes if they do not stimulate these internal discussions.

While the literature has linked SBTs with **improved access to capital**, this study did not find conclusive evidence that investors are specifically interested in SBTN. However, it was observed that investors are increasingly interested in nature and biodiversity strategies. Nevertheless, further observation and research are needed to determine if SBTN is a distinct criterion for investors within capital decisions. Only if this assumption holds true can it serve as a genuine incentive for companies to implement Science-Based Targets for Nature.

5.1.6 Institutional Theory and Resource-Based View

Specific factors about *Institutional Theory* were examined in institutional structure (chapter 5.1.2 and 5.1.3). Moreover, concerning the concept of *institutional isomorphism*, the findings indicate that the implementation of SBTs for Land is partly influenced by coercive and normative isomorphism, but less so by mimetic isomorphism. The latter can be attributed to the fact that no company has committed to the targets yet. Coercive isomorphism, encompassing stakeholder pressures and laws and regulations, is evident as mandatory reporting initiatives serve as significant drivers for companies to establish SBTs for Land. Stakeholder pressures exert only minimal influence. Normative isomorphism, arising from shared values, can be linked to the moderate influence of companies' willingness to contribute to the Global Goal for Nature by substantiating their strategy with SBTs for Land.

The assumptions from the *Resource-Based View* have not been validated regarding the incentives for implementing SBTs for Land, but they do explain many of the barriers highlighted in this study. While the RBV argues that CSR measures are implemented to achieve competitive advantage, this was not identified as a motive for agri-food corporations to implement SBTs for Land due to current uncertainty. According to the RBV, companies remain inert due to internal conflicts. This was confirmed as high implementation costs conflict with cost-saving goals, and trade-offs between SBTs and social goals need to be determined and addressed. Moreover, the RBV emphasizes that developing new resources is a time-intensive capability. This explains companies' concerns about addressing the unavailability of data and skill.

5.1.7 Model of incentives and barriers in applying Science-Based Targets for Land

This thesis has assessed the incentives and barriers identified in existing literature regarding SBTs for Carbon, SBTs for Nature, organization-centric nature targets and biodiversity mainstreaming (see chapter 2.3.2 and 2.3.3) in the context of SBTs for Land. By doing so, it confirmed, disproved, and expanded the existing body of knowledge.

The findings from Chapter 4 have been synthesized in the model presented in Figure 5-1. The central company is influenced by various incentives (green) and barriers (red) in its decision to implement SBTs for Land. These incentives and barriers are categorized into different categories (grey), corresponding to the structure of chapter 4. Institutional structure (chapter 4.1) is represented by policies and norms, as well as external stakeholders, covering reputation and stakeholder pressures. Strategic Management (chapter 4.2) is represented by strategic management aspects including goal alignment, operational risk management, and social considerations. Internal Capacity (chapter 4.3) is represented by internal stakeholders (beliefs and mindsets) and other internal capacities such as metrics capability, data availability, tool availability, resource availability, and skill availability. Lastly, Economic Performance (chapter 4.4) covers sub-categories related to competitive advantage, costs (implementation + cost of inaction), change of portfolio, and capital attraction.

When the arrow points towards the company, it indicates how the categories influence initial decision-making. If the arrow points towards the categories, it demonstrates how target setting

would positively or negatively influence the categories and, therefore, act as an incentive or barrier. The colored circles at the end of each arrow indicate the degree of influence of the specific incentive or barrier on companies' decisions to implement SBTs for Land. This has been derived from the findings regarding the extent to which companies agree or disagree with the incentives and barriers (see Appendix 6):

1. Green = high influence = Companies agree – companies disagree > 3
2. Yellow = medium = Companies agree – companies disagree =1-3
3. Grey = low = Companies agree – companies disagree < 1
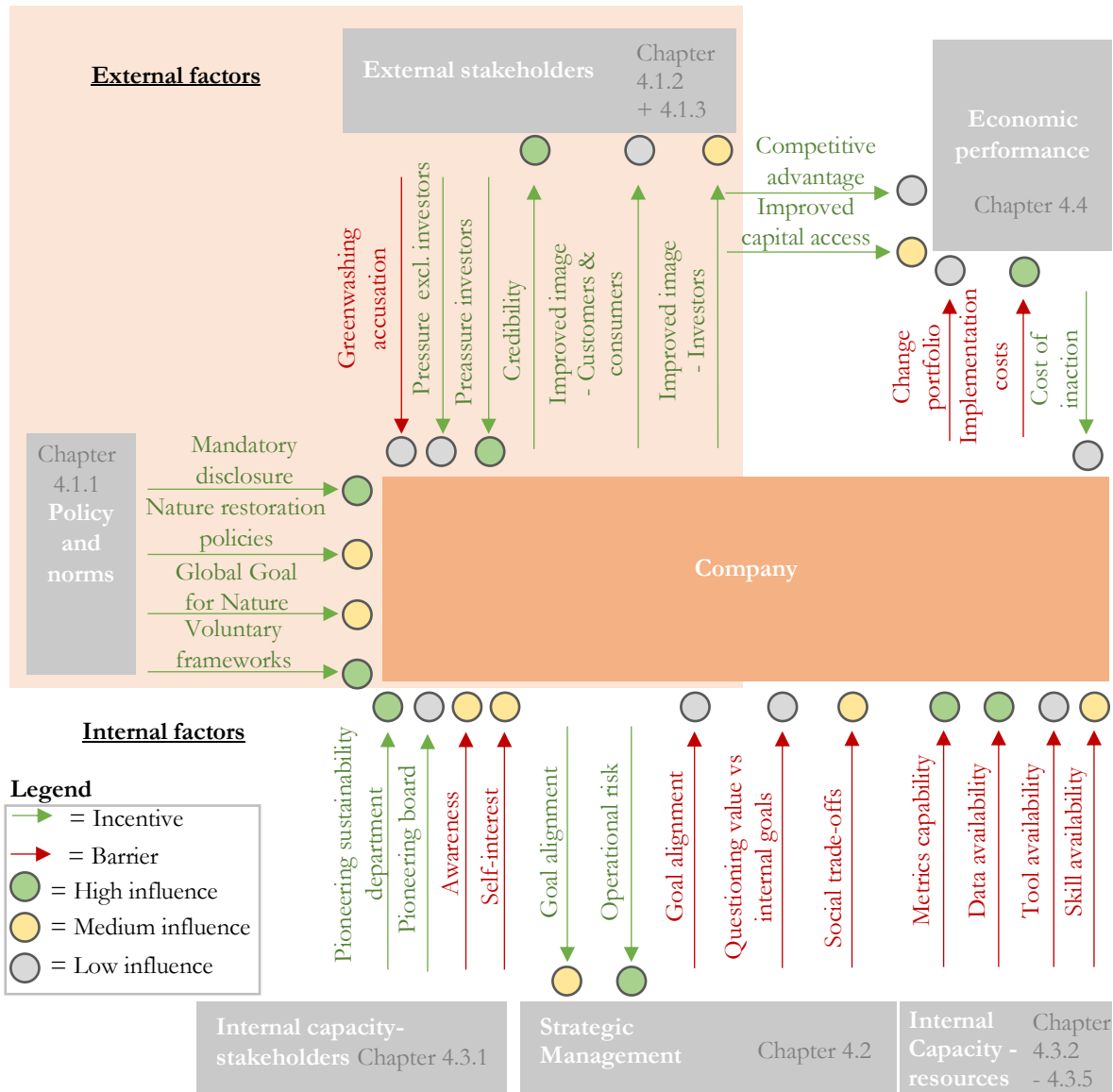
Figure 5-1 Model of incentives and barriers in applying Science-Based Targets for Land

Source: Own illustration

5.1.8 The role of Science-Based Targets for Land in the sustainability transformation

As highlighted in chapter 1.2, some studies examined which type of transformation is promoted by SBTs. Even though SBTs "can spark pivotal transformation" (Gifford et al., 2023, p.6), Gifford et al. (2023, p.7) criticize that "neoliberal approaches typically do not address the root

cause of consumption, instead promoting market-based mechanisms, often perpetuating inequity, uneven access, greenwashing and causing harm". Similarly, Tilsted et al. (2023) associate the risk of promoting unjust social relations with SBTis. Additionally, Quahe et al. (2023, p.11) highlight a "paradoxical tension" involved in SBTs by "seeking to fundamentally change the system whilst working within it". Even though it was not the pure focus of this study, the interviews resulted in findings towards this topic.

Examining the role of SBTs for Land in the sustainability transformation assumes that organizations will implement them in the first step. This study has highlighted incentives and barriers that influence whether this implementation will occur. However, the study results do not allow for a definitive conclusion on whether SBTs for Land will be sufficiently adopted by organizations. Nevertheless, it is evident that uncertainties persist when implementing SBTs for Land regarding the specific benefits or implementation roadmap. The question remains whether companies recognize the value of having an overarching goal and accept that it takes time to determine the concrete action steps to steer the company in the right direction. This will also depend on whether society acknowledges that making a positive impact on nature requires time.

In a subsequent stage, it can be debated whether SBTs for Land, when implemented, contribute positively to the sustainability transformation. Interviewees expressed concern, particularly regarding target two (land footprint), which they fear may incentivize industrial agriculture and consequently contribute to biodiversity degradation. This risk is acknowledged within the technical guidelines for step 3 (land) (SBTN, 2023c, p.20) highlighting the need to "ensure that companies appropriately balance the need to use land more efficiently while avoiding unsustainable forms of agricultural intensification". They are raising the ambition, to include soil health aspects within upcoming versions of the guidelines (SBTN, 2023c). Moreover, they argue that the requirement of setting SBTi FLAG targets decreases the risk of increased GHG emissions from overuse of fertilizers and pesticides (SBTN, 2024c). Furthermore, they highlight that the Land Engagement Target (target 3) also includes water and other environmental pressures and that companies are required to demonstrate how they address potential risk associated with land footprint reduction such as reduced food waste or shifting towards less land intensive products (SBTN, 2024c).

However, it is undeniable that the current absence of SBTN guidelines on achieving land efficiency could lead to harmful activities. Therefore, there is a need to ensure clarity in forthcoming guidelines including revised step 3 guidance as well as upcoming step 4 (act) and step 5 (track) guidance. Furthermore, it is necessary to validate whether the bold assumptions being made hold true, so that a positive contribution can be ensured (see chapter 4.5.1).

Given the uncertainty surrounding economic benefits, which serves as a barrier for companies to implement SBTs for Land (see chapter 4.4), it has become evident that companies proceed under the narrative that reducing environmental impact is achievable without sacrificing profitability. This raise concerns that the transition may not prioritize social justice, as companies may be unwilling to incur additional costs, even if farmers alter their practices. Moreover, if economic value continues to be the primary focus, doubts arise as to whether SBTs for Land can truly achieve their goals, as sustainable practices may entail higher costs for agri-food corporations, even if they are unable to command premium prices. To prioritize nature conservation, there is a need to recognize the costs of inaction. This recognition currently seems to be low according to the findings of this study.

Thirdly, it is important to acknowledge that SBTs serve as guiding principles, yet the effectiveness of their implementation lies in mechanisms such as altering governance structures. SBTs primarily intensify the pressure for action. To achieve sustainable change, it is crucial to

develop an action plan and engage in strategic implementation and evaluation. This process may involve further substantial challenges and complexities that were not initially apparent when deciding to set SBTs for Land and therefore not captured in this study. As emphasized by Sá et al. (2023), merely establishing targets is insufficient for companies to realize these goals. A comprehensive set of indicators is required to gauge progress toward the desired objectives.

Finally, further discussion is warranted regarding the level of contribution that constitutes success for SBTs for Land. As emphasized by several interviewees, SBTs for Nature exhibit a higher level of granularity and are more thoroughly researched and developed compared to other frameworks. They represent the initial effort to align organization-centric targets with global thresholds. Also the European Comission Align project (2022) states that SBTN will be the standard to guide companies to set SBTs for Nature. Consequently, they have the potential to motivate companies to transition from merely improving to fulfilling the requirements of nature. Thus, they serve as a promising initial tool for translating conservation objectives into corporate terms, despite the need for further enhancements. Additionally, when corporations publicly commit to these targets, it signifies the allocation of resources to the issue, marking an initial step toward success. Furthermore, these targets provide a means for the public to hold corporations accountable for their actions. Consequently, while short-term compliance may not always be immediately evident (which would be an indicator for success), the commitment to these targets can still persuade management of the significance of preventing biodiversity loss and degradation of nature.

5.2 Reflections and limitations

5.2.1 Methodological, conceptual, and analytical choices

The creation of the analytical framework played a crucial role in the thesis and shaped how data was collected and analyzed. It is important to recognize that a broader systematic literature review to identify incentives and barriers in implementing SBTs and organization-centric targets for nature might have revealed other criteria.

The analytical framework informed the interview structure and questions. Despite concluding each interview with an open question about additional incentives and barriers, it is necessary to recognize that the structured nature of the questions, guided by the analytical framework, may have influenced the interviewees (see the interview guide in Appendix 4). To mitigate the impact of the analytical framework on the analysis results, codes were added during the analysis based on interviewee responses, extending beyond the predefined framework.

The choice of a qualitative multiple case study approach with semi-structured interviews proved as suitable for the study as it resulted in detailed findings. The number of interviews offers a comprehensive view of existing incentives and barriers, indicated by interview saturation meaning that the same topics emerged repeatedly through the course of the interviews. However, the assessment of low, medium, and high influence (resulting from Appendix 6) should be interpreted with caution due to the methodological limitation of a qualitative case study for such quantitative inquiry. The distribution of agreements to certain incentives and barriers resulting in the assessment of low, medium and high influence may have varied with different interviewees.

Examining the chosen theories, the two selected theories provided a solid foundation for assessing both internal and external drivers and barriers of organizational change. However, as noted by Fernando & Lawrence (2014), theories are inherently incomplete, and to gain a more comprehensive understanding of practice, it is recommended to incorporate multiple theories. Consequently, a deeper understanding might have been achievable by considering additional

theories such as resource dependency theory, which elucidates firm behavior in light of uncertainties regarding the accessibility of required resources (Celtekligil, 2020). This approach could have facilitated a more profound understanding of the incentives for operational risk management toward SBTN and the reasons why the costs of inaction do not yet appear to be a primary argument for implementing SBTs for Land.

5.2.2 Generalizability and limitations

As knowledge is provisional and contingent within the pragmatic worldview, the individual actions observed in the seven companies may not be fully generalizable according to the pragmatic worldview. It must be acknowledged that interviewees brought up their own perspective based on their existing experience. However, it is suggested that the analytical framework can be employed to facilitate quantitative analysis with a broader sample.

Additionally, the study's focus exclusively on agri-food corporations in Europe further affects the generalizability of its empirical findings. Analyzing *sectoral generalizability*, it is contended that the majority of elements in the derived model are relevant for other corporations, as they encompass general internal and external factors that influence business decisions. However, the assessment of impacts may vary significantly across different industries, thus limiting the generalizability of results obtained from metrics, data, and tool availability. Similarly, concerning *geographic generalizability*, most elements are sufficiently applicable, except for policy and norms, and stakeholder pressures, which may differ in other continents. Examining the *thematic generalizability* of the research, which focuses on land guidelines, raises the question of whether the findings could be applicable to SBTs for other nature realms. Given that internal and external stakeholders, policies and norms, as well as valuation methods (economic elements), may vary across different nature realms, caution must be exercised when applying the study findings to other SBTN guidelines. However, on a broader scale, most of the sub-categories are likely to also be applicable for other ecosystems, even though specifics might be different such as measurement challenges. This can be concluded from the fact that some of the interviewee statements were tight to broader SBTs for Nature rather than only to SBTs for Land (see chapter 4). Finally, concluding about *temporary generalizability*, it needs to be acknowledged that this study is only referring to the first versions of the guidelines[22]. However, these guidelines will evolve over time and the understanding of stakeholders will enhance.

Furthermore, three limitations can be identified within the research scope (a full overview can be found in 6.2. 'Recommendations for further search'). Firstly, it is important to note that the coverage of metrics, data, and tool availability is not exhaustive due to the limited time frame and researcher's limited ecological background. The objective was to capture the perspectives of companies on this matter in regard to SBTs for Land rather than generating a comprehensive overview of the current landscape concerning land pressure and biodiversity metrics, data, and tools. Moreover, the policies and norms mentioned in this study are only a snapshot of those that could potentially influence the setting of SBTs for Land. These could include policies that are addressing the same topics such as the Regulation (EU) 2023/1115 on deforestation-free products (European Commission, 2024b). Therefore, there is the need to further explore the relationship between broader policies and the establishment of SBTs for Land. Finally, the barriers related to the specific target guidelines represent only an initial overview. It is important to acknowledge that the guidelines are highly complex, and a thorough review of specific requirements was not feasible within the interview timeframe.

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[22] Step 1 - Assess = Version 1 October 2023, step 2 – Prioritize = Version 1 October 2023, step 3 – Target setting = Version 0.3 May 2023

6 Conclusion

6.1 Conclusions from the research

The degradation of nature, primarily as a consequence of human activities, is becoming increasingly apparent, with biodiversity, a crucial indicator of ecosystem health, undergoing continuous decline. Despite the significant impact of businesses, particularly agri-food corporations, on nature and their reliance on ecosystem services, effective action to reverse this trend is lacking, and biodiversity is currently not adequately considered in business decision-making processes. The initial step towards implementing a strategy for nature and biodiversity conservation is to establish specific targets. In addition to organization-centric targets, SBTs for Nature provide a framework to align corporate objectives with global conservation thresholds. While specific guidelines for SBTs for biodiversity have not yet been published, the land targets of SBTs (initially released in May 2023) are intrinsically linked to biodiversity through their focus on addressing land use and land use change pressures, as well as considering biodiversity materiality in the prioritization process. Despite the importance of SBTs for Land, the factors influencing companies' decision to implement them remain unclear. Consequently, this study contributes to the understanding of the corporate implementation process of SBTs for Land, by investigating the incentives (RQ1) and barriers (RQ2) for companies to implement them. The study thereby focused on agri-food corporations in Europe, utilizing a qualitative case study approach. Five main categories of incentives and barriers were identified influencing the implementation of SBTS for Land: Institutional structure, strategic management, internal capacity, economic performance, and critique of the SBTN Land guidelines.

In conclusion regarding **incentives (RQ1),** nine sub-categories have been identified: Policies and norms, reputation, stakeholder pressure, goal harmonization, operational risk management, social considerations, beliefs and mindsets, costs of inaction, and capital attraction. In the light of a theoretical lens, the incentives identified in this study are mainly explained with coercive and normative isomorphism (IT) and less by the aim to gain competitive advantage (RBV). Despite the significant costs of inaction, these are currently not clearly embedded in companies' decision-making process with regard to implementing SBTs for Land. The most influential incentives identified in this study are as follows:

1. **Policy and norms**: The alignment with CSRD, TNFD and SBTi
2. **Reputation:** Credibility important whereas image gain perceived as not feasible
3. **Stakeholder pressure:** Only investors, not from other stakeholders
4. **Operational risk management:** Ensuring the continuity of the supply chain

The findings on **barriers (RQ2),** were concluded with the identification of thirteen sub-categories: Reputation (greenwashing accusation), Social trade-offs, beliefs and mindsets, metrics capability, data availability, tool availability, skill set availability, implementation costs, change of product portfolio, characteristics of the targets, complexity of guidelines and provisional nature of guidelines. Most of the identified barriers can be attributed to the RBV, which emphasizes the internal conflict and the time-intensity of establishing new resources. Currently, the need for changing companies' portfolio due to a reduction in material throughput resulting from SBTs for Land is rarely being discussed even though it is representing a major interference in the business. The most influential barriers identified in this study are as follows:

1. **Metrics capability:** Metrics for measuring nature pressures and biodiversity status exist, but their specific usage in different situations lacks clarity
2. **Data availability:** High-level tools available but supply chain traceability and costly measurement for primary upstream data is challenging

3. **Implementation costs:** Uncertainty about implementation costs including employees, tools and actions

6.2 Practical implications and recommendations for non-academic audiences

6.2.1 Agri-food corporations

It is imperative for agri-food companies, as central stakeholders, to integrate considerations of nature and biodiversity in their strategies. With accelerating decline in biodiversity, executives can no longer afford to ignore the risks associated with ecosystem failures and biodiversity loss, nor the regulatory requirements and stakeholder demands related to it. Despite existing barriers and uncertainties, SBTN provides a credible standard to align company action with global thresholds. The process should be viewed as iterative, rather than a one-time task, and companies should not be deterred by challenges or unknown factors as SBTN itself is a mobilization process. Getting started with the process does not oblige companies to commit to setting targets. To convince management and executives on the merits of the implementation of SBTs for Land, sustainability professionals must **transparently address the barriers while highlighting the incentives.**

Policies and norms can be a convincing argument to incorporate SBTs for Land. Sustainability professionals should facilitate cross departmental collaboration with legal and accounting (CSRD) as well as finance (TNFD) to make most use of the synergies of SBTN with these policies and voluntary frameworks. Given that companies are pivotal stakeholders in corporate action on nature and biodiversity, it is recommended that they clearly differentiate between these two terms to prevent confusion. In terms of **metrics, tools and data availability**, companies should not delay action due to confusion, but rather start with enabling supply chain traceability and gathering local data by mapping out players in specific areas to collaborate with. It is important for companies to recognize that no single tool or metric can address all sustainability challenges. Consequently, they should exercise caution when consultants offer one-size-fits-all solutions. Additionally, companies are encouraged to build **internal expertise** by forming interdisciplinary teams that include both ecological and business expertise. Moreover, **economic barriers and uncertainties** should be addressed by highlighting the costs of inaction, potential access to capital, and cost synergies with other initiatives like CSRD. Transparency about expectations is crucial. It should be made clear from the outset that costs may increase, especially considering the necessity of compensating farmers for changing practices. It is likely to take some time for the costs to be recouped.

To achieve the incentive of **credibility and competitive advantage,** as well as **reducing the greenwashing accusation risk**, companies should increase external awareness about SBTs for Nature. It is essential that the stakeholders, including investors, are able to comprehend the value add of SBTs compared to organization-centered goals and the ambitious nature of the targets. Additionally, end-consumers and customers need to be aware that it will take time to deliver and measure actual contribution to restore nature. Moreover, it is of the utmost importance that companies address **social considerations** alongside environmental factors. Environmental targets should not disadvantage farmers, as companies are setting SBTs for Nature for their own advantages.

In terms of practical implications it is crucial **not to pause action** while being fixated solely on targets. The implementation of SBTN should be integrated into a broader program, considering practical aspects such as adjusting governance systems. Companies are encouraged to join the Corporate Engagement Program for updates and start the journey of SBTs for Nature. While measuring corporate impact on nature and setting targets are crucial, it is essential to

acknowledge the complexity of ecosystem health and connections. Data and analysis should inform decision-making, but decisions should not be solely driven by them.

6.2.2 Political decision-makers and guideline developers

Given the existing challenges like supply chain traceability and data availability, mandatory implementation of SBTs for Land may not currently be feasible. However, **policymakers** can play a crucial role in supporting the successful implementation of SBTs for Land through various means. Firstly, considering that institutional factors replace a significant incentive to implement SBTs for Land, there is a need to enhance understanding of the connections to different regulations and voluntary frameworks. This could entail the clear integration of SBTN within the CSRD, the definition of the role of SBTN within the Global Goal for Nature and nature-positive initiatives, and the examination of how the perception of the SBTi influences the development of SBTN. In this context, policymakers could further explore the establishment of National Biodiversity Strategy and Action Plans to define clear requirements for companies and integrate SBTs for Land as a mechanism for solutions. Additionally, there is potential to investigate the extent to which subsidies support the action required from SBTs for Land and their improvement potential. For example, supporting regenerative agriculture or providing compensation benefits for renaturation efforts could be explored. Furthermore, given that the majority of challenges stem from the time-intensive process of establishing new resources, as proposed by RBV, governments should also provide support in this regard. This could involve setting up working groups to reduce uncertainty in valorization or offering clarity on the use of specific metrics for measuring the state of nature. Fourthly, it is recommended that governmental institutions provide support for a critical review of the SBTN guidelines to assess whether the requirements and assumptions contribute to sustainable transformation.

Furthermore, the study identified several practical implications for **SBTN developers** during the revision process of current guidelines. There should be particular emphasis on clarifying the capacity of metrics in various contexts and valuing costs and competitive advantage to strengthen arguments for convincing management. Additionally, developers are encouraged to foster in-depth discussions on what is achievable and how challenges can be addressed, rather than concluding discussions prematurely by asserting that certain actions are not feasible within the complexities of an organization. Moreover, further guidance is required for solutions to overcome social trade-offs as well as the risk of incentivizing intensive agriculture with the land footprint target. In conclusion, it is recommended that developers continue their work on establishing complementary material, which is translating scientific information into business language to make the document less complex for companies. Lastly, sectorization approaches are highly required by interviewees.

6.3 Recommendations for future research

The insights and limitations of this study offer numerous opportunities for further research. Firstly, the research **scope could be broadened**. This could include another sector, geography and other realms captured from SBTN. Moreover, the view of companies that are not engaged in the Corporate Engagement Program should be captured as they have different perspectives and might be more critical towards the targets. This way the broader scope of results may allow the possibility to connect certain company characteristics such as their stage of development of a nature and biodiversity strategy, the existence of SBTs for Carbon or the expertise of employees responsible for the nature and biodiversity strategy. Studying a broader sampling size could be done by performing a quantitative analysis using the elements of the suggested model as the basis. Moreover, it needs to be acknowledged that the guidelines as well as institutional structure and internal awareness will change over time suggesting that a similar study in the future might discover different results.

Moreover, the depth of the results should be enhanced by exploring the different sub-categories identified in this thesis. Within **institutional structures**, it is important to identify overlaps between the goals of SBTN and broader policies that apply different instruments in diverse thematic areas. Emphasis should be placed on largely uncertain connections such as those of SBTN and nature-positive initiatives. To determine whether SBTs for Nature could improve companies' image, the awareness, and perception of customers and end-consumers towards SBTs for Nature should be studied. Within corporate **strategic management**, it is important to compare organization-centric goals and existing measures with the requirements of SBTs for Nature to identify gaps and better understand their interplay. Currently, discussions surrounding the contribution of SBTs for Land to physical risk management often focus on a high level, emphasizing indirect contributions via addressing company impacts. However, case studies are needed to examine best practice examples that illustrate how setting SBTs for Nature can directly influence physical risk management, considering different risk time horizons. A deeper understanding of the latter might be possible to generate by utilizing the Resource Dependency Theory. Given the relevance of the social dimension, it is crucial to study concrete social trade-offs resulting from SBTs for Land and propose solutions.

Future research should give special attention to the topic of **internal organizational capacity** to implement SBTs for Nature, as these may present barriers that require significant time to overcome. There is a need for further research on specific metrics for assessing biodiversity state of nature and their suitability for different circumstances. Additionally, more research is needed to explore the connection between these metrics. While there is extensive literature available on supply chain traceability, it should be examined in the context of SBTN requirements to assess its feasibility. Furthermore, understanding different measurement techniques for primary farm data and their feasibility in global corporations needs to be examined. It is also important to determine which specific skills are lacking in organizations to set SBTs for Nature and whether these skillsets are theoretically available to be hired. As indicated in this study, the **economic implications** of implementing SBTs for Land are currently highly uncertain and require further investigation. This includes assessing the valorization of implementation costs such as labor, tools, and actions required to achieve the targets, as well as the economic consequences of potential changes in the product portfolio. Moreover, one could study why the costs of inaction do not yet appear to be a primary argument for implementing SBTs for Land utilizing the Resource Dependency Theory. Additionally, empirical evidence is needed to determine whether there is a relationship between SBTs for Nature and competitive advantage. While investors are showing increasing interest in nature strategies, it is important to explore how they plan to integrate the SBTN within their decision-making parameters.

Lastly, there are requirements for further research **outside the addressed research questions** but connected to SBTs for Nature. To examine the SBTN governance, the roles and interest within the Network should be illuminated and what this means for the target development. Considering the flexibility and different possible approaches, the target setting process should be studied to determining the different used approaches of setting the targets. After the setting of SBTs for Nature has accelerated, the **actions resulting from the targets** need to be studied. It needs to be determined how they are embedded in the broader Corporate Performance Management cycle and the companies' governance system. Moreover, it needs to be assessed whether actions implemented by companies have the potential to reach the SBTs for Nature. To further zoom out it needs to be assessed if the requirements of the SBTs really **contribute to a sustainable transformation** and within that which kind of transformation are fostered by SBTs for Nature.

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Appendix

Appendix 1: Information sheet and consent form

INFORMATION SHEET and CONSENT FORM

The form "Information sheet and consent form" is intended to familiarize you with the research project of my Master's Thesis. Its purpose is to ensure that you have received all necessary information about the research project and data processing and can participate in the study voluntarily. If you have any questions about the research project, please feel free to contact me using the following contact information.

Name: Marleen Mammen, Student M.Sc. Environmental Management and Policy, Lund University, Sweden
Contact: X or X (anonymized)
Institution: International Institute for Industrial Environmental Economics (IIIEE), Lund University, PO-Box 196, 22100 Lund, Sweden

Title of the research project: Integrating biodiversity considerations into corporate strategic decision-making - Challenges and incentives in applying Science-Based Targets for land in agri-food corporations in European context

Description of the research project

As an answer to the profound degradation of nature and an inadequate application of biodiversity targets in corporations, the Science-Based Targets Netwok (SBTN) released the first guidelines for Science-Based Targets (SBTs) for Nature (freshwater and land) in May 2023. The aim of this qualitative study is to enhance comprehension of the factors influencing companies' choices to establish SBTs for Nature, through an investigation of the drivers and barriers involved in the target setting process.

> **Scope:** Agri-food corporations headquartered in Europe, SBTs for land
> **Beneficiaries:** Agri-food corporations (supporting the target setting process), politicians (fostering assessment of a mandatory implementation of SBTs), SBTN (assisting revision of the guidelines)
> **Timeframe:** January – May 2024

Purpose of the interview

As part of this research, I aim to conduct a series of semi-structured interviews. I would like to learn more about:

- The incentives for you to be interested in establishing SBTs for land
- The barriers and challenges you face in assessing biodiversity impacts and dependencies (step 1), prioritizing key issues (step 2), setting measurable targets for land (step 3)

I will ask you a series of open-ended questions about the above-mentioned topics. You can respond to these in as much detail as you like. You can also offer information that I may not ask you about but that you feel is important. The interview will last approximately 60 minutes depending on your answers.

With your permission, I would like to record the interview to accurately transcribe the information you provide. It will be used for transcription purposes only. You may choose not to be recorded in which case notes will be taken. The recorder can be turned off at your request and the interview can be stopped at any time if you do not wish to continue.

Data management and confidentiality

All the data for this project is collected and stored in accordance with the General Data Protection Regulation (GDPR) 2016/679 of the European Union, which entered into force in May 2018. The regulation protects individuals regarding the processing and collection of their personal data. All the research materials, including the participants' data will be securely stored for 10 years. After that time

period, any personal data collected will be deleted. In addition, data will be deleted at any time on request of the participant. From the beginning of the process, pseudonymization of personal data is applied. Pseudonyms will also be used for further processing the responses. Special attention is paid to direct quotes, for which I will use indirect identifiers (such as gender, region, role) in the transcription protocols, so that they cannot inadvertently identify respondents. The audio/video-recordings, if authorized by the interviewee, will be deleted after they have been transcribed and analyzed, hence they will not be stored for 10 years. At any stage of the research project, the research participants have a right to gain access to their own personal data, request data correction or limitations to how their data is processed (latest until 20th April 2024).

CONSENT FORM

This form is to ensure that you have been given information about the Master Thesis project (see Information sheet) and to give you an opportunity to confirm that you are willing to take part in this research. For all activities below, please indicate which applies to you (*checked box indicates consent*):

☐	I have been **familiarized** with the Master Thesis project, I have had the possibility to ask questions and I have received satisfactory answers to my questions
☐	As a research participant, I am aware of my **right to withdraw participation** at any time (latest until 20th April 2024)
☐	I give my consent that the interview can be **audio- and video-**recorded, transcribed, and analyzed
☐	I give my consent to **be identified by my organization**
☐	I understand that the results of the research will be presented so that **no information can be traced to me personally /** I have been informed that **pseudonymity of participants will be ensured**
☐	I give my consent that a record of my interview can be **safely stored** for future reference
☐	I have been informed who will **benefit** from the participation
☐	I have been informed how **data will be either destroyed or reused** at the end of the research

Note: Your participation is voluntary. As an interviewee, you do not have to answer all the questions that are asked; you reserve the right to refuse or cease participation in the interview process without stating your reason and may request to keep certain materials confidential.

There will be no monetary payment for participating in the research, but you will get access to the published document as well as an executive summary in the form of a slide deck.
Please, sign below to confirm your consent:

	Participant	**Researcher**
Name		Marleen Mammen
Signature		
Date		

Source: Author

Appendix 2: SBTN Step 1 (Assess) overview

Step category	Activity	Data required	Data source	Information depth
1a: Materiality screening *(100% of direct and upstream spending)*	Materiality high level screening	List of economic activities (ISIC)	**1. Prescriptive approach**: SBTN Materiality Screening Tool and the High Impact Commodity List based on ENCORE - *List of sources in SBTN toolbox* **2. Flexible approach**: Use other available tools or models	Sectoral global averages
1b: Value chain assessment *(impacts associated with at least 67% of their material upstream impact)*	Direct and upstream location data	Sourcing location data	**1. Observations** **2. Modelled** (spend-based estimation vs. volume-based estimation) *-List of sources in SBTN toolbox*	At least national level (upstream)
	Pressure estimation*	**Land use change** [Area converted since 2020] , **land use** [Area of land use, including known land management practices], **soil pollution** [Applied nitrogen (N) and phosphorus (P) (kg ha-1)]	Examples mentioned: Spatial modelling, remote sensing, Environmental expected input-output (EEIO), Lifecycle assessment (LCA) *List of sources in SBTN toolbox*	At least national level (upstream)
	State of nature estimation	Species risk and extinction indicators	Example: STAR *List of sources in SBTN toolbox*	At least national level (upstream)

*Only considering land targets

Source: Author based on (SBTN, 2023b)

Appendix 3: Overview of aspects of the Science-Based Targets for Land

Aspect	Target 1: No Conversion of Natural Ecosystems	Target 2: Land Footprint Reduction	Target 3: Landscape Engagement
Definition	No conversion from a natural ecosystem to another land use or profound change in a natural ecosystem's species composition, structure, or function	Reduction of the amount of agricultural land required per year to produce the products produced or sourced by a company	Establish initiatives with different stakeholders to improve the ecological integrity of working lands and surrounding landscapes
Impact	Avoid biodiversity loss and GHG emissions		Improving the ecological condition of landscapes, including working lands, to enhance ecosystem structure, composition, and function and the social systems that depend on such landscapes
Outcome	Conservation of natural land and ecosystems	Reducing pressures on land from large companies. Reduce the global agricultural land footprint and allow some areas to be restored into natural ecosystems	Enable regenerative, restorative, and transformational actions
Mechanism		Incentivize agri-food companies to reduce the amount of agricultural land needed to produce their products	Landscape initiatives, such as between producers of conversion-driving commodities, sourcing companies, and local communities
Applies to	Conversion driving and high land use emission companies	Large agriculture companies, 10,000 employees	All companies with material pressure on land
Timeframe and coverage	Highly dependent on sector and position in value chain 2025-2030	Allocated based on 500mha reduction by 2050 with incremental targets to 2030	One landscape initiative that is equivalent to a 10% coverage of the company's estimated land impact area footprint OR Two landscape initiatives, regardless of their size, in materially relevant landscapes Start with +/- 10% coverage of company land footprint increase coverage to 2030
Commitment	Requires companies to commit to achieving no-conversion across their operations and supply chain volumes and to make and disclose progress toward that goal	1. **Absolute contraction approach**: all companies reduce their agricultural land footprint at the same rate, regardless of sector baseline performance 10.6% decrease in land occupation by 2050 2. **Intensity contraction approach:** A reduction in the agricultural land footprint of the company by the target year per kg of agricultural products, relative to the base year, using a rate of 1% annual linear reduction	Companies commit to substantially increase ecological and social conditions at the landscape level Stakeholder participation in design holistic rather than isolated reporting systems for actions
Indicators	Conversion = a change of a natural ecosystem to another land use or profound change in a natural ecosystem's species composition, structure, or function	Land footprint = amount of agricultural land required per year to produce the products produced or sourced by a company (reported in hectares per year)	o Companies should report on the % of their land footprint that each landscape initiative is estimated to cover o SBTN acknowledges the variety of indicators, metrics and indexes that can be used to assess ecological and social conditions in landscapes (gives some suggestions)

Data requirements	1. Location and delineated area of production units of high-impact commodities that they own or manage 2. Project site areas (e.g., farms, mining, infrastructure, and construction sites) that they own or manage. 3. Geographic origin and volumes of high-impact commodities in their supply chains at the production unit level or subnational sourcing area level	1. Hectares of agricultural land in direct operations or upstream (in company supply chain) 2. Volume of all material agricultural commodities produced or sourced. 3. Primary or statistical data on yields (production per hectare) of those commodities.	1. Location and delineated area of operational sites or sourcing areas pertaining to high-impact commodities and locations prioritized in Step 2. 2. Origin and volumes at the production unit level or sourcing area level. 3. Baselining for ecological and social condition of the landscape
Solutions		Less production of same product (e.g. less food waste, caution: if demand stable then others just take it up), shift to another product (shift to healthy and sustainable diets), higher productivity (sustainable crops, more circular use) SBTN provides additional guidance on the types of response options companies can focus on in their delivery of the Land Footprint Reduction target	
Connection to other frameworks	Accountability Framework Initiative IFC Performance Standard 6	Global Biodiversity Framework	ISEAL Maturity Matrix (CDP)
Next versions		o Include **soil health** aspects o Help ensure that productivity gains that reduce the intensity of agriculture's land footprint do not **undermine other land management goals**	o quantitative metrics for selected land extent and condition indicators that will be regionally emergent and relevant o thresholds and translational science to link outcomes to corporate actions

Source: Author based on (SBTN, 2023c)

Appendix 4: Interview guide

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INTERVIEW QUESTIONNAIRE

Title of the research project: Integrating biodiversity considerations into corporate strategic decision-making - Challenges and incentives in applying Science-Based Targets for land in agri-food corporations in European context

Aim: The aim of this study is to enhance comprehension of the factors influencing companies' choices to establish SBTs for Nature, through an investigation of the drivers and barriers involved in the target setting process.

Questionnaire Structure: The questionnaire comprises two distinct sections. The first section focuses on identifying the factors that influence the initial decision to establish SBTs for nature. The second section examines the barriers encountered during the target setting process, as these barriers can potentially hinder implementation efforts. Subcategories within each section are derived from existing research on incentives and barriers related to setting Strategic Sustainability Targets as well as organizational theories. Respondents are not obligated to answer all sub-questions if the information is not available to them. Additionally, interviewees have the flexibility to choose the order in which they respond to the questions. At the conclusion of each section, respondents are encouraged to provide any additional comments that address the overarching guiding questions (see beginning of each section).

1. **Initial decision to set SBTs for Nature**
   Overall guiding questions:
   - What have been your incentives to consider establishing SBTs for nature?
   - Were there any factors that argued against establishing targets during your decision period?

1.1. **Institutional structure**
   - What advantage do you see in establishing SBTs for Nature compared to GRI 101 (previously GRI 304), TNFD, CSRD, IFRS (ISSB) and other (disclosure) frameworks?
   - What are the **legal requirements** you mainly respond to with setting up the targets?
   - Do you think SBTN target setting will give your company an **improved image**? Where do you base your conclusion on?
   - Or did you also fear **greenwashing** accusation? If yes, why?
   - Will you use it for **communication purposes**?
   - Was it a convincing argument for you that with the application of SBTN you follow a **standardized approach** across industries?
   - Do **conflicting perspectives**, such as those regarding biodiversity-friendly farming systems, argue against initiating targets? If yes, do you have any examples?
   - What **stakeholder pressures** influenced your decision to establish targets? (customers, employees, others)

1.2. **Beliefs and mindset**
   - Who have been the drivers/**supporters** in your company for implementing SBTs for nature? (e.g. specific department or position of person)
   - What **beliefs, values or mindsets** drove their decision?
   - Which people **hindered** the implementation of targets? (e.g. department or position of person) How did you convince them?
   - What **beliefs, values or mindsets** drove their decision?

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1.3. Strategic Management

- Was the benefit of an improved **risk management** (production/operation) through SBTs for nature considered in the decision? How does the target setting concretely help you in this regard?
- Do SBTs for nature help you in your strategic decision making to **avoid misalignment** between goals and give biodiversity a clear position within the company's strategy? Do you have a concrete example where they helped?
- Did the framework convince you because it is tested and vetted by scientific experts? If yes, why?
- Are you in favor of SBTs for nature because you might be able to compare yourself to peers one day?
- Did you choose the framework as it helps you to substantiate your **nature-positive strategy** (ambitious, science-based, integrated, and underpinned by a clear measurement framework)?

1.4. Economic benefits

- Do you think SBTs for nature will prove business relevance through the enablement of **premium prices** or competitive advantage? If yes, why?
- Do you think SBTs for nature will enhance your ability to access finance in capital markets?
- What **potential higher costs** did you consider in your decision that might result from nature degradation and a decreased availability of resources?
- Are you also hoping that raw materials will be less expensive due to land efficiency gains?

1.5. Ambiguity

- Did the **extensive timeframe until impacts become visible** serve as a counterargument against implementing the targets? Why are you still considering to implement the targets?
- Reducing nature impacts inherently requires **a reduction in material throughput**, which could result in less profits or a forced change of product lines. Was that discussed in the decision process? What were the arguments from both sides (for and against SBTN)?
- When considering activities to achieve the environmental targets, there will always be **social trade-offs**. Was this challenge discussed in the decision process? If yes, how?

1.6. Internal Capacity

- Was the **absence of metrics and information** to measure the impact raised as a counterargument against the targets? If yes, why did you still decide to proceed?
- Did you fear that you will not handle the target setting with the **current company's skillset**? How did you overcome that fear?
- Was a lack of **finance for solutions or the costs for labor** to set up the targets considered in the decision-making? If that was a fear, how did you conquer it?

2. <u>Barriers faced in the target setting process</u>

Overall guiding questions:

- What barriers and challenges are you facing in assessing biodiversity impacts and dependencies (step 1), prioritizing key issues (step 2), setting measurable targets for land (step 3)?

2.1. Institutional structure

- Do you face controversy from **too divergent concepts** e.g. on biodiversity friendly farming systems? If yes, do you have any examples? How do you overcome them?
- Framing: Is it a challenge for you to match internal company centric land and biodiversity targets with the SBTN guidelines? Do you have concrete examples?

2.2. Ambiguity

- Do you face challenges in the prioritization process due to **trade-offs with economic or social goals**? How do you overcome them?

2.3. Internal Capacity

- Which **tools/ metrics** are you using to measure biodiversity indicators? Which problems occurred in using those tools and how are you conquering them? Does SBTN require different tools than the ones that you are already using?
- What presents a greater obstacle for you: Supply chain traceability or the availability of nature pressure/ biodiversity metrics/tools?
- What challenges are you facing with the **impact problem** (e.g. spillover) in your measurement process?
- What challenges are you facing with tracing back the impact **of embedded or transformed commodities**? How do you handle it?
- Which exact data are you missing in the measurement process? How are you planning to overcome these gaps?
- Do you have enough **skilled workers** to set the targets? How did you find these employees or if not, how are you planning to find them?

Source: Author

Appendix 5: Description of coding structure

Categories			Description	Incentives	Barriers
Institutional structure	Policies and norms	Mandatory disclosure standards (CSRD)	SBTN helps with fulfilling some of the reporting requirements	X	
		Other nature restoration policies	Companies realize that regulations for nature restoration are increasing and therefore are encouraged to look into SBTN e.g. EU Nature Restoration Law, Global Biodiversity framework, Nagoya protocol, Responsible sourcing	X	
		Nature-positive: The Global Goal for Nature	Companies might want to contribute to the Global Goal for Nature by substantiating their strategy with SBTN. Companies acknowledge that their operations significantly contribute to environmental degradation and, as a result, feel compelled to take action to address it	X	
		IPBES	With the IPBES report the relationship between business activity and nature degradation became more clear and therefore interest in SBTN arouse	X	
		Voluntary frameworks	Companies want to align their efforts with other voluntary frameworks such as TNFD and SBTi. It might be a natural step for them to look into SBTN if they already adopted SBTi.	X	
	Reputation	Credibility	Having a credible target setting approach to present to stakeholders increases companies' credibility and avoids greenwashing claims	X	
		Improved image - Customers and end-consumers	SBTs for Nature would allow the company to improve their image towards customers and end-consumers	X	
		Improved image - Investors	SBTs for Nature would allow the company to improve their image towards investors	X	
		Fear of greenwashing accusation	Companies perceive a reputational risk in publicly committing to ambitious goals that they may not be able to fulfill. Companies might be hesitant to set targets because they are not 100% sure if they can reach it (data gaps still existing) - they aim to have a substantiated strategy before the commit		X
	Stakeholder pressure	Business coalitions e.g. Business for Nature, WBCSD	Companies are either a member of these coalitions who advocate for SBTN or see that these coalitions are becoming more prominent. The request from those coalitions to establish SBTs for Nature or a substantiated	X	

				X	
			nature/biodiversity strategy might pressure companies		
		End-consumers - Nature strategy	The end-consumer is requesting the companies to set a substantiated nature/biodiversity strategy this could include requests for principles like responsible sourcing and regenerative agriculture, nature conservation	X	
		End-consumers - SBTN	The end-consumer is requesting the companies to set SBTs for Nature	X	
		Customers - Nature strategy	The customers of the production and processing companies (= distributors and traders) might request companies to set a substantiated nature/biodiversity strategy this could include requests for principles like responsible sourcing and regenerative agriculture, nature conservation	X	
		Customers - SBTN	The customers of the production and processing companies (= distributors and traders) might request companies to set SBTs for Nature	X	
		Employees - Nature strategy	Employees pressure their employers to set a substantiated nature/biodiversity strategy this could include requests for principles like responsible sourcing and regenerative agriculture, nature conservation	X	
		Employees - SBTN	Employees pressure their employers to set SBTs for Nature	X	
		Investors - Nature strategy	Investors pressure their borrowers to set a substantiated nature/biodiversity strategy	X	
		Investors - SBTN	Investors pressure their borrowers to set SBTs for Nature	X	
Strategic Management	Goal harmonization	Align strategic goals	Enhances the comprehension among various internal stakeholders regarding the shared direction they aspire to pursue (through standardization)	X	
		Align organization-centric goals with global thresholds	SBTN helps to align organization-centric goals with global thresholds	X	
		Organization-centric vs. SBTs - Tools and methods are not aligned	The tools and methods to measure companies' impact and the understanding of sustainable agriculture differs from organization-centric goals to SBTN		X
		Questioning the value of SBTs vs organization-centric targets	Companies think that they are already doing the right thing internally without SBTs. They might also think that they even go beyond the requirements from SBTN already.		X
	Operational risk management	Operational risk management	SBTN supports to increase supply chain resilience	X	

	Social considerations	Long-term profitability	Regenerative agriculture processes might support long-term profitability for farmers	X	
		Social trade-off	A tension may arise with social goals if the rights of the farmers is not considered and the burden of increased requirements is put without compensation incl. economic trade offs for farmers/ data collection/ changing vendor		X
Internal capacity	Beliefs and mindsets	Pioneering effort from sustainability professionals	The initial drive to look at SBTs for Nature and consider its implementation resulted from individual sustainability professionals	X	
		Pioneering effort from board level	The initial drive to look at SBTs for Nature and consider its implementation resulted from the board level	X	
		Internal stakeholder awareness	Internal stakeholders might not be aware of the urgency to address nature degradation and the company's role in it		X
		Self-interest of internal stakeholders	For certain stakeholders the actions needed to set and fulfill SBTs for Nature might result in financial impacts, job security concerns, loss in decision-making power or change of tasks		X
	Metrics capability	Metrics capacity	Lack of understanding which quantifiable measure best suits different purposes to track and access impact		X
	Data availability	Supply chain traceability	It is a challenge to determine the origin of the raw materials of a product		X
		Location/ farm data availability	When the origin is known, generating data about the impact of specific farms is challenging		X
		Database	Available data is not yet openly shared to increase the accessibility		X
	Tool availability	Tool availability	There might not be enough tools available that process, analyze and interpret the data (generate metrics)		X
	Skill availability	Skill availability	Required skills to analyze the data and convince internal stakeholders might not be sufficient in the company		X
Economic performance	Competitive advantage	Customer and end-consumers	The increased reputation from SBTN leads to customers and end-consumers choosing your company instead of others. This would lead to increased revenue	X	
	Costs	General costs	General costs (no clear distinction) might occur in target setting process		X
		Labor costs	High costs for labor in target setting process		X
		Tool costs	High costs for tools		X

		Action costs	The actions that are required to meet the targets might cost e.g. engagement programs, compensate farmers for reduction of land or regenerative farming practices		X
		Cost of inaction	If we don't act on nature degradation, less land will be available due to land degradation and therefore prices for raw materials might increase	X	
	Change of portfolio	Change of portfolio	The trajectory towards achieving nature-positive outcomes, which are supported by SBTs for Nature, necessitates a reduction in material throughput. Achieving the targets could mean to change the product portfolio		X
	Capital attraction	Capital attraction	Having SBTN allows you to have a better ESG rating and therefore eases your access to capital	X	
SBTN Land guidelines	Provisional nature of guidelines	Provisional nature of guidelines	The guidelines for SBTs for land will be reviewed after the pilot phase and are open for potential changes. This inherently keeps companies from committing to it at the current point in time		X
	Too complex	Too complex	The guidelines are written in a very scientific way and are complex to understand for business stakeholders		X
	Land conversion target	Land conversion target	Concerns about the applicability of the land conversion target (target 1)		X
	Land footprint target	Land footprint target	Critique towards the land footprint targets (target 2)		X

Source: Author

Appendix 6: Level of agreement and disagreement towards incentives and barriers for the implementation of Science-Based Targets for Land

	Categories		Number of companies			Number of ecosystem actors		
			Agree	No statement	Disagree	Agree	No statement	Disagree
Institutional structure	Policies and norms	Mandatory disclosure standards (CSRD)	4	3	0	0	4	0
		Other nature restoration policies	2	5	0	1	4	0
		Nature-positive: The Global Goal for Nature	3	4	0	3	1	0
		IPBES	1	6	0	0	4	0
		Voluntary frameworks	6	1	0	2	2	0
	Reputation	Credibility	4	3	0	3	0	1
		Improved image - Customers and end-consumers	1	1	5	0	3	1
		Improved image - Investors	2	5	0	0	4	0
		Fear of greenwashing accusation	2	3	2	1	1	2
	Stakeholder pressure	Business coalitions	1	6	0	0	4	0
		End-consumers - Nature strategy	1	4	2	0	4	0
		End-consumers - SBTN	0	2	5	0	3	1
		Customers – Nature strategy	2	2	3	0	4	0
		Customers - SBTN	0	2	5	0	4	0
		Employees - Nature strategy	1	5	1	0	4	0
		Employees - SBTN		5	2		4	
		Investors - Nature strategy	6		1	0	4	0
		Investors - SBTN	2		5	0	3	1
Strategic Management	Goal harmonization	Align strategic goals	2	5	0	0	4	0
		Align organization-centric goals with global thresholds	2	5	0	1	3	0
		Organization-centric vs. SBTs - Tools and methods are not aligned	1	4	2	2	2	0
		Questioning the value of SBTs vs organization-centric targets	2	3	2	0	3	1

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Category	Subcategory	Item						
	Operational risk management	Operational risk management	5	2	0	3	1	0
	Social considerations	Long-term profitability	2	5	0	2	2	0
		Social trade-off	3	4 (2 not yet sure)	0	3	1	0
Internal capacity	Beliefs and mindsets	Pioneering effort from sustainability professionals	7	0	0	3	1	0
		Pioneering effort from board level	3	0	4	1	2	1
		Internal stakeholder awareness	3	3	1	1	3	0
		Self-interest of internal stakeholders	1	6	0	0	4	0
	Metrics capability	Metrics capacity	4	3	0	3	1	0
	Data availability	Supply chain traceability	7	0	0	3	1	0
		Location/ farm data availability	3	4	0	2	2	0
		Database	1	6	0	2	2	0
	Tool availability	Tool availability	2	4	1	2	1	1
	Available skill sets	Skill availability	3	3	1	4	0	0
Economic performance	Competitive advantage	Customer and end-consumers	0	2	5	0	4	0
	Costs	General costs	7	0	0	4	0	0
		Labor costs	3	4	0	2	2	0
		Tool costs	2	5	0	4	0	0
		Action costs	2	5	0	1	3	0
		Cost of inaction	1	6	0	0	4	0
	Change of portfolio	Change of portfolio	1	5	1	0	4	0
	Capital attraction	Capital attraction	3	4	0	0	4	0
SBTN land guidelines	Provisional nature of guidelines	Provisional nature of guidelines	3	4	0	3	1	0
	Too complex	Too complex	0	7	0	3	1	0
	Land conversion target	Land conversion target	2	5	0	0	4	0
	Land footprint target	Land footprint target	2	5	0	2	2	0

Color coding companies agree: green >3; orange =1-3; red <1
disagree: red >0
Color coding ecosystem actors agree: green >2; orange=1-2
disagree: red > 0

Source: Author