Analysing the Usage of Corporate Environmental, Societal and Governance Data in the European Union Banking Sector

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TU Delft Delft University of Technology

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Using a Qualitative Research Methods Approach to investigate barriers faced by banks during sustainable corporate financing

By

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Preface

With the submission of my final draft of my thesis report on the topic “Analyzing the usage of corporate ESG data in the EU banking sector”, my masters journey comes to an end at TU Delft. Switching my focus from a Bachelors in Mechanical Engineering to a Masters in Management of Technology was a huge jump in my personal career aspirations. The skills I developed as an engineer was constantly challenged over the course of my master’s program but the roller coaster ride over the past two years was definitely memorable. Right from working on my group projects with my classmates to submitting my assignments at the last minute, the first year was a challenging year for me which slowly shaped my interests in the field of finance. Combined with my long-term passion for sustainability and my specialization track in finance and economics, I had decided to pursue my master thesis on the topic of sustainable finance. Conducting an exploratory study in the field of ESG data utilization by interviewing industry experts helped me understand the current state of sustainability in this industry and helped me further build a conceptual framework to address one of the relevant barriers.

In this journey, I would especially like to thank my advisor Aleksandrina Ralcheva who provided me with constant support in my thesis direction. In addition, I would like to extend my gratitude to my external supervisor Rosanne Perizonius from BearingPoint who helped me stay on track through our weekly scheduled meetings. I am also grateful for the combined support of my second supervisors Johannes Gartner and Victor Scholten and my Chair Cees van Beers. The feedback and support I received from my supervising committee made a significant difference in shaping my academic thesis report.

Furthermore, my family and friends played a huge role in my academic journey. Amma and Appa, thank you for always being there and giving me the confidence to get through this phase in my life, especially during the tough times. Reshma (thanks bestie), Yining (happy now?) and Sohinee, your continuous support and help were vital for me to get through this journey, and I appreciate it from the bottom of my heart. Similarly, all my friends who accompanied me during my never-ending coffee breaks and even my friends from back home, thank you guys!

Finally, in the wise words of Snoop Dogg, *“I wanna thank me for believing in me, I want to thank me for doing all this hard work. I wanna thank me for never quitting”.* My master’s journey and especially my thesis research has been an amazing experience, during which I've not only acquired knowledge in various domains but also grown significantly as an individual. I am grateful to have had all the people involved in my thesis journey and I look back fondly at these experiences.

Dankjewel,

Rishab GSS
September 2023

Executive Summary

In the current environmental conditions, with the rise of sustainable finance concepts like Environmental, Societal and Governance (ESG), firms in the financial sector have found new ways to drive a sustainable change. Banks in particular play a key role in promoting sustainable practices both within their organization and also have a significant effect on the global economy. However, banks have had difficulties integrating ESG practices in their sustainable credit distribution products to corporate clients.

Due to the qualitative nature of ESG data, even with the involvement of regulatory bodies, there are no established standardized processes for ESG integration. Literature exhibits a clear knowledge gap on the utilization of ESG data in the credit risk assessment process. Furthermore, the primary barriers faced during this process has been attributed to comparability, materiality, accuracy, and reliability of ESG data quality with the lack of comparability having the most significant impact. Hence, based on the knowledge gap identified, the following main research questions was formed:

"How can banks in the EU effectively utilize corporate ESG data during the sustainable corporate financing process?"

By fusing a thorough literature review and 11 interviews of professionals from the banking industry, consultancies, and asset management companies, a process flow diagram was mapped highlighting the different phases of the sustainable corporate financing process. The main phases were comprised of: *Opportunity, Due diligence, Determining need for ESG data, Sourcing ESG data, Corporate Sustainability Assessment, Setting KPI's and Decision.* Furthermore, during this process the primary barriers were classified as Data Quality Barriers (*Lack of Materiality, Lack of Accuracy, Lack of Comparability and Lack of Reliability*) and Integration Challenges *(Lack of Data, Sourcing Data, Quantification of Data).* Given the relevance of the comparability barrier, its effects were studied in more detail and was followed by proposing a conceptual framework bolstered by stakeholder theory, legitimacy theory and institutional theory to solve the barrier of Lack of Comparability. The relevant dependent variables in this framework were identified as: *Data Harmonization Initiatives, Standardization Efforts, Industry Collaboration, Regulatory Interventions/Compliance and Client Engagements*. As directed by the conceptual framework, banks were recommended to adopt the dependent variables Data Harmonization Initiatives, Standardization Efforts and Industry Collaboration and were further advised to help clients adhere to compliance. Furthermore, stakeholders' motivation and regulatory incentives were highlighted as key determiners in addressing the barrier. A processual validity approach was adopted to ensure validity throughout the research process which additionally consisted of validating the generated process flow and conceptual framework by relevant experts.

The outcomes of the explorative research showcased the intricacies in the sustainability credit risk assessment and the stakeholders involved while highlighting the inter-relation between the barriers identified. Though the lack of comparability conceptual framework was proposed to be a barrier with significant effects, during the interview analysis it was revealed that the advent of Corporate Sustainability Reporting Directive (CSRD) would have a significant effect on this barrier and that challenges like sourcing ESG data and lack of ESG data would be more relevant in a few years. Although the conceptual framework accounted for this, some of the limitations in this research study was the inability to recruit more interviewees and also the inability to gather interview data from an external data provider to retrieve a true holistic approach. For future research, studies are recommended to research the effects of the implementation of CSRD and to study the state of other pressing barriers.

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Abbreviations

CDO: Chief Data Officer
CDP: Carbon Disclosure Project
CDSB: Climate Disclosure Standards Board
CEO: Chief Executive Officer
CFO: Chief Financial Officer
CFP: Corporate Financial Performance
CRA: Credit Rating Agencies
CRO: Chief Risk Officer
CSA: Corporate Sustainability Assessment
CSO: Chief Sustainability Officer
CSR: Corporate Social Responsibility
CSRD: Corporate Sustainability Reporting Directive
COP: Climate Change Conference
EAD: Exposure at Default
EB: Executive Board
EBA: European Banking Authority
ECB: European Central Bank
EFRAG: European Financial Reporting Advisory Group
ESG: Environmental, social, and governance
ESP: Environmental and Societal Policies
ESR: Environmental and social risk
ESRS: European Sustainability Reporting Standards
EU: European Union
FASB: Financial Accounting Standards Board
GFC: Global Financial Crisis
GHG: Greenhouse Gases
GRI: Global Reporting Initiative
HREC: Human Research Ethics Committee
IASB: International Accounting Standards Board
IFRS: International Financial Reporting Standards
IIA: Institute of Internal Auditors
ILO: International Labor Organization
ISSB: International Sustainability Standards Board
KRI: Key Risk Indicators
KYC: Know Your Client
LGD: Loss Given Default
MBB: Members Management Board
MSCI: Morgan Stanley Capital International
NFRD: Non-Financial Reporting Directive
PD: Probability of default
RWA: Risk Weighted Assets
SB: Supervisory Board
SFDR: Sustainable Finance Disclosure Regulation
SRI: Socially Responsible Funds
TCFD: Task Force on Climate-Related Financial Disclosures
UN: United Nations
UN-PRI: United Nations Principles for Responsible Investment
WBCSD: World Business Council for Sustainable Development
WWF: World Wide Fund for Nature

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1. Introduction

The aim of this chapter is to introduce the thesis topic and objective of the study to the broader audience. With the help of the research background in section 1.1, the background of the topic is initially explored to reinforce the importance of the study. Later in the subsection 1.2.1, the prior research is explored to provide a foundation for the study. In 1.2.2, the research gaps are identified from the prior research work conducted to in turn frame the main and sub research questions of the thesis study in 1.2.3. Lastly, a reading guide is presented in section 1.3.

1.1 Research Background

"*Sustainable development is a fundamental break that's going to reshuffle the entire deck. There are companies today that are going to dominate in the future simply because they understand that*", spoke Kering's CEO Francois-Henri Pinault. While the issues of climate change have been looming around the public for decades, combined with increase in regulatory and public pressure, the Global Financial Crisis (GFC) of 2007-2008 had resulted in a paradigm shift whereby corporations have begun to integrate sustainability practices in their business operations (Galbreath, 2013).

After the emergence of initiatives like Paris Agreement Goals (2015), COP26 (2021), UN 2030 Agenda and EU Green Deal, where countries vowed to fight the climate change battle together by undertaking active sustainability initiatives, the concept of Environmental, Societal, and Governance (ESG) began to popularize (EBA, 2021). ESG data acted as a baseline for investors in the financial sector to prioritize long-term value growth in their decision-making models (Brogi et al., 2022). The definitions and key components of ESG are explained in Table 1.

Pillar	Overview	Key Components
Environmental	Environmental concerns that may affect a company's capacity to maintain its financial stability	• Greenhouse Gases (GHG) emissions • Energy consumption and efficiency • Exposure to fossil fuels • Water, air, soil pollutants • Water usage, recycling, and management • Land degradation, desertification, soil sealing • Waste production and management (hazardous, non- recycled) • Raw materials consumption • Biodiversity and protection of healthy ecosystems • Deforestation
Societal	Social factors that may have an impact on an organization's capacity to maintain its financial stability	• Implementation of fundamental International Labor Organization (ILO) Conventions • Violation of UN Global Compact Principles • Inclusiveness/Inequality • Exposure to controversial weapons

		• Discrimination • Insufficient whistle- blower protection • Rate of accidents and number of days lost to injuries, accidents, fatalities, or illness • Human rights policy • Investment in human capital and communities • Trafficking in human beings
Governance	Governmental problems that can affect a company's capacity to maintain its financial stability	• Anti-corruption and anti-bribery policies • Excessive CEO pay • Diversity (unadjusted gender pay gap and board gender diversity

Table 1 ESG definitions and factors adapted from (EBA, 2021)

ESG considers the impact of a project on the environment, ethical and societal considerations in the workspace, and accountability, transparency, and engagement among stakeholders (Li et al., 2021). The triple bottom line accounting for the profit and loss, people, and environmental aspects of ESG serves as a reliable set of metrics for organizations implementing a sustainability framework (Elkington, 1998) and has been linked to reputational gains and increase in investor confidence in the firm (Brogi et al., 2022). The concept of ESG is extensively researched in the literature, and its adoption by firms is explained by two pillars: the invisible hand theory proposed by Adam Smith, which suggests that hidden forces in the market economy unintentionally led to a greater social impact, and addressing market failures (Benabou and Tirole, 2010).

Given the influence banks exert over the economy through their investment decisions, ESG data plays a vital role during the process and as well as in propagating sustainable business practices to the economy (Nitescu and Cristea, 2020). A study conducted by Deloitte found that ESG risk has been identified as the most important type of risk among financial institutions in the coming years, linked to factors like climate change influencing the cost of capital and interest rates of credit (Ziolo et al., 2021). Compared to terms like "socially responsible investing," ESG gained popularity in the banking space due to its neutral connotation and its underlying concept being a collection of data instead of a normative concept that was viewed as a "deceptive marketing strategy" by many (Leins, 2020). Banks have realized that integrating ESG data into their decision-making does not necessarily conflict with their profit-driven business model but instead optimizes their financial gains while considering environmental, societal, and governance considerations (Leins, 2020). Combined with the ethical motives and the regulatory push from the European Central Bank (ECB), Figure 1 showcases the boom in emergence of integration of ESG risks in the banking sector from 2021 to 2022. Compared to the previous year which showed more than half the banks not making progress on their ESG risks integration, the year 2022 was portrayed with most of the banks equipped with at least basic ESG practices.

A strong use case for ESG in the banking sector has been integrating this data into ESG-linked credit to place incentivizes like lower interest rate on more sustainable companies (Rabobank, 2022b). Conventional loan origination and distribution processes for large clients utilize quantitative metrics to assess the credit risk of the corporate (Cole et al., 2004), but the integration of ESG data in this process helps the bank asses the credit risk of the client from a new lens (Mendiratta et al., 2021) as well as motivating the client to adopt sustainability practices in their business operations to improve their overall corporate ESG performance (Lei et al., 2023). However, given the lack of clear directives and the lack of standardization on ESG

data, unethical practices like greenwashing have risen in prominence causing actors to lose trust in the concept (Yu et al., 2020) with some even calling it a mere “marketing strategy” (Cornell and Damodaran, 2020).

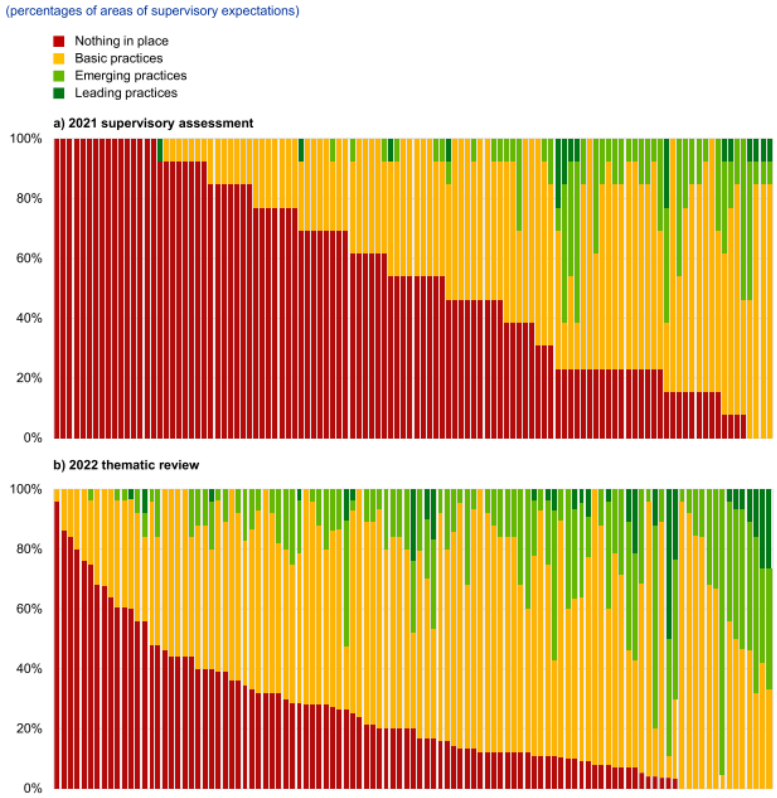

Figure 1 Bank by Bank maturity supervisory assessment, adopted from ECB, Walking the talk – Banks gearing up to manage risks from climate change, 2022

The demand for ESG concepts has resulted in the emergence of a vast number of non-financial reporting frameworks (Câmara and Morais, 2022), however, the debate over standardization versus fragmentation has emerged (Bose, 2020). Investors have criticized the presence of multiple frameworks and data sources as causing an "Alphabet soup," making the extensive ESG data available overwhelming during the investment decision-making process and leading to ineffective analysis of reports (Young-Ferris and Roberts, 2021). "Reporting Fatigue" has also been identified as an expensive concern, with multiple standards demanding extensive resources. ESG data providers on the other hand argue that standardization could lead to firms engaging in imitation, which could inhibit investors from clearly differentiating between the scores (Bose, 2020). This ambiguity and lack of agreement on ESG data between different actors make the sustainability rating framework implemented fragile and burdens the investment decision-making of corporate bankers (Billio et al., 2021). Furthermore, for banks, the sense of urgency to address these issues is multidimensional but stemming from establishing a competitive advantage for them among their peers and for risk mitigation in their operational activities (Chiaramonte et al., 2022)

1.2 Problem Definition

1.2.1 Prior Research

Conducting a preliminary literature review before conducting the classical literature review is helpful to set the foundation of the research study while parallelly helping identify the research scope and gap. Table 2 provides the details about the primary journal papers used for this prior research phase. Appendix A highlights the literature review strategy adopted for this section.

Author, Year	Publication Title
Stubbs and Rogers, 2013	Lifting the veil on environment-social- governance rating methods
Eccles et al., 2017	How to Integrate ESG into Investment Decision-Making: Results of a Global Survey of Institutional Investors
Amel-Zadeh and Serafeim, 2018	Why and How Investors Use ESG Information: Evidence from a Global Survey
Ziolo et al., 2018	Sustainability in Bank and Corporate Business Models
Chiaramonte et al., 2022	Do ESG strategies enhance bank stability during financial turmoil? Evidence from Europe
Hamrouni et al., 2020	Are corporate social responsibility disclosures relevant for lenders? Empirical evidence from France
Ahmed et al., 2018	Why banks should consider ESG risk factors in bank lending?
Brogi et al., 2022	Be good to be wise: Environmental, Social, and Governance awareness as a potential credit risk mitigation factor
Trahan and Jantz, 2023	What is ESG? Rethinking the “E” pillar
Kotsantonis and Serafeim, 2019	Four Things No One Will Tell You About ESG Data
Christensen et al., 2020	Why is Corporate Virtue in the Eye of The Beholder? The Case of ESG Ratings Dane
Kaplan and Ramanna, 2021	How to Fix ESG Reporting

Table 2 Overview of journal papers used in preliminary literature study

Integration of ESG factors into investment decision making to tackle environmental and societal challenges still at an early stage, has been gaining popularity across firms in the financial sector (Stubbs and Rogers, 2013). Such integration of non-traditional data like ESG information, provides investors with a unique and comprehensive perspective on their financial activities. This includes considerations such as greenhouse gas emissions human rights policies, and anti-corruption measures, which reveal insights that conventional financial metrics do not encompass (In et al., 2019). Corporations that disclose their ESG performance metrics have been linked to increased investor confidence and positive reputation gains, resonating with both internal and external stakeholders (Brogi et al., 2022). Similarly, motivations have been linked to the changing sustainable mindset of investors driven by stakeholders as well as the materiality of the data in risk management practices (Eccles et al., 2017). The emergence of ESG in the banking sector have been linked to occurrences such as industrialization and the Global Financial Crisis of 2007-2008, which led to significant economic turmoil within financial markets, exposed deficiencies in risk management and ethical issues within the banking sector (Galbreath, 2013). As a result, banks found themselves compelled to confront these issues in response to regulatory, stakeholder, and shareholder pressures, all with the aim of enhancing their reputation (Ahmed et al., 2018).

As ESG integration gains traction among both investors and banks, a set of tools known as Sustainability Reporting Tools comprising (standards, frameworks, and ratings) had emerged. These tools served as valuable resources for stakeholders, facilitating the more efficient integration of sustainability data, including ESG factors, into their decision-making processes (Siew, 2015). Consequently, financial firms had established investment styles like active engagement, full integration, and negative screening to integrate ESG data but were met with a variety of challenges that negatively affect their investment processes (Amel-Zadeh and Serafeim, 2018). Institutions like banks were shown to adopt initiatives like direct and indirect integration of ESG by either introducing sustainable innovations in their operational activities or by incentivizing sustainable business practices of their clients respectively (Ziolo et al., 2021). Indirect integration methods of ESG have not just been linked to helping clients adopt sustainable business practices in the long run but has also been linked to an increase in investor confidence, allowing these firms to stay stable and competitive even during financial crisis with this insurance blanket like practice (Chiaramonte et al., 2022) (Hamrouni et al., 2020). In spite of this, financial firms are slow to adopt standard ESG integration strategies due to difficulties in assessing the qualitative nature of ESG data (Ahmed et al., 2018).

The multifaceted concept of ESG captures the three sustainability related pillars of an organization, however, aggregating these pillars into a risk metric is an ever-evolving challenge (Brogi et al., 2022). Regulatory authorities are presently engaged in formulating guidelines aimed at the standardization of this procedure; however, the prevailing ambiguity in data significantly deters investors from embracing these practices (Trahan and Jantz, 2023). These barriers are ranging from data quality issues to integration challenges. Between these challenges, the lack of a common ESG or sustainability definition decreases the ability of investors to decipher these reports and analysts from rating agencies depend on their subjective judgement and proprietary assessment methodology to carry out ratings which affect the reliability and reproducibility of the results (Kotsantonis and Serafeim, 2019 Despite the increasing prevalence of ESG disclosures facilitated by frameworks such as GRI, the issue of data inconsistency continues to exacerbate (Christensen et al., 2020). The absence of standardized frameworks and integrations gives rise to a state of disarray and subjectivity in sustainability analyses, thereby exacerbating the divide between investor inclinations and sustainability objectives. (Kaplan and Ramanna, 2021). Even though the ESG reportings by companies have seen a significant rise in, the divergence in ESG data has only increased (Christensen et al., 2020) and taking all the barriers into consideration, lack of comparability of ESG data consistently underscored as a pivotal challenge (Ahmed-Zadeh and Serafeim, 2018).

1.2.2 Research Gap and Research Objective

From a scientific gap perspective, according to Brogi et al., 2022, *"Integrating ESG factors into credit risk assessment is the most novel challenge for the financial industry and at the same time an opportunity to create sustainable lending"*. A general lack of critical methodology on "How" ESG data is used by investors was detected (Amel-Zadeh and Serafeim, 2018) and in this space, studies in the context of the banking sector were especially identified to be limited (Buallay et al., 2020). Recently, a bibliographic review conducted by Galletta et al., (2022) brought out a new perspective on the current state of literature of ESG performance in the banking industry. Lack of research investigating the correlation between the impact of sustainability regulations on the corporate financing was highlighted. While Efimova, (2018) had highlighted the need for investigation of ESG integration in different investment phases, Goss and Roberts., (2011) had drew attention to the lack of information on how ESG criteria enter the creditworthiness assessment processes and the effects it has on loan pricing. As researchers continue to critique the lack of transparency on ESG integration by credit institutions (Erragraguia, 2018), even regulatory bodies like the EU commission had recognized this importance (Venanzi and Matteucci, 2022).

Additionally, though there has been a rise of standards and frameworks advising clients about sustainability disclosure practices to ensure more comparable metrics, the divergence between ESG rankings has only been rising (Berg et al., 2020). Even though lack of comparability was highlighted as one of the primary barriers in the integration process (Amel-Zadeh and Serafeim, 2018), literature has primarily concentrated on identifying such barriers and little research is done on reflecting the effects of these barriers (Christensen et al., 2020) and possible solutions for them especially in for firms in the banking industry (Venanzi and Matteucci, 2022). The study conducted by Lopez et al., (2020) highlighted the need for standardization and harmonization in ESG ratings but the calls for action do not show the interlinks and complexity of the ESG comparability barrier.

Young-Ferris and Roberts, 2021 had highlighted that the emphasis on ESG standards have in reality made it *"difficult to identify the financial materiality of ESG issues"*. Similarly, Siew, (2015) called attention to the comparability barrier and suggested future research on the "*recommendations to facilitate this harmonisation*". Although a study conducted by Romberg, (2020) proposed a conceptual model to ESG risk management, the study was conducted by using secondary data and the author highlighted the need for research to be aided with analysis of internal firm reports and primary data sources like interviews. Furthermore, they highlighted the need for research on ESG risk management the owner's perspective.

From a societal gap perspective, existing research is devoid of practical and validated solutions to address the challenges presented by literature especially in the qualitative research lens. As stated by Chowdhury and Paul, (2020) "*future research should focus on the development of strategies or systems for implementing particular CS initiatives efficiently and effectively*". By looking at the process from a qualitative exploratory lens the gap, the misalignment of interests of the stakeholders and the banks is given a new perspective. Furthermore, Eccles et al., (2017) had pointed out that an investigation on ESG integration practices adopted by different investors can help point towards an effective integration strategy. Hence through active collaboration among stakeholders of the ESG integration process, the links to existing theory and current industry practices can be established.

In conclusion, considering both the scientific gap and societal gap, there is a general lack of research investigating the integration of ESG in the credit risk assessment especially in the field of corporate banks. Furthermore, there has been a limited focus on the effects of the lack of comparability barrier without any holistic recommendations on overcoming the barrier. Hence the problem statement is devised as: *While using ESG data, financial firms like banks are faced with complex barriers, hindering the effective usage of this data in sustainable corporate financing.*

1.2.3 Research Question and Scope

The primary objective of this study is to investigate how banks can utilize corporate ESG data the sustainability credit risk assessment process for sustainable finance products within the EU. First, the background of the state of corporate ESG data integration in the banking sector is established while identifying the barriers faced in the process. Next, the existing practice of ESG data utilization in the sustainable corporate financing process is established while analysing both the stakeholders and the process flow map. Later, the current state of the barriers is identified within the context of sustainable corporate financing. Finally, since lack of comparability was deductively highlighted as a significant barrier by literature, a framework is then proposed to address this barrier bankers. Based on the knowledge gap identified in the previous sections combined with the research scope, the main research question has been formulated as:

"How can banks in the European Union (EU) utilise corporate Environmental, Societal and Governance (ESG) data in the sustainable corporate financing process?"

i. SRQ1: What is the current state of corporate ESG data integration in the banking sector?
    a. What are the barriers faced by banks during this process?

ii. SRQ2: How is ESG data utilized in the sustainable corporate financing process?
    a. SRQ 2.1 Who are the stakeholders involved in the process?
    b. SRQ 2.2 What is the decision-making process for utilizing corporate ESG data?

iii. SRQ3: What is the current state of the identified barriers in the sustainable corporate financing process?

iv. SRQ4: Lack of Comparability was identified as a key barrier in literature, How can banks address it while utilizing ESG data?

1.3 Research Relevance

1.3.1 Scientific Relevance

The scientific relevance of the qualitative research seeks investigate the ESG integration practices among banks, which has been limited especially in the corporate banking sector (Venanzi and Matteucci, 2022). Furthermore, the decision-making process of corporate ESG data utilization in the sustainable corporate financing process strives to be comprehended . Concepts like the different phases and tools used by banks are aimed to be probed in the light. In addition, it attempts to explore dynamic relationship between the external and internal stakeholders during the decision-making process.

Likewise, it aims to explore the state of barriers faced by banks during the decision-making process and in particular the lack of comparability barrier. To improve the applicability and generalizability of the research findings, the focus of the research has been on larger corporate banks in the EU. The underlying motivation for this scope is because larger banks were found to have more a mature decision-making process in place while integrating non-financial metrics like ESG data. Furthermore, the banks in the EU region have been quick to adopt sustainability practices due to increasing regulatory pressure from institutions like the EU commission and hence have been chosen as the geographical scope.

1.3.2 Societal Relevance

As stated in section 1.1, it is evident that the barriers faced by banks during the integration of non-financial metrics like ESG data is a critical challenge to be attended to. Especially with the evolving regulations and emergence of standards from international bodies, the barriers faced need to be tackled swiftly to establish sustainable business practices. Though existing larger banks have practices in place to integrate this data, the process is not standardized and the ESG data sources used are still in the consolidation phase. The objective of the research is to examine the current factors affecting the ESG integration process. The first contribution of this research is linked directly to the banks receiving a holistic outlook of the process in the eyes of different stakeholder groups and for them to reflect on the initiatives they can adopt to mitigate the effects of the barriers. Similarly, the research is beneficial for ESG data providers and policy makers. By providing first-hand accounts of the process flow and challenges faced, these stakeholder

groups can reflect on relevant challenges and its effects to integrate them during the decision making. Overall, when accounted for, the research findings can help different stakeholder groups collectively achieve the EU sustainability ambitions.

1.3 Reading Guide

This chapter has addressed the scope of the problem and identified the research gap that will be the focal point throughout the subsequent chapters. In Chapter 2, an in-depth exploration of the methodology and various approaches employed to address the primary research question and its related sub-questions will ensue. Chapter 3 will undertake a classical literature review to further highlight the intricacies of the problem background. Within this context, sub-question 1 will be addressed by scrutinizing the existing literature on the background and guidelines and will also answer its sub research question of analysing the barriers. Advancing to Chapter 4, an extensive investigation into the ESG data utilization will be undertaken, delving into each phase by interpreting qualitative data sourced from interviews, thereby addressing sub-question 2. Chapter 5 will delve into the realm of barriers, evaluating potential obstacles, and addressing sub-question 3. Subsequently, Chapter 6 will deliberate on the Lack of Comparability Barrier, ultimately addressing sub-question 4. With Chapter 7 validating the research findings and Chapter 8 reflecting on the proposed conceptual framework, the final Chapter 9 will furnish a comprehensive conclusion to the primary research question by harmonizing the solutions derived from all sub-questions.

2. Research Methodology

This chapter provides information on the research methodology chosen to analyse the usage of corporate ESG data in the European banking sector. It first describes the research design in 2.1, research methodology to answer each sub-research question with the aim to answer the main research question in 2.2 and concludes by describing the flow and structure of the research in 2.3.

2.1 Research Design

In literature, authors have presented varying interpretations of the intentions behind research purposes. While terms such as research designs, aims or purposes have been employed interchangeably by different researchers, the established classification of research studies are exploration, description, explanation, evaluation, intervention, and participatory action research (Strydom, 2013). Given the emerging nature of research in ESG data applications, an exploratory research design aligns with the problem statement. Studies adopting exploratory research allows researchers to acquire a comprehensive grasp of a phenomenon while dealing with substantial volumes of unorganized data, which allows them to offer fresh insights for unexplored concepts (Reiter, 2017).

To facilitate the exploratory research, a qualitative research study can help identify links and patterns in emergent concepts by interpreting the experiences and perspectives of study subjects (Moriarty, 2014). Snape and Spencer (2003) stated "*Qualitative researchers study things in their natural settings, attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them*". In contrast to quantitative research, qualitative research is dynamic and subject to change, allowing the researcher to challenge their initial research question based on the results from participants over the course of the study (Frankel and Devers, 2000).

This qualitative exploratory design follows a hermeneutic loop of the research which comprises of a forward and backward arc. The forward arc is an iterative methodology to generate an explanation on the formulated research question using the research methodology by constantly polishing and refining the findings from each research phase (Figure 2) (Reiter, 2017). To support the exploratory research, initially a descriptive research phase is adopted to establish a formal background on the relevant topic through literature review. After the background of the research has been explored, the qualitative research method of semi-structed interviews begins to collect the interview data. The interview data is analyzed, and a summary of the findings are then validated to later form the established results (Stebbins, 2001). Reviewing the results in the backward arc allows for reevaluation of the data to formalize the optimal explanation of the problem statement and further provides guidance for subsequent future research (Ellis et al., 2011).

During this iterative research loop, descriptive findings from the literature review evolve into explanatory frameworks that further undergo expert validation to transform into established theories or frameworks. This cycle serves the purpose of corroborating and reinforcing prior discoveries, and further challenges preexisting researchers to refine their findings (Meredith, 1992).

Engaging in any research design comes with drawbacks, and the exploratory research approach has been criticized on three stances: qualitative nature of data, inconclusive results, and lack of

generalizability (Swaraj, 2019). Similarly, the introduction of the researcher's personal bias is also a recurring challenge in qualitative research (Sparks, 1993). The impact of these limitations is dampened by constraining the scope of the research to produce a generalizable result within the industry and geographical context. Additionally, the incorporation of the validation round to the research allows the external interview participants to reflect on the findings and improve credibility of the research.

Furthermore, recognizing the potential biases and assumptions, the data collection process was conducted while maintaining a strict participant-observer role and transparency of the procedure was sustained through constant self-reflection and memo writing. Similarly, in lines with principles of reflexivity, active collaboration with the supervising committee was undertaken throughout various stages of this master's thesis to integrate critical feedback on the research design, data analysis and final results.

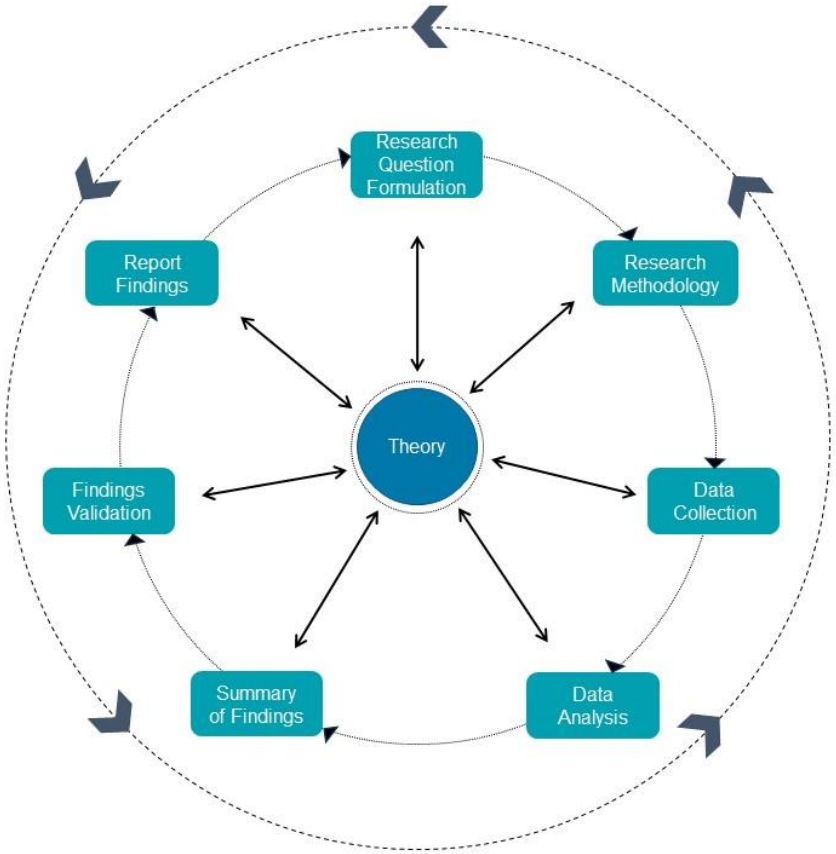

Figure 2 Steps in Exploratory Research inspired from (Reiter, 2017)

2.2 Research Methodology for Sub-Research Questions

Adopting the iterating approach of exploratory research, multiple research methods are adopted and combined to develop an in-depth assessment (Figure 3). The primary research methods used in this study are listed below:

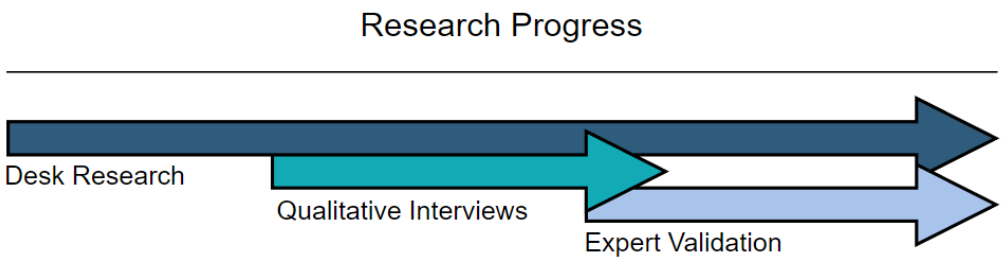

Figure 3. Research Methods Phases

2.2.1 Research Phase 1: Desk Research

Sub Research Question 1: What is the current state of corporate ESG data integration in the banking sector?
SRQ 1.1 What are the barriers faced by banks during this process?

The research methodology of literature review is broadly classified into four approaches: theory building, theory modification, theory refinement and theory extension (Seuring et al., 2020). The initial phase of the research adopts a descriptive theory building and concentrates on setting the background for the study with regards to ESG standards, frameworks, and guidelines on ESG in the banking sector. To answer this phase, a classical literature review of scientific papers and firm annual reports has been conducted via desk research to explore the existing pool of information which was then stored in the Mendeley reference manager software. The scientific papers were sourced and analysed with the help the Scopus database and further enhanced with Google Scholar. The pooled data was also helpful to set the (deductive) codes for later research phases.

Subsequently, a theory extension approach was adopted in the later stages of literature review to enhance findings out of the qualitative interviews. In particular, audited reports of banks were a valuable source of information on the risk management framework utilized and enriched the findings from the expert interviews. In line with the exploratory approach, the literature review was a non-linear process that took place across the whole duration of the research period.

2.2.2 Research Phase 2: Qualitative Interviews

Sub Research Question 2: How is ESG data utilized in the sustainable corporate financing process?
SRQ 2.1 Who are the stakeholders involved in the process?
SRQ 2.2 What is the decision-making process for utilizing corporate ESG data?

Sub Research Question 3: What is the current state of the identified barriers in the sustainable corporate financing process?

The sub research question 2 and 3 were exploratory in nature hence after the preliminary desk research, semi structured interviews were conducted to explore the current state of ESG data utilization in the banking sector. To obtain the required levels of data form the interviews, a theoretical saturation (*the moment at which additional research on a theoretical construct no longer shows any novel characteristics or provides any fresh theoretical insights into the developing findings*) (Bryant and Charmaz, 2007) in a relatively analogous group of interview subjects was set to be achieved with a sample interviews size of 9-17 (Hennink and Kaiser,

2022). And hence in this study, to balance the time constraint and labour intensity, 11 expert interviews were conducted.

Initially, interviews were conducted with participants from three large banks within the Netherlands from departments such as risk management, sustainability, and capitals market. Opinions were also collected from financial consultants within the EU who worked closely with such banks on these processes to enrich the overall findings. Lastly, data was also collected from participants in asset management companies to retrieve a holistic picture of the state of ESG data utilization as well as to analyse the best industry practices that could be implemented in the banking space.

The employment of semi-structured interviews in this research allowed the researcher the autonomy to explore potential emerging concepts during the interview process (Adeoye‐Olatunde and Olenik, 2021). This approach proved particularly advantageous when investigating the challenges faced by stakeholders from diverse backgrounds in their utilization of ESG data. By employing open-ended questions, the study delved into the root causes of these barriers, allowing for the categorization of varied perspectives. This categorization laid the foundation for subsequent pattern analysis.

The qualitative interviews were conducted online via MS Teams for ease of transcribing the interview data. With the collected transcripts, the data was cleaned and analysed using the computer assisted qualitative research tool Atlas Ti which was specifically catered for grounded theory approaches (Ritchie and Lewis, 2012). Using such research tools, a thematic analysis of the data was conducted by first cleaning the interview transcripts, then coding the data based on themes and then analysing these codes to identify the patterns which acted as a base for the exploratory research. The data collection and analysis process are explained in more detail in section 4.1.

To ensure compliance with GDPR as well as TU Delft's ethical standards, details about the research and the interview were assessed by the Human Research Ethics Committee (HREC) of TU Delft and approved. To ensure anonymity, personal information of the participants from the study was not revealed in this report. Furthermore, participants were asked to sign a consent form which briefed them about the usage and storage of the interview data. More information about these procedures is listed down in Appendix C and D.

2.2.3 Research Phase 3: Expert Validation Interviews

Sub Research Question 4: Lack of Comparability was identified as a key barrier in literature, How can banks address it while utilizing ESG data?

The final phase of the research method is observed to entail the closure of the hermeneutic loop through the validation of research derived from the preceding methodology. Unlike quantitative research, wherein emphasis is placed on statistical, measurable data, qualitative research, however, necessitates the adoption of two phases of validation to ensure the rigor and trustworthiness of the findings without which research holds no value, transforms into a work of fiction, and forfeits its practicality (Morse et al., 2002). Initially, the validation process is undertaken in accordance with the criteria outlined in the literature. Subsequently, the research findings are subjected to validation by three members of the previous interviewees' pool. The validation meeting for online expert interviews served dual objectives: Firstly, the research findings pertaining to the process flow were presented to the experts. Opinions and feedback on the intricacies of the process flow were duly recorded and subsequently integrated into the relevant sections. Secondly, the perspective of industry experts on the constructed conceptual

framework was sought. The data collected in this regard later informed the discussions and conclusion chapters.

2.3 Research Flow and Structure

The research flow and structure of the research study delineating the research methods, research activities and research questions are highlighted in Figure 4.

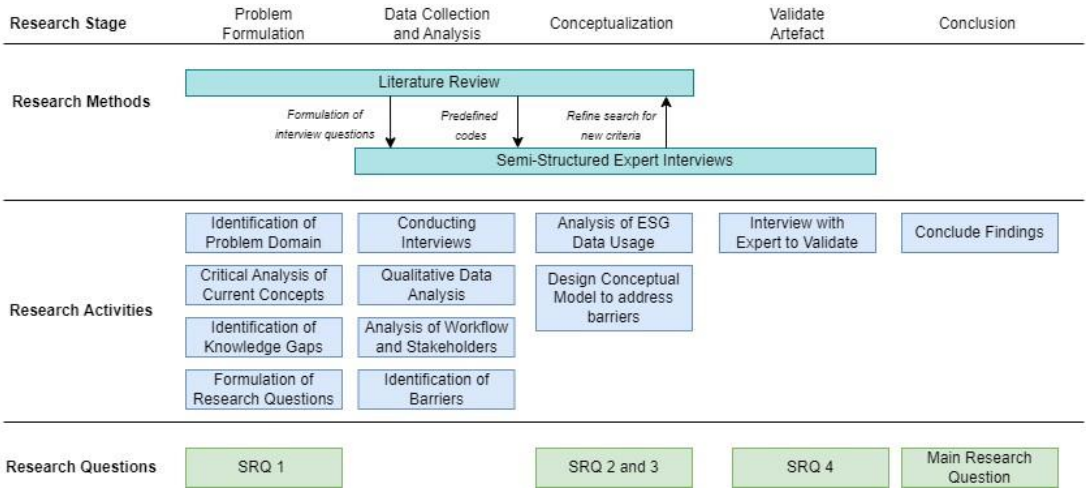

Figure 4 Research Flow and Structure

3. Literature Review

This chapter dives deeper into the current applications of ESG data and establishes a background for ESG in the banking sector using the 5W1H framework in section 3.1. Thereafter, the main regulations and guidelines are identified while using ESG data in 3.2 and the chapter concludes by highlighting the major challenges faced by stakeholders during the process in 3.3.

In academic writing, theories serve to back and strengthen the topic being studied. Integration of theories in the literature review phase enhances the arguments being built over the discovery of new research and further highlights the research gaps to assist the researcher to expand existing knowledge during the course while staying within certain critical assumptions *(*Seuring and Yawar, 2020). The European Union (EU) banking sector is currently witnessing a shift as it embraces the incorporation of environmental, social, and governance (ESG) considerations into its operational framework (Venanzi and Matteucci, 2022). To navigate the intricate landscape of ESG data utilization within EU banking institutions, this literature review adopts a structured theory generation approach underpinned by three central theories: Stakeholder Theory, Legitimacy Theory, and Institutional Theory. These theories have been deliberately selected for their collective capacity to provide comprehensive insights into the motivations, behaviors, and contextual influences that underpin the integration of ESG data in the EU banking sector.

Stakeholder Theory, the first theory, helps visualize the various groups like investors, customers, regulators, and society that have a say in what banks do. Stakeholder Theory showcases how different groups influence and are influenced by the ESG actions banks take and provide insights on pressure faced by banks to adopt ESG data (Twinamatsiko and Kumar, 2022). Legitimacy Theory, the second theory, helps us understand how banks aim to appear trustworthy and approved by society. This theory is relevant because banks, besides making money, want to show that they are socially responsible. Legitimacy Theory helps us see how banks communicate their commitment to ESG principles and why they do it (Eliwa et al., 2021). Institutional Theory, the third theory, adds another layer by explaining how rules, industry standards, and other institutions affect banks' behavior. Institutional Theory helps us see why banks follow ESG regulations and guidelines and how external institutions shape their choices (Galbreath, 2013).

By using these three theories, the theory generation approach of literature review aims to provide a comprehensive understanding of why and how ESG data is being used by EU banks. It goes beyond describing the current situation and helps discover areas that need further research. This review sets the stage for a deeper exploration of how ESG data is changing the EU banking sector, which will be explored in the empirical investigation that follows.

3.1 ESG Data as a Tool for Banks

As discussed in the earlier chapter, the current literature has thus far not adequately addressed the inquiry into the integration of ESG factors within the decision-making process. To elucidate this matter, the present study employs a problem-solving methodology, specifically the 5W1H framework, to comprehensively explore the contextual landscape prior to addressing the central query (Table 3). The review of the literature aims to ascertain the parameters of the issue under consideration.

The adoption of the 5W1H framework, as advocated by Prasad and Kumar (2022), finds its historical origins in the realm of journalism. This framework is selected due to its proven utility in facilitating an exhaustive analysis of nascent domains, such as the integration of ESG factors. The 5W1H framework provides a structured approach to address the fundamental dimensions of a research inquiry during the preliminary phase: Who, Why, What, Where, When, and How. Serving as a guiding scaffold, this framework expedites the systematic delineation of key elements including stakeholders, underlying motivations, content nuances, geographical context, temporal aspects, and causal relationships within the subject matter (Stebbins, 2011). It is important to note, however, that the utilization of this framework within the study is not strictly prescriptive, but rather, its application remains flexible, with dimensions being incorporated as warranted to ensure accurate and comprehensive coverage of the research landscape (Jia et al., 2016).

5W1H	Description	Explanation
What	What is the significance?	Credit Distribution Sustainable Finance Products
Who	Who are the stakeholders?	Investors and Banks
Where	Where is the target group located?	European Union, Americas
When	When did they start using it?	Industrialization GFC
Why	Why should they integrate it?	Changing preferences Reputation Risk Stakeholder pressure Correlation to FP
How	How are they integrating it?	Risk Management Due Diligence

Table 3 5W1H framework

3.1.1 What is the significance of ESG data in the banking sector?

Sustainability reporting, which incorporates alternative data like ESG data, offers investors a distinctive and comprehensive perspective on their financial endeavors. This involves including aspects such as greenhouse gas emissions, human rights policies, and anti-corruption measures, which elicit insights that conventional financial metrics fail to capture (In et al., 2019). Companies that engage in sustainability reporting and divulge their ESG performance metrics have been associated with enhanced investor confidence and favorable reputation gains, resonating with both internal and external stakeholders (Brogi et al., 2022). However, for these companies to uphold their long-term value, it becomes imperative to align their ESG transparency with their actual sustainability accomplishments, preventing accusations of engaging in greenwashing practices (Yu et al., 2020).

Financial institutions like banks act as crucial players in the pollution game because the power wielded by credit lending decisions and sustainable finance plays a vital role in ensuring a stable long-term growth of the economy of a nation (Galletta et al., 2022). Furthermore, given the importance of market forces to promote ESG practices, banks are in a unique complementary and crucial position (Nitescu and Cristea, 2020). From the stakeholder's perspective, ESG disclosures have helped banks build trust, especially during times of economic difficulties and have in turn reduced the likelihood of bankruptcy (Galletta and Mazzù, 2022).

The forward-looking approach of ESG has allowed banks to integrate these concepts into their risk management practices and their sustainable finance products. First in terms of risk management, the integration of ESG factors is crucial for banks to balance their risk and returns over their responsible investments (Brogi et al., 2022). Furthermore, integration of these factors have also been linked to an increase in financial performance of banks (Shakil et al., 2019). From the client's perspective, such integration practices has been associated with lower costs of debt from banks due to its potential reduction in operational risks and cash flow volatility (Erragraguia, 2018).

In a similar vein, banks have commenced the introduction of sustainable finance products to their clientele, aimed at encouraging their sustainable practices. These endeavors not only contribute to the augmentation of banks' reputation but also facilitate the cultivation of more robust client relationships. An illustrative instance of such products is the emergence of ESG linked or sustainability linked loans (Kim et al., 2021). These distinctive loan arrangements extend advantages to clients, such as reduced interest rates, thereby minimizing their debt costs, prolonged loan durations, and occasionally even encompass insurance premiums linked to their ESG risk profile (Mejia-Escobar, 2020).

3.1.2 Why should they integrate it?

Investors recognizing this impact of ESG on the quality of risk management worldwide have increasingly started to incorporate non-financial data alongside financial data during their investment decision-making (Dumrose et al., 2022) (Stubbs and Rogers, 2013) and the primary motivations for the integration have been linked to financial performance, reputational risk, and market push.

Literature focusing on the impact of ESG data on the financial performance of firms and the rationale behind integrating sustainability principles into their business practices is still emerging (Patara and Dhalla, 2022). A study conducted by Friede et al. (2015) demonstrated that almost 90% of the studies examining the relationship between ESG factors and Corporate Financial Performance (CFP) indicated a non-negative relationship and another study indicated that firms who issue sustainability reports outperform those who don't in the same industry (Siew, 2015). In the context of risk management, incorporation of ESG factors has been linked to a reduction of credit defaults among customers and proved to increase the lending efficiencies within banks (Weber et al., 2015).

Similarly, ESG integration has also been linked to increasing the resilience of the bank stability during a financial crisis as well as to increase its reputation because of fostering a positive engagement with the local stakeholders (Chiaramonte et al., 2022). Increasing transparency in their business operations through company disclosures have helped companies proved their efficient use of resources which directly been linked to increase in investor confidence and help the company maintain its competitiveness (Brogi et al., 2022)

The growing interest in this domain was also influenced by market forces, with majority pointing out demands from stakeholders and executives (38% and 35% respectively) and the minority linking it to regulatory and peer pressure (18% and 10%) (Eccles et al., 2017). While financial motives being one of the primary drivers among these stakeholder groups, the geographic region of the investor base plays a crucial role in this process. A large percentage of investors in the United States region use these factors as part of their investment strategy whereas the more investors in the European region use it for ethical reasons and to bring about relevant ESG changes in the sector (Amel-Zadeh and Serafeim, 2018).

In conclusion, firms from any region that are more aware of ESG factors demonstrate greater profitability and exhibit greater adaptability in adopting sustainable banking practices that promote long-term success even during economic crises (Ahmed et al., 2018) (Venanzi et Matteucci, 2022).

3.1.3 When did they start using it?

While integrating Environmental and Societal factors into responsible investing was limited to a small set of financial institutions in the 20th century, investors and corporations are now showing a growing interest promoting CSR (Leins, 2020). Integrating data into the investment decision-making process plays a crucial role in determining the creditworthiness of the product being financed by the banks and with the rise of analysing alternative data through new innovative industry 4.0 technologies, sustainability data like ESG has been linked to providing stakeholders with a unique outlook on the investment inexplainable by conventional financial metrics (In et al., 2019). The banking sector was disregarded as a major player in environmental concerns (unlike industries like manufacturing), however, events like industrialization and the Global Financial Crisis of 2007-2008 which triggered massive economic among economic markets, revealed the lack of risk oversight and ethical concerns in the banking industry (Galbreath, 2013), forcing them to address these concerns presented by the regulators, stakeholders, and shareholders and to improve their reputation (Ahmed et al., 2018).

The rise in integration of ESG in this sector can also be associated with the release of guidelines and standards by regulatory bodies for this space. The introduction of the GRI indicators in 2011 served as a standard for corporate sustainable disclosures which was later made mandatory in multiple regions (Global Reporting Initiative, 2011). Similarly, the United Nations 2030 Agenda for Sustainable Development and Paris Agreement of 2015 stressed the importance of integrating such ESG factors into businesses (Ortas et al., 2015). It can therefore be concluded that, level of social expectations was significantly higher for banks after the GFC which in turn promoted more CSR disclosures for them to build back their reputation as well as to have an insurance-like blanket on them in the case of a future crisis (Galletta et al., 2022). The guidelines and policy relating to ESG utilization will be discussed in more detail under section 3.2.

3.1.4 Who are the stakeholders and where are they located?

The primary uses of ESG data have been by groups such as asset managers to make informed decisions on their investments and banks to integrate sustainability metrics to their risk management models. Within this scope, the primary stakeholders of these processes have been the corporate client, senior management, relationship manager, sustainability team, risk management team, regulators, and NGO's. While section 4.1.4 delves deeper into the relationship between the stakeholders in the process, the subsection below highlights the roles of the stakeholders.

Client: The clients correspond to the end corporate receiving the sustainable finance product. This group engages in sustainable practices, align with ESG criteria, provide transparent ESG data, and collaborate with banks to develop and support sustainability initiatives.

Senior Management: The senior management involved corresponds to the roles of CEO, CFO, CSO, CDO and the Sustainability Panel. This stakeholder group plays the key role of overseeing the corporate financing process and is in charge of changing the procedure based on the evolving regulatory landscape.

Relationship Manager: The relationship manager consists of the individuals or group that maintain close contact with the client. They act as the primary mediator between the client and the bank and help communicate the details such as client information and product KPI's.

Sustainability Team: The sustainability team comprises of the group that are the primary owners of the ESG information. They extract the ESG information from multiple sources and help analyze them and communicate it to the risk management team.

Risk Management: The risk management team are the primary owners of risk assessment of the corporate client. They are involved in the process to quantify the risk associated with the client based on aspects like credit history, physical risk, transitional risk etc. Along with the expertise of the sustainability department, the risk management department finalizes the KPI's of the financing product.

Regulators: Given the evolving regulatory landscape of this field, the regulators are tasked with collaborating with industry partners to pass regulation to assist the ESG data utilization process while aiming to strive by the EU green deal.

NGO's: The NGO's function encompasses advocating for responsible banking practices, diligent monitoring of environmental and social impacts, rigorous research endeavors, and collaborative engagements with financial institutions aimed at fostering sustainable finance initiatives.

In terms of the geographical scope, the European region has been leading the integration of sustainable finance due to pressure not just from their national authorities but also from the European Union bodies. While other major economies like USA, China, India and other non G20 countries are found to significantly lag behind the EU in terms of setting sustainability initiatives and agendas (BloombergNEF, 2021). Similarly on the global scale, ESG is not always viewed and adopted the same way. Significant number of investors from the USA do not believe in the materiality of the reports and studies find that ethical motivations for using the data in the EU outweighs the financial motivation, unlike the case of the USA (Amel-Zadeh and Serafeim, 2018).

However, within the EU, due to the unification of sustainable policies by regulatory bodies, ESG practices surpass the confines of national boundaries and businesses instead adopt such practices from their industry peers *(Iamandi et al., 2019)*. Similarly, the perceived advantages of ESG were not limited to an industry or country but were instead acknowledged globally (Eccles et al., 2017).

3.1.5 How are they integrating it?

Though the emergence of ESG in the financial sector is relatively new and in the consolidation phase, the integration of different data dimensions has been a common practice in the banking sector. Through the challenges of integrating a diverse set of variables ranging from carbon emissions to labor working conditions, banks have been found to integrate ESG either internally (direct) or externally (indirect) into their business model (Ziolo et al., 2021) (Bătae et al., 2020).

Internal methods or green banking constituted banks engaging in eco-innovation in their operational activities by for instance adopting ESG risk assessment techniques to mitigate ESG-related risks in their operations or banks making a strategy shift to reduce their carbon footprint by switching to more sustainable renewable energy sources. These methods directly correlate with the bank's financial and investment operations, and it is easier to gauge and monitor their effect on ESG factors (Ziolo et al., 2021).

The external method or sustainable finance method on the other hand involves banks encouraging their clients to adopt sustainability practices in their businesses in exchange for lower costs of capital (Tarulli et al., 2022). Tying interest rates of credit disbursed to a firm's ESG performance commonly addressed as ESG lending has been a recent trend in the North American and Western European regions. While there is no clear indication that the performance of the borrower's ESG score increases after engaging in this type of lending practice, stock markets are shown to act positively after disclosing the issuance of such loans (Kim et al., 2021). Studies have also developed tools for banks to integrate environmental risk coefficients for capital requirements without provoking a shock to the banking system (Esposito et al., 2019). For integrating ESG factors as an investment tool, "ESG integration" and "Socially Responsible Funds (SRI)" have also been on the rise (Knight and Dixon, 2009). The former acts as a quantitative risk analysis metric to analyze the client's credit position during credit distribution or to analyze the bank's portfolio risk (Nitescu and Cristea, 2020). The latter is characterized as a strategy to invest in sustainable companies to generate a positive return by using screening techniques (Landi and Sciarelli, 2019).

3.2 Overview of Guidelines and Recommendations within the EU

The basis of regulations around ESG principles originated from environmental related laws passed in the from the 1970's. With the involvement of bodies like the United Nations, framework and guidelines like the Kyoto Protocol were released for countries to prioritize climate change and global warming concerns. In more recent years, the Sustainable Development Goals 2030 were released by the United Nations and the Paris Agreement international treaty which essentially replaced the Kyoto Principles was signed between 196 countries which entailed regions to keep the rise in global temperature well below 2 degrees Celsius (EBA, 2021). Evolving from these initiatives, the EU has been a frontrunner in releasing sustainability related regulation such as the EU Green Deal that aim to have zero net emission of greenhouse gas by 2050. Along with setting sustainability goals, through this plan, the EU has also focused to foster sustainable (ESG) investments by setting adequate compliances for corporate investors (Alamillos and de Mariz, 2022). In addition to the Green Deal, in 2021 the EU had also published its Sustainable Finance Action Plan, primarily rooted in the EU taxonomy, Disclosure frameworks and sustainability tools.

With the rise in popularity of ESG integration by investors and banks alike, tools that have been collectively referred to as Sustainability Reporting Tools (Standards, Frameworks and Ratings) have been established for stakeholders to integrate sustainability data like ESG into decision making processes more effectively (Table 4). Additionally, given the effect regulations can have on propagating sustainability principles across businesses by either motivating or incentivizing, such tools become a key necessity. In order for stakeholders to have a consistent and standard understanding of these sustainability goals, the wide range of SRTs can act as a guide during their decision making (Siew, 2015). Similarly, the initiatives taken by the EU commission like releasing the Holy Trinity consisting of: NFRD, SFDR and EU Taxonomy also help with standardization efforts of ESG data (Câmara and Morais, 2022).

Type	Name	Publication Body
Regulations and Initiatives	EU Taxonomy	EU Commission
	NFRD (now CSRD)	
	SFDR	
Reporting Frameworks	TCFD	Financial Stability Board
	CDP	CDP
	ESRS	EFRAG Project Task Force
	IASB	IFRS Foundation
	Equator Principles	The Equator Principles Association
	UN-PRI	UN
Reporting Standards	EFRAG	EFRAG
	GRI	GRI
	ISSB	IFRS Foundation
	FASB	Financial Accounting Foundation
	IASB	IFRS Foundation
ESG Ratings Providers	MSCI	MSCI
	Sustainanalytics	Sustainanalytics
	Bloomberg	Bloomberg Inc.
	Eco Vadis	Eco Vadis
	RepRisk	RepRisk

Table 4 Outlook of EU Regulations, Corporate SRTs and ESG data providers (sourced from GRI Perspective: https://www.globalreporting.org/media/jxkgrggd/gri-perspective-esg-standards-frameworks.pdf)

3.3 ESG Data Challenges

It is found that ESG reporting quality and quantity have increased, but corporate ESG performance has plateaued since 2015 (Arvidsson and Dumay, 2021). Data from ESG rating agencies are not regulated like the Credit Rating Agencies (CRA) (Stubbs and Rogers., 2013) and are formulated by their proprietary research methodologies. Their assessment practices are often kept hidden to protect their Intellectual Property and maintain their competitive edge in the credit ratings market. The expert knowledge gathered by these agents serves as a fundamental tool for financial markets for ESG assessment and reflects the social legitimacy in the industry-accepted sustainability principles (Escrig-Olmedo et al., 2019). Many CEOs recognize the intricacies of quantifying sustainability metrics and this diversity in metrics can be linked to the sources of data for ESG reports. Given the distinction in access to data sources, the claim of ESG reducing information asymmetry for stakeholders is put into question (Diaz-Sarachaga, 2021).

The multidimensional nature of ESG ratings and their difficulty following clear realizations of results has made it less apparent than analyst forecasts or credit ratings as to how well these are likely to be judged (Serafeim and Yoon, 2022). Although institutions like UN-PRI have issued guidelines on how firms can use ESG data, studies show that reliability and validity are major concerns of investors while utilizing ESG data. Additionally, ESG as a tool once used for

measuring intangibles to help gauge the market valuation beyond quantifiable information (Stubbs and Rogers, 2013) would instead provide misleading information and affect the trust in ESG rating agencies (Escrig-Olmedo et al., 2019). The lack of standards in ESG reporting can lead to gaps in data consolidation by rating agencies and in instances of lack of information about certain criteria, analysts' resort to oversimplification of data to compile a holistic report of the corporation which casts doubt into the validity of the sustainability report. The excessive importance given to quantitative data by the top management hinders the reporting process and the right balance between qualitative and quantitative information is required for a complete ESG report (Diaz-Sarachaga, 2021).

ESG assessment is still in its early stages making it prone to ambiguity and inaccuracies (Patara and Dhalla, 2022). ESG ratings have begun their consolidation process in the past decade with ESG rating agencies merging with CRAs to establish a common rating method. However, with the evolving sustainability regulations and reporting standards, divergence of assessment methods take place among rating agencies. The low overlap between the agencies is proved by the agencies not willing to share their assessment methodologies to best suit their reporting method and the differences in access to data from corporations (Dumrose et al., 2022) (Kotsantonis and Serafeim, 2019). Though awareness of ESG reporting has increased recently, ESG disagreements have been increasing over time (Christensen et al., 2020). Investor demand for ESG assets has proved to be significantly affected by rating uncertainties in a portfolio, further affecting the future cost of capital for green firms (Avramov et al., 2022). Similarly, in a study conducted by Ahmed-Zadeh and Serafeim, (2018) out of the identified barriers of: lack of comparability, lack of standards, cost of ESG information lack of reliability and many more, the barrier of lack of comparability was identified to be the most common among the survey respondents.

Apart from losing investors' trust in the ESG data due to low levels of transparency among the data providers (Patara and Dhalla, 2022), Greenwashing has been observed to be a common trend during the ESG reporting process. As companies preferred showcasing certain aspects of their sustainable practices over others, three types of greenwashing practices firms engage in have been identified. First comprises of Greenwashing strategy where firms disclose large amounts of data to overwhelm the investors and hide their real performance. The second common type was when firms selectively disclosed their data to create a false green impression of the firm to the public eye. The final practice was when firms engage in greenwashing at the product level to present a false sense of sustainability to the customer base. Such greenwashing practices can undermine the credibility of ESG data during investment decisions and serve as a barrier for investors using ESG data during their investment strategy and also lead to misallocation of funds towards firms that aren't as sustainable as they claim to be (Yu et al., 2020).

The complex process of reading ESG data oftentimes stops investors from getting more ESG data from other data providers in order to reduce the complexity of reading the data even though getting scores and perspectives from different rating agencies would bolster their ESG findings. Furthermore, ESG scores can be issued by third-party agents as well as the company itself. When companies provide their own data there is a clear risk of whitewashing/window-dressing. Whereas if it is provided by external agents then there is the case of how each of them measures and outputs the data "alphabet soup". Similarly, the tension existing between the multidimensional aspect of ESG data and the lack of unified application method of ESG data creates a "Self-reinforcing bottleneck that impedes progress" and this tension is unlikely to disappear any time soon as stated by (In et al., 2019).

Hence, in the widespread barriers of ESG information in decision making can be identified as: lack of reporting standards, lack of materiality data reliability, low comparability, low accuracy and quantifiability, greenwashing concerns.

3.4 Conclusion of Chapter 3

SRQ1: What is the background on ESG integration for firms in the banking sector?

- *What are the barriers faced by banks during this process?*

Findings from the literature review suggest that ESG, as a tool for firms in the financial sector, can be used in the areas of risk management and to distribute sustainable finance products to their clients. The primary motivation for such integration practices was linked to financial gains, ethical motives, and stakeholder pressure. To assist firms with these sustainability transitions, regulators, and other international institutions have released a plethora of standards and frameworks. However, it was highlighted that despite regulatory interventions, firms are faced with a wide range of challenges when integrating ESG factors like lack of reporting standards, lack of materiality data reliability, low comparability, low accuracy and quantifiability, greenwashing concerns.

Since the background and barriers of the ESG integration process has been established according to literature, the following chapter will explore the current utilization process flow of ESG data and subsequently reflect the current state of barriers in the context.

4. Decision-Making in ESG Data Utilization

The objective of this chapter is to explore the process of corporate ESG data utilization in the EU banking sector. Building on top of the findings during the literature review phase, in section 4.1, a qualitative research methodology is adopted to gather data on this topic from industry experts. While keeping the main research question in mind, an initial draft process flow is proposed via this research method. Building on this draft, the final process flow is presented highlighting the different phases in the process in 4.2.

4.1 Data Collection and Analysis Methods

As highlighted in the previous chapters, the research method of semi structed interviews was adopted to explore this field given its flexibility and explorative nature. To retrieve a holistic output of the process flow, 11 experts from the financial services industry were interviewed and the visualization of the thematic analysis is portrayed in Figure 5. The below subsections discuss the overview of the interview process.

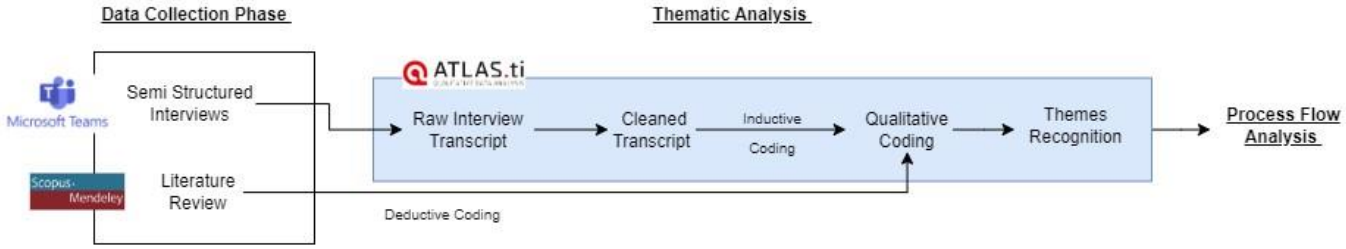

Figure 5 Qualitative Data Analysis Process

4.1.1 Sampling Process

Before starting the qualitative study, it is crucial to have a sound sampling process in place to extract the most suitable forms of data with the given resources. Adopting the framework published by Robinson (2014), Table 5 highlights the sampling strategy adopted for this study.

Sampling Phase	Overview
Phase 1: Defining target participants universe	Experts in the corporate ESG data management
Phase 2: Determining participants sampling size	≥9 participants
Phase 3: Defining sampling strategy	Convenience Sampling
Phase 4: Sourcing participants' sample	Snowball Sampling

Table 5 Sampling Process Table

While narrowing down the problem statement and research questions, the primary inclusion criteria were set as experts with adequate knowledge with dealing with ESG data during the sustainable corporate financing process within the EU region. Given the time and resources available for this study, from existing literature, the minimum sample size was set at 9 participants within a homogenous group, which was said to achieve theoretical saturation rate of 90% (Hennink and Kaiser, 2022). Due to the nuances of the topic, the convenience sampling strategy was selected and hence the research results will only be generalized within the geographic context instead of a global context. Once these key criteria of the sampling process

were set, through referral process of snowball sampling, 11 interview participants were recruited for this study. These participants were primarily contacted personally via professional networks and through the partner organization BearingPoint. A more detailed outlook of these participants is provided in Table 6 below.

4.1.2 Interview Process

Expert ID	Team	Role	Years of Experience	Organization
P1	Sustainability Advisory	Director	9	Bank 1
P2	Sustainability Advisory	Risk, Regulation and Reporting Expert	2	Bank1
P3	Sustainable Capital Markets	Associate	2	Bank 2
P4	Wholesale Sustainability	Senior Director	4	Bank 2
P5	Credit Risk	Manager	2	Bank 3
P9	Financial Services Transformation Advisory	Manager	2	Consultancy 1
P7	Sustainable Finance	Consultant	9	Consultancy 1
P8	Financial Services	Senior Consultant	2	Consultancy 2
P9	Financial Risk Management	Manager	3	Consultancy 3
P10	Sustainable Investment	Project Manager	6	Asset Management 1
P11	Global Asset Management	Product Owner	6	Asset Management 2

Table 6 Expert Interview Participants Overview

Before commencing the interview process, an interview protocol was developed (in Appendix A) based on the participant's background to guide the interview questions as well as to maintain uniformity through the research. During the interview meeting, initially the participants were given a brief introduction about the thesis topic and the research outcomes of the interview to set forward appropriate expectations. After this, data about their background and role were recorded to understand the perspective and nature of the rest of the interview data. Soon after, questions were asked according to the interview protocol in expectation of them answering the second and third research questions. Towards the end, the participants were given a chance to share any additional information about the topic that was perhaps not emphasized on. All the meetings were held online via MS Teams and lasted on average 43 minutes, with the longest one running for 1 hour 10 minutes and the shortest one running for 33 minutes. With the data being accessible only to the lead researcher and supervisor, the participants were informed that they could at any time withdraw from the study.

In the pursuit of methodological rigor and the assurance of data reliability and completeness, meticulous attention was directed toward potential data gaps that might emerge during the research process. To tackle these challenges, a rigorous participant selection procedure was executed. Interviewees were chosen based on their industry experience, ensuring a holistic understanding of the topic with the average years of experience of the interview participant amounting to ~4 years. Furthermore, a thorough evaluation of their job descriptions was

undertaken at the start of each interview to confirm the relevance of their roles to the research's focal area. Similarly, the research upheld strict confidentiality, assuring interviewees that their responses would remain confidential and sensitive information would not be disclosed as per compliance with GDPR as well as TU Delft's ethical standards. Moreover, the validity of the research is explained in detail in Chapter 7. By taking a proactive stance in addressing concerns associated with data gaps and potential liabilities, these precautions bolstered the credibility and trustworthiness of the research's outcomes in an academic context.

4.1.3 Interview Data Analysis

After the conclusion of the interviews, the video recording, audio recording and the written transcripts were downloaded from MS Teams and then uploaded to the qualitative research analysis tool Atlas Ti. Adopting the thematic analysis framework prescribed by Braun and Clarke (2006), the interview data was analyzed in six phases (Table 7). This process was used to organize the themes identifies within the interview data and then categorize it accordingly for an effective analysis process. Using the frameworks prescribed by both grounded theory and thematic analysis, a multidimensional outlook of the process flow can be visualized (Floersch et al., 2010).

Process Stage	**Overview of Phase**
Familiarization with the amassed data	Repeated reading of the cleaned transcripts and take noting down code ideas.
Creating preliminary codes	Based on the ideas, generate an initial list of raw codes.
Exploring themes	Analyze the broader theme by creating a thematic map based on the formulated codes.
Evaluating themes	Review and refine the identified themes to underline the essence of each theme.
Defining and naming themes	Further analysis and scrutinization of themes to narrow down the theory.
Generating report	Develop a detailed overview of the interview data and connect it to the main research question.

Table 7 Process stages of a Thematic Analysis (Inspired by Braun and Clarke (2006))

In the data analysis phase, for a holistic outlook on the interview data, a hybrid approach of both inductive and deductive coding is used to generate the list of codes in Atlas Ti. Through this approach, the codes and themes identified can be fed back in the feedback loops and simultaneously allow knowledge to be incorporated from literature and themes from the interview (Fereday and Muir-Cochrane, 2006). First in the deductive approach (Figure 6), from the literature review in Chapter 3, important concepts were first picked to then develop an initial list of codes. These codes were then matched to the quotations from the cleaned transcript files of the interview. The top-down approach of deductive coding allows for a detailed explanation on certain parts of the data but lacks the ability to showcase a general outlook on it.

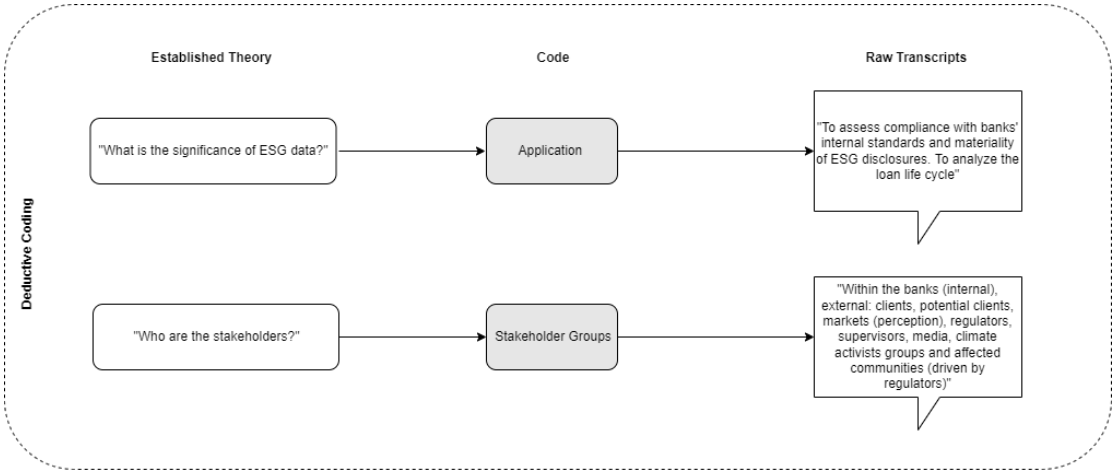

Figure 6 Deductive Coding Approach

Parelly, an inductive coding approach was adopted to ensure an overall outlook on the interview data (Figure 7). As new concepts emerged from the interview transcripts, themes were simultaneously assigned to them. Later in this bottom-up approach, new codes were derived from these constructed themes. The use of inductive approach is advantageous to explore new theories within the interview data and allows codes to emerge naturally from the raw data.

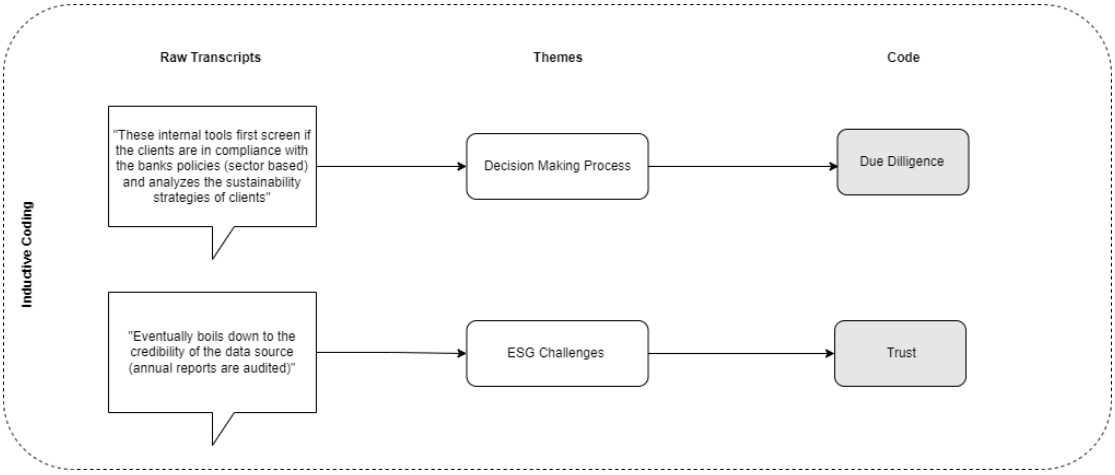

Figure 7 Inductive Coding Approach

The comprehensive list of codes, developed through the hybrid coding process, is displayed in Appendix B. Subsequently, the final set of codes was generated using the Atlas Ti software, and these codes were then depicted in a preliminary thematic map (Figure 8). The visualization of these codes within the thematic map contributes to the organization of data, the recognition of patterns, and the enhancement of analytical precision. This method simplified data management, enabling the identification of patterns and relationships among codes, and allowing potential themes to emerge. Additionally, the preliminary thematic map served as a dynamic instrument throughout the iterative research process, facilitating the refinement of analysis, the verification of consistency and promoting collaboration within supervising committee. Furthermore, it aids in conveying initial findings and insights, thereby contributing to the overall quality and rigor of the research. Ultimately, the preliminary thematic map establishes a structured basis for the creation of the final thematic map, ensuring that the resultant themes faithfully encapsulate the richness of the qualitative data.

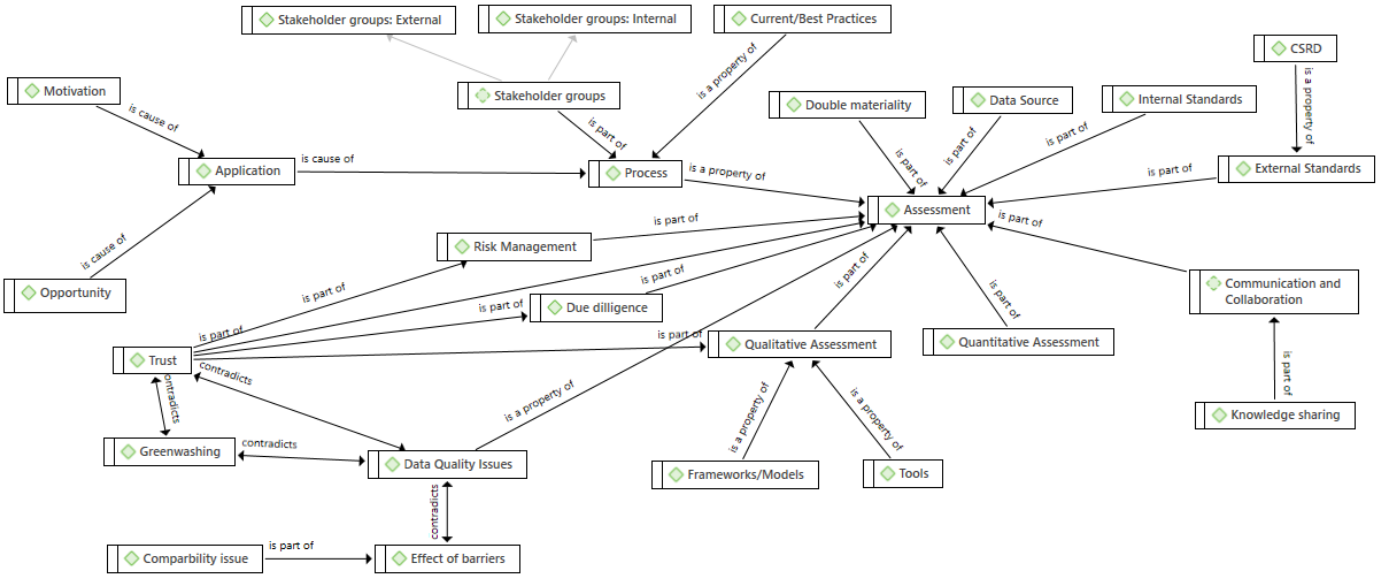

Figure 8 Initial Thematic Map

4.1.4 Bank Risk Management Structure and Stakeholder Analysis

First introduced by the Basel Committee of Banking Supervision in the year 2011, the three lines of defense model was a risk management framework for banks that emphasized the importance of managing risk exposure across all different processes of the banks (Figure 9). The first line of defense takes up the role of "Risk Owner" and is in charge of identification and management of risk. The second line of defense acts as the "Risk Challenger" who monitors and challenges the risk management framework. And finally, the third line of defense takes the role of "Internal Auditor" where they provide an independent advisory service to both the first and second line. Furthermore, the Senior management and the Board/Audit committee are present to supervise and maintain the overarching risk management framework. Harmonization between these different defense lines can help banks strengthen all aspects of their risk management framework to achieve a robust operation environment (Luburić, 2017)

With the rise in popularity of ESG risks, in 2020 the Institute of Internal Auditors (IIA) updated this model to integrate ESG and sustainability considerations within the risk management framework. The transition to a more forward-looking framework of risk management stresses the importance of incorporating sustainability elements alongside active participation and collaboration of different stakeholder groups to achieve a sustainable future (WBCSD & IIA, 2022).

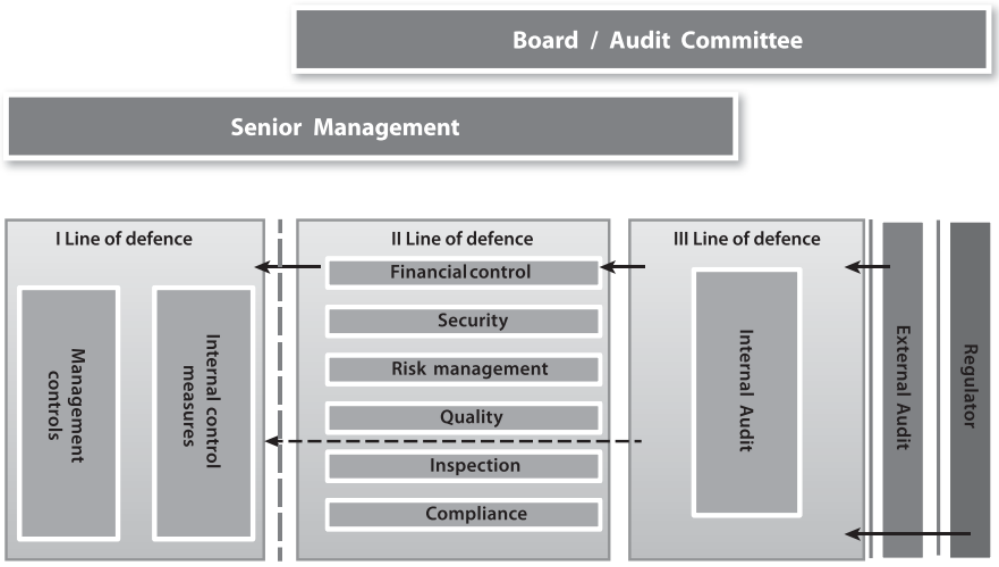

Figure 9 Three Line of Defense Model from Luburić, 2017

The stakeholders involved in this research study context can be broadly categorized into two groups: internal and external (Table 8 and Table 9). The presence of external stakeholders is acknowledged in this study. However, internal stakeholders have been prioritized as the focus data subjects.

Stakeholders	**Skills/Expertise**	**Organization Position**	**Description**
Senior Management	Risk Management	Executive and Supervisory Board	CRO, CSO, CFO, CDO and the Sustainable Finance Panel are responsible for overseeing the risk operations in the bank
Relationship Manager/ Program manager/ Client advisor/ Client Owner	Business Domain Knowledge	First Line of Defense	Primary contact with the client and manage their portfolio
Sustainability Department	Sustainability Risk	Second Line of defense	Primary owners of sustainability risks
Risk Management Department	Risk Management	Second Line of Defense	Responsible for bank's risk management framework and risk appetite
Compliance Party	Bribery and Corruption risk	Second Line of Defense	Ensure legal compliance of banks operations
Reporting Team	Regulatory Reporting, Data management	Second & Third Line of Defense	Handle regulatory reporting including sustainability related disclosures of the bank

Table 8 Internal Stakeholders

Stakeholders	Skills/Expertise	Description
Corporate Client	Business Domain Knowledge	Recipient of Sustainable Finance Product
ESG Data Provider	Data governance, Data quality	Primary distributors of external sustainability data
Regulators & Policy Makers	Laws and Regulation	Serve and protect public interests
Banking Supervisor	Laws and Regulations	External body that ensures bank's legal compliance
Consultants	Business Domain Knowledge	Provide advisory services to the banks to improve their operation efficiency
NGO's	Standards and Guidelines	Release risk management related standards and guidelines for banks
Activist Groups	Lobbying	Pressure banks to switch to sustainable practices

Table 9 External Stakeholders

In the context of this study, effective categorization and analysis of stakeholder groups play a vital role. This process offers a clearer picture of intricate relationships among these groups, helping address our core research question (Bryson, 2004). From the array of techniques available for dissecting these stakeholder groups, the Power Interest Matrix method has been selected as the guiding framework (Figure 10). This matrix, comprised of four distinct quadrants, helps gauge the delicate balance between the interests held by these groups and the influence they wield. The first quadrant "Subjects," is home to those groups that may not hold considerable influence but are deeply vested in the subject matter. The second quadrant "Crowd" represents groups with relatively low power and interest. The third quadrant "Context Settlers" accommodates those who may not wield substantial influence, yet their high interest propels them into the conversation. Finally, the fourth quadrant "Players," are entities that possess both significant power and a keen interest in the matter at hand. With the help of the internal and external stakeholders' categorization in table 8 and table 9, the power-interest grid is mapped out in Figure 10. Among the categorized stakeholders, the main stakeholder groups with the highest power and interest during the process were identified as the clients, senior management, relationship manager, sustainability team, risk management team and the regulators.

Figure 10 Stakeholders Analysis: Power Interest Grid

4.2 Process Flow Analysis

4.2.1 Environmental context

As mentioned in the previous chapters, the process of integrating new data points into the risk management framework isn't new however, the process of integrating a dimension hard to quantify such as sustainability is relatively newer as stakeholder groups within this industry are still trying to standardize this process with the help of regulations. As stated by (P1*): "(integrating ESG data) was already part of the risk analysis I think what has changed recently is…with the establishment of the EU Green Deal, I think there is much more attention of the credit risk element. So that's sustainability is not just a reputation risk or a nice to have managed risk at the site, but that it can also. And then especially looking at climate change, it can have very clear, tangible credit risks to your business".* Similarly (P7) stated: *"So it's kind of enriching the traditional investment decision making process. But yeah, I wouldn't say it has changed it fundamentally like all the other factors that were assessed before, ESG gained in prominence like us are still there. But yes, she's like it's an additional factor to consider."*
Hence compared to traditional credit risk analysis with financial metrics, the sustainability credit risk analysis builds up on the existing process but considers the ESG elements as a new addition.

The environmental context for this study is based on banks utilizing corporate ESG data during the sustainability credit risk management process for the distribution of sustainable financing products like ESG linked loans (sustainable corporate financing). As stated by (P5): "*ESG linked loans is where we have interest rate dependent on whether a company achieves its ESG targets or not. So, if it does achieve its targets, we are lower their interest which is all (stated) in the loan documentation".* Similarly, ABN Amro stated they view sustainability as a commercial opportunity and a means of aiding the wider shift to a low-carbon economy. To aid in this shift, they are boosting finance for sustainability and integrating sustainability risk, such as climate risk, into our approach to lending and investing services *(*ABN AMRO, 2022a). Rabobank also stated they have executed pricing incentives, manifesting as reduced interest rates, tailored for clients who hold specific eco-labels (Impact Loan), meet predetermined sustainability key performance indicators (Sustainability-linked loans), or engage in substantive sustainability investments (Green Loan), contingent upon the sector (Rabobank, 2022a). These measures are designed to actively stimulate our clients' transition towards sustainable practices.

Furthermore, to further bolster the research, interview opinions were collected from experts in the asset management sector. This was found to enrich the overall datasets as it has been found that the process of utilizing ESG data is similar between these different institutions as stated by (P1): *"the overall (decision making) structure is the same for investments and banks"*. Retrieving data from a different type of financial firm provides a more holistic outlook on the usage of ESG corporate data.

4.2.2 Phases of Processes

Taking inspiration from the three lines defense model, in an iterative thematic mapping process, the individual process flow diagram according to each interview participant was first drawn. After completion of these individual maps, alongside the memos from the interviews and data from annual reports, the final process flow diagram of ESG Data Utilization during sustainable corporate financing was constructed (Figure 11). Given the time constraint of these expert interviews, data from audited annual reports of the largest banks in the Netherlands (ING, RaboBank and ABN AMRO) was used to enrich the process flow diagram.

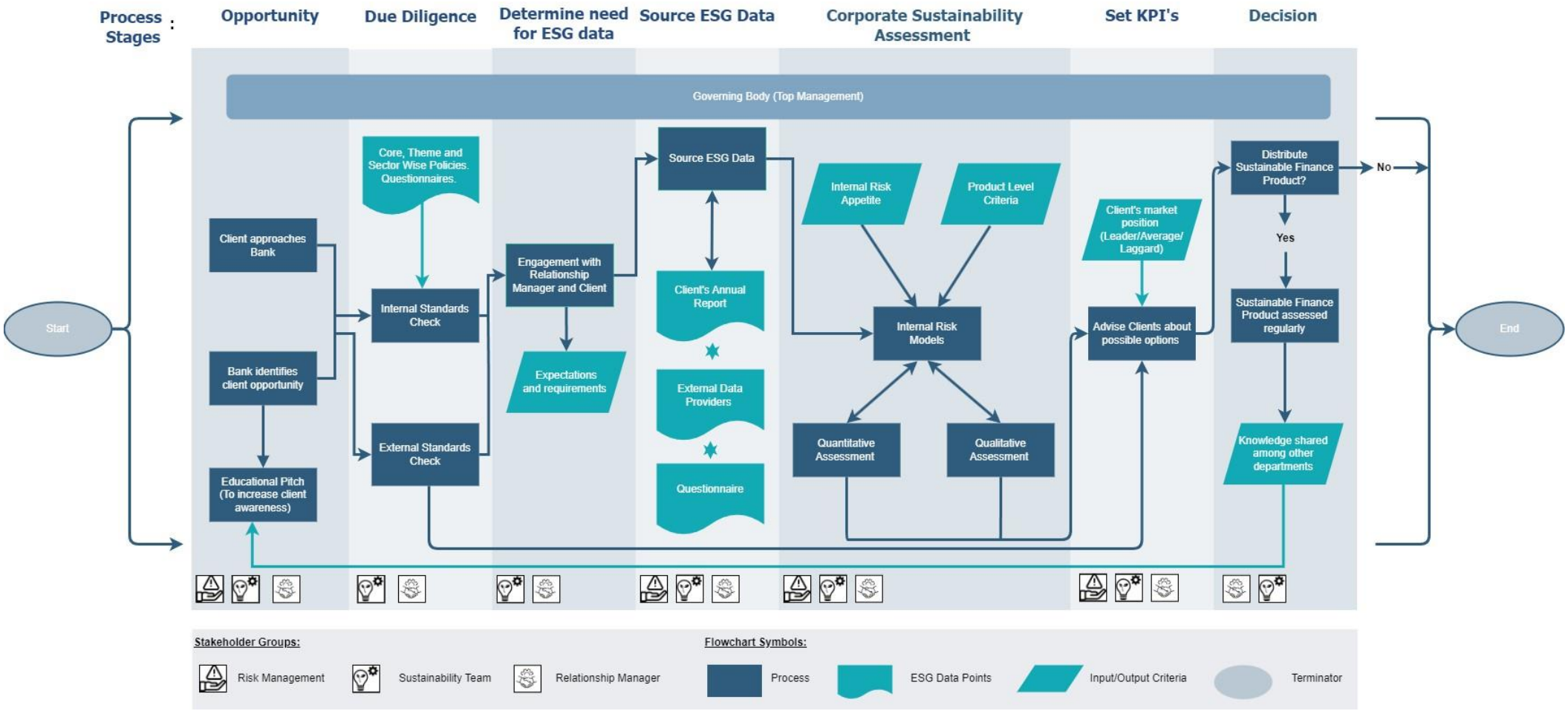

Figure 11 ESG Data Utilization Process Flow during sustainable corporate financing

The map portrays the multiple phases involved during the decision-making process during the distribution of a sustainable finance product to the end client. Starting from the opportunity identification phase all the way to the decisions, a variety of stakeholders are involved during this process to ensure its smooth operation. However, the three main stakeholder groups highlighted in this map are: the risk management department, sustainability team and the relationship manager. In the subsections below, each phase of the process flow is described in more detail.

4.2.2.1 Opportunity Phase

In contrast to the traditional process of credit distribution, where generally the corporate client approaches the financial institution for a line of credit, during the sustainable corporate financing procedure, either the client approaches the bank, or the banks also approaches the client based on sustainability opportunity they identified. Generally, as (P5) mentioned: *"Clients come to the bank most of the times."* During this process, either the advisory team (including the relationship manager) or the consulting team assists the client about their possible options. For the bank to get a holistic understanding of the requirements, they generally ask questions along the line of: *"Have you considered this? Would you like to do this? Would you like our help with this rather than take a general done? Would you like to ring fence it? And you know, be it only for sustainability or ESP (Environmental and Societal Policies) purposes."* These questions are especially investigated to ensure transparency ever since the risk of greenwashing has been a growing concern among activist groups (P1, P5).

The other times banks approach clients, as (P3) mentioned: "*Sometimes the company doesn't know about the financing instruments, there can be very long discussions on this because if it's sustainability link loans or bonds, then you really need to show how this is compared to other companies and why this is ambitious and…. it's very subjective".* During these times, the sustainability department of the bank set out to increase the awareness of such sustainable finance products through educational pitches showcasing elements along the themes of: how they can decarbonize their operations, educating them about the benefits of the sustainable products, and showcasing the interest in financing such innovations (Rabobank, 2022b) (P3).

When it comes to syndicate deals, due to the involvement of a groups of banks, (P4) highlighted that: "*(the lead bank) approaches the loan syndicate for approval… and then the process involves more active stakeholder dialogues to prove that their (corporate client) ambitions are above the business-as-usual trajectory".* In this context, the syndicate deal finalizes only when the group of lenders are convinced that the particular client is going to perform above par on their sustainability KPI's.

4.2.2.2 Due Diligence

After the opportunity identification phase and a client is interested in the sustainable finance product, the necessary due diligence is carried out to ensure the legal compliance of the corporate client and typically the corporate lending clients are subject to stricter guidelines, where specialized procedures and client assessment tools are set (ABN AMRO, 2022a) (P1). This process as stated by (P5) is done: *"We do an annual review of all this. So, when the client is on board, we perform this test. It's basically due diligence. And then every year, or sometimes if a client is really good in performing very well, we do it every two years"* and *"if it's really significantly higher risk, then it goes to team ESR where they look at it in detail and then they have calls and try to understand what's happening and try to mitigate the problem"*

To carry out this process, the Know Your Client (KYC) model is adopted by banks compromising two sets of standards: Internal and External. For the internal standards, as (P8) mentioned: "*most banks in their due diligence have an exclusion list. And the exclusion lists usually is… made based on the… mission of the company*". To better align with their personal sustainable investment policies, banks have started to implement such exclusion lists to not

engage in any type of financial activities with companies dealing with fur products, deforestation, private arms dealing, etc. In line with the Dutch Financial Supervision Act, this exclusion list is updated frequently based on new developments to ensure the protection of the reputation, values, and risk appetite of the firm. Generally, this tool is the first cut-off point for the due diligence phase after which the bank utilizes the client assessment tools (ABN AMRO, 2022a) (ABN AMRO, 2022b).

The client questionnaire is an example of one of the tools used during this process where alongside the help of the relationship manager, the bank determines the compliance of the company with regard to the bank's internal risk management framework, internal and course sector policies (ABN AMRO, 2022a) (P4). According to (P5) these questionnaires also look into: *"we look at, you know, physical risk (floods, national calamities and biodiversity), we look at transition risks (policy related)."* and it is important to note that these questionnaires are sector dependent. (P5) states: *"different sectors get different questions as…. (Flood risks) for certain other cycles, it's not really that that much of a problem"*

Whereas for the external standards, as *(P1) states: "Another check against, what is called the equator principles specific standard to project finance"*. The equator standards (Amiram et al., 2021) are a voluntary set of guidelines that banks adopt to ensure the positive environment and societal effect of corporates. These two standards combined help banks: "*determine…. whether or not client meets our policies and how high risk (they are)*" (P2) and also "*help them make informed decisions on the credit worthiness (of the client)*" (P8).

4.2.2.3 Determining need for ESG data

After the due diligence phase, the bank has to establish the need for sourcing this ESG data. Headed by the first line of defense in the bank, as (P8) mentioned: *"There's the first line defense, and that's usually relationship managers, analysts, project managers and product owners who have the daily job of making sure they collect enough data, they escalate when things go wrong."* The analysis pointed out that this department is in charge of the preliminary analysis of the client's profile where they later determine the market position of the client with regard to their competitors. As (P3) stated: *"And based on our own model, you can have a front runner just, an average and a laggard. And information is used during the decision making. If the company is larger than …. (they) are required to provide additional explanation when they apply for credit.*" Hence as (P5) states: "*We have goals with them (client) in order to understand how all the data you know solves our problem"*, the goals and expectations of the sustainable finance deal are retrieved by the relationship managers and analysts (first line of defense).

4.2.2.4 Sourcing ESG data

Before the phase of Corporate Sustainability Assessment, using the retrieved information about the sustainable finance deal, a number of ESG tools are used by both the first and second line of defense members. The three primary sources of this ESG information are highlighted below (Table 10).

Tool	Examples
Client Reports	Annual Reports, Client Sustainability Disclosures
ESG/Sustainability Data Providers	Sustainanalytics, Bloomberg, MSCI, S&P 500, Moody's, RepRisk
Questionnaires	Casy NextGen questionnaire, Climate Risk questionnaire

Table 10 Sourcing of ESG data

- **Client Reports**

As part of the EU green deal, all large companies in the EU are mandated to release their environmental and sustainable practices along with the risks associated with them to the public (Fetting, 2020). Normally (P4) claims: *"(ESG data) is sourced from the clients directly. Typically, the disclosures that they have to put together ready through their own sustainability reports, we prefer that when a client is coming across, it makes it way easier if a client is already reporting under some sort of a framework like GRI or TCFD, that makes it way easier for us to pick up things.*". However, participants have explained their difficulties in sourcing ESG data for smaller firm, for instance (P9) mentioned: *"So I think some of them (banks) are still struggling with how to do this, as most of the large companies publish it (ESG data) in their annual report but with smaller SME's, data is not as readily available"*. But compared to the other ESG sources, an audited client report has been referred to as the most convenient source of ESG data (P4, P8, P9)

- **External data providers**

Given the variance in different clients reports across companies and sectors, external data providers have been another popular source of ESG data for bankers. Typically, the sustainability department engages in long and active talks with different data providers to understand the scope of data available. (P5) mentioned that: "*Sometimes we even have ad hoc requests to include certain data points, so then they make exceptions, and they actually do a bit of research 6 to 9 months and then they come up with the data for that and they include it in the model as well. So, it's basically negotiations contracts*". Once the data provider and the bank reach an agreement about the datasets, the process of negotiation begins, and if the deal is within the bank's budget, then the data provider shares the required client data. A few of the major engagement points during these conversations with the data provider are: "*try to understand what data they use. We try to understand where they get the data from How relevant is the data? How often it is refreshed because we don't want to use our data, we want constant updates to data as well If there's something wrong and you know it doesn't, it's not fit for purpose, are they? Are they flexible in terms of changing it for us*". A few prominent external data providers used by banks are: Sustainalytics, Bloomberg, MSCI and S&P 500 ESG. Similarly, free databases and meteorological sites are also an active tool used by them to keep track of physical risks of the corporate (P9).

During this process, the theme/sector of the corporate client plays a crucial role in sourcing the right kind of ESG data. Banks are diligent in and according to (P7): "*So in general, banks would see, what is the objective of our methodology? And then which provider is best in class for which topic and then they would take different elements and then construct their own methodology?"*. However, during the interviews it was revealed that Bank 1 are in fact skeptical of using such data providers. As (P1) states: *"So we don't use external data sets a lot. I think mainly maybe also for the reason that there is often less standardization of reports, and it turns into a cherry-picking contest. I think in the terms of the rating agency landscape, there will always be difference because some focus on the investor lens and others focusses a lot more on the engagement lens"* and they move on to claim that these differences in lenses are not too helpful for providing a larger sustainability picture. More details of this barrier will be discussed in the following sections.

- **Questionnaires and other tools**

Though corporate reports and external data providers are the two predominant sources of ESG data for larger firms, smaller SME's often do not have as much sustainability related information publicly accessible due to the lack of sustainability disclosure regulatory pressure in the space (Dinh et al., 2023). During such times, (P9) states: "*but I think they also have quite some clients who don't publish an annual report and then it's in need more questionnaire style. So, they already have quite some of these questionnaires also for Right. Non easy topics and then they often also integrate some sustainability easy related questions into it, and they do it*

at the initiation phase (due diligence) with the client, but they also regularly do revisions throughout the contract with the client.". Along the same lines, (P1) stated that the sector specific questionnaire: "determines whether or not client meets our policies and how better they are high risk or not."

Furthermore, (P1) also mentioned that: *"need to pull a lot more out of them in the meeting, so we need to schedule a meeting, help them understand why they need to tell us this and then maybe they don't even have it yet. So, then it's time to it takes time for them to develop"*. Hence such stakeholder engagement tools allow banks an opportunity to retrieve the missing ESG data. More details about the above barriers will be discussed in the subsequent chapters.

4.2.2.5 Corporate Sustainability Assessment

Typically, the risk management framework adopted by commercial banks are split between three types of risks: financial risk, non-financial risk and overarching risks as seen in Figure 12. Sustainability (or ESG) risks have been identified as an overarching risk affecting all pillars of the risk taxonomy and are treated as both a standalone risk and driver of the other risk dimensions (ABN AMRO, 2022a). Upon further analysis, ESG impact has been identified to have the largest effect on the credit risk dimension for banks especially in the long term where its impact on operational risk is deemed material but its impact on liquidity risk, market risks and the other risk types are currently examined to be not material (Rabobank, 2022a). The significance of a risk rooted based on its ability manifest and cause financial or reputational damage and given the double materiality effect wherein the financial activities of banks can affect the environment and the environment similarly can credit risk of the banks (natural disaster events affecting businesses) (ING, 2022), ESG risks are an important component to credit risk.

Figure 12 Risk Taxonomy adopted from (ING, 2022) and (ABN AMRO, 2022a)

Rooted in the three lines of defense model, banks target these ESG risks in three different levels: Client level, portfolio level and economy level (Rabobank, 2022b). The strategies implemented by banks on the client level primarily aims to ESG risk assessment to help finance their sustainable operations (Rabobank, 2022a). In the credit risk management setting, these client level strategies are implemented using the Corporate Sustainability Assessment (CSA) (ABN AMRO, 2022a). The CSA, overlooked by the Second Line of Defense, is a data driven approach to determining the sustainability risk of the client using a myriad of factors. Split into a qualitative and quantitative approach, the internal risk model adopted by the bank is mainly influenced by the internal risk appetite and product level criteria (P9).

The client sustainability credit risk undertaken by the bank is rooted in two major considerations: the bank's risk appetite and the sector focus of the client (ABN AMRO, 2022a). The Risk

appetite of a bank dictates the levels of acceptable risk that the bank can integrate into their portfolio while aligning its strategy with the Paris Agreement Goals. Using both an inside out and outside perspective on sustainability risk, the risk appetite framework is reviewed and updated frequently by the bank and approved by committees like the Members Management Board (MBB), the Executive Board (EB) and the Supervisory Board (SB) (ING, 2022). Unlike asset management firms assigning a ESG score to a client (P7), bank based on the client's sector and their compliance with the internal sustainability policies, have risk indicators constituting the sector that help determine the market position of the client during the Sustainability Assessment. The assessment of their credit application is strongly influenced based on their position as the front runner, average or laggard. Where a company might receive more favorable conditions on their product if they were a market leader or even average but as (P3) stated: "*if the company is laggard, then…(they) have to provide additional explanation when… (they) want to apply for a credit committee*".

Based on the above considerations, the bank utilizes two approaches to carry out the sustainability assessment: Quantitative and Qualitative. Traditional credit risk analysis follows a quantitative procedure to analyze the risk indicators such as the probability of default (PD), exposure at default (EAD) and loss given default (LGD). This procedure is suitable for dealing with large datasets to provide a material statistical result of the credit risk. But while dealing with Sustainable Credit Risk, a blended approach of both quantitative and qualitative analysis is adopted by banks. Due to the lack of information on this newer type of risk, the use of the qualitative elements allows analysts to integrate their personal experiences and perspectives from different stakeholders into the credit risk assessment (ING, 2022). These models are extensively evaluated independently and reviewed annually to ensure their compliance with ECB's and EBA's definitions and requirements (ABN AMRO, 2022a).

In the qualitative analysis of sustainability credit risk, corporate data is compared against their market peers and analyzed based on risk indicators. Tools like the questionnaire and other client meetings help build the categorization of clients into high, medium, and low risk. As (P5) states: "*(Analysts) come up with a low, medium, high, it's all the input into the system and that is for everyone who has, you know, the rights and the access to that system to see."* Using this as a basis for analysis, (P9) highlighted: "*A qualitative assessment… is the initial phase where do we focus on our risk and then they look out for the riskiest parts of the portfolio basically which metrics could be used to express this risk as a number (quantitative)."*

Thereafter, the quantitative approach is taken. The quantitative sustainability credit risk model adopted is closely regulated by the ECB and integrates data points from the credit risk analysts and the client's sustainability metrics (carbon emissions, resource efficiency, geographic location) (Rabobank Road to Paris, 2022). Subsequently, the risk model outputs variables that highlights the risk indicators and serve as a basis for estimating the Risk Weighted Assets (RWA) and the minimum capital requirements according to the IFRS 9 models and the Basel framework (ING, 2022). In cases where datapoints are missing for the risk models, proxy datapoints are used to complete the analysis. As (P9) had highlighted *"If you know the sector and turnover you can do some high-level estimation, but it's a bit more difficult because there you cannot always just disclose proxies, right? (Always using them) is actually difficult"*. But with historical client datasets and other indicators, using the outcomes of the quantitative assessment, the categorization of the company based on their risk is further reinforced (Tammenga, 2020).

After the hybrid sustainability credit risk analysis, the client rating is allotted by the first line of defense and then sent for approval to the second line of defense before the final decision process is initiated (ABN AMRO, 2022a). During this process, the sustainability credit risk team also receives advice from different departments within the bank, as stated by (P1): "*So the credit risk decisioning department gets advice from the client sustainability assessment. A lot of departments within the banks are dealing with the sanctions risk of seizures, the sanctions party*

abiding on it, there is a compliance looking, more specifically on corruption risk". Especially given the qualitative aspects of the hybrid approach, the entire process of Corporate Sustainability Assessment could span for an extended duration of time, as stated by (P5): *"because (the decisions) really impacts the Assets and liabilities as well as our reputation and the future. So, we take our time with it. Sometimes it extends to weeks, even a few months, but we want to get it right."*

4.2.2.6 Setting KPI's

After the decision from the credit risk team and the upper management (generally the CSO, CRO and the sustainable finance panel), the intricacies of the deal are set by analysts and relationship manager from the first line of defense in consultation with the advice from the credit risk department from the second line of defense (P8). During this stage, with the understanding of sustainability assessment, client's market position and the relevant external standards, the loan conditions are set (Rabobank, 2022a). As (P1) mentioned: "*all these factors are weighed into the final decision. Do we want to onboard this client and or do we want to go ahead with this financing? Yes, or no? Or do we want to maybe set specific conditions when granting them this finance?*".

Incentives such as lower interest rates are provided to the industry leaders to incentivize and motivate positive sustainable changes in their business operations. Whereas a premium interest rate is laid on the laggards of the industry (Rabobank, 2022a). External Standards like the Equator Principles and the UN Guiding Principles for Business and Human Rights (P1) provide banks with the necessary framework to benchmark and monitor the corporate's performance and additionally allow banks to stay on track with their internal sustainability strategies (ABN AMRO, 2022a).

4.2.2.7 Decision

The final decision is communicated to the clients through the relationship manager. If the company exhibits adequate compliance with the sustainability guidelines of the bank and meets the minimum requirements of the sustainability assessment, with the help of tools like the Client Score Card highlighting the sustainability assessment, they are given the credit proposal and briefed about the intricacies of the sustainable finance deal. If the client partially meets the sustainability assessment criteria, then the bank offers the credit proposal conditionally. Generally, in these circumstances, the bank offers advice to the client about possible measures to improve reporting transparencies and sustainability efforts (biodiversity, emissions, human rights) to eventually improve their market position in the sector for more favorable financing conditions. However, if the client does not meet the sustainability criteria, then the relationship manager informs the client and terminates the finance product (ABN AMRO, 2022a). Over the course of the deal, Key Risk indicators (KRI) are in place to monitor the impact of the deal. This allows them to set checkpoints and limits that play an important role in determining the incentives towards to the end of the deal. As highlighted by (P1): "*There's also it's serving as input in all these sorts of points throughout the client journey, and these assessments are also reviewed regularly*". Depending on the risk of the client, the sustainable finance deal is reviewed annually or even biannually (P5).

4.3 Conclusion of Chapter 4

SRQ2: How is ESG data utilized in the sustainable corporate financing process?

- *SRQ 2.1 Who are the stakeholders involved in the process?*
- *SRQ 2.2 What is the decision-making process for utilizing corporate ESG data?*

This chapter sought to investigate how decisions are made during a sustainable corporate financing process while using ESG data. The results show the sustainable corporate financing process involves ongoing decision-making and weighing of many considerations, interests, and repercussions.

At first, the qualitative data analysis process is highlighted. The interview participant was first recruited and then meetings with them were conducted via MS Teams. Using research tools like Atlas Ti, the recorded interview data were categorized according to themes via a hybrid (inductive and deductive) coding process.

To later answer the question: *Who are the primary stakeholders involved in this process?,* the external and internal stakeholders were tabulated from literature review and interview data and with it a Power Interest Grid was constructed.

Later on, to answer the question: *What is the decision-making process for utilizing corporate ESG data?,* using the preliminary thematic analysis map, the process flow diagram was constructed. Here the process flow phases were identified as: Opportunity, Due diligence, Determining need for ESG data, Sourcing ESG data, Corporate Sustainability Assessment, Set KPI's and finally the decision phase.

However, it was highlighted that a variety of barriers affect the process flow of sustainable corporate financing of banks. Hence the next research question aims to investigate these barriers.

5. Barriers influencing the process

Subsection 3.4 had highlighted the different challenges when it came to dealing with ESG data from the banking or investors perspective. This section tries to dive deeper into the challenges faced by the expert interview participants while dealing with ESG data and the effects it has on their operational activities. Section 5.1 first categorises the barriers while Section 5.2 highlights the effects of the barrier.

5.1 Barriers Analysis

As highlighted by the GRI standards board: "*The quality of information is important for enabling stakeholders to make sound and reasonable assessments of an organization, and to take appropriate actions*" (GRI 101: Foundation 2016, 2016). However, the concept of ESG data quality has proved to be multi-dimensional and with it there are wide range of complex interlinked barriers affecting the effective implementation of ESG in the financial sector (Jonsdottir et al., 2022).

To gain a better understanding of these barriers, over the course of the expert interviews, an open-ended question of *"What according to you are the major challenges while utilizing ESG data?".* Initially, information regarding only the data quality issues of the ESG were expected from them the experts as literature had abundantly pointed out before. However, it was noticed that a more than 50% of the participants had pointed out the issues with integrating ESG data into the process. Hence, similar to the classification of barriers found during the literature review in subsection 3.4, the barriers faced by the interview participants in terms of the data quality were highlighted in Table 11 as: Lack of Materiality, Lack of Reliability, Lack of Data Availability and Lack of Compatibility. Similarly, the barriers faced by them during the integration of ESG data were recorded in Table 12: Lack of Data Availability, Difficulties in Sourcing and Quantifying ESG data.

5.1.1 Data Quality Barriers

Barrier	Overview	Experts
Lack of Materiality	• Lack of right data	P8, P10 and P11
Lack of Reliability	• Greenwashing concerns • Differences in ESG measurements	P2, P5, P8, P9, P10 and P11
Lack of Accuracy	• Gaps in data • Fragmented data • Data not updated	P1, P4, P5, P7 and P10
Lack of Comparability	• Subjective assessment issues • Lack of standardized metrics • Disagreement among rating providers and other data sources.	P1, P2, P3, P5, P6, P7, P8, P9, and P10

Table 11 ESG Data Quality Challenges

In line with the literature, lack of materiality was highlighted as a challenge especially during the sourcing relevant ESG data phase. The lack of materiality stems from the lack of clear direction or guidelines for firms to define ESG factors (EBA, 2021). The absence of universal standards affects the bank's ability to determine the ESG factors impact on the company's financial health which further inhibits the integration process of non-financial data in financial decisions especially while banks analyse larger companies (P10 and P11). In the context of smaller corporates, the lack of regulations on obligatory sustainability reporting and the lack of adhering to specific reporting metrics was also highlighted as a challenge (P8). Hence, this barrier underscores the need for standardized frameworks and improved clarity on materiality criteria to enhance the effectiveness of ESG integration into sustainable financing practices.

Similarly, lack of reliability concerns was linked to the differences in ESG measurement techniques used by different ESG data providers. The barrier arose from the from the varying levels of accuracy, consistency, and transparency associated with ESG data reporting by companies (EBA, 2021). These disparities in data quality were highlighted to undermine the "trust in data" that bankers' had both from external data sources and corporate disclosures (P2, P5, P8, P9, P10 and P11). The barrier was further underlined to complicate the evaluation process of companies' sustainability performance and their alignment with ESG principles. Due to these challenges, bankers addressed the difficulties in assessing risks, making informed financing decisions, and emphasized greenwashing concerns (P2, P5). However, they noted that it was not within their authority to inspect greenwashing behaviour and instead they choose to trust the data at face value. Hence, this barrier calls for standardized reporting practices, enhanced data verification mechanisms, and increased transparency in ESG data disclosure, that could contribute to the credibility and reliability of ESG information used by bankers.

Lack of accuracy was highlighted as a barrier from the initial sourcing stages of ESG. The barrier arises from the potential gaps and inconsistencies in the collection and reporting, of corporate ESG data (EBA, 2021). Similar to the lack of materiality issue, the lack of standardized methodology and definitions lead to an increasing discrepancies and inaccuracies within the ESG data. Such effects also undermine the "trust in data" and affect the ability of bankers to make informed financial decisions which could lead to a misjudgements of companies' sustainability profile. These gaps led to analysts relying more on proxy data to complete their sustainability assessments (P1, P4, P5 and P10). Hence this barrier calls for a transparent data validation processes and standardized reporting frameworks to increase the trust and accuracy of ESG data for bankers.

The lack of comparability was identified as a barrier by experts in the context of lack of a common data platform about clients. Due to the lack of comparable metrics, stakeholders were dependent on sourcing ESG data from multiple sources to form their personal and unique conclusion instead of relying on a common ESG source (EBA, 2021). This challenge stems from the subjectivity and inconsistency in ESG data reporting standards, and disclosure practices across different companies and industries. The lack of standardized reporting frameworks hinders the banks' ability to compare and assess ESG performance across its current or future corporate clients. Consequently, this barrier introduces complexity and ambiguity in the ESG data which affect the financial decision-making process of and evaluating sustainability profiles of corporates (P1, P2 P3, P5, P6, P7, P8, P9, and P10).

5.1.2 Integration Challenges

Challenge	Overview	Experts
Lack of Data	• Relevant ESG data not available (especially for SME's)	P5, P2, P7, P4, P9, P1, P5, P6 and P3
Sourcing Data	• Lack of common data platform • Difficulties in retrieving data from SME's	P1, P2, P5 and P9
Quantification of Data	• Difficulties in quantifying and assessing ESG data.	P8 and P3

Table 12 ESG Integration Challenges

This challenge of lack of data arises from the limited availability and completeness of ESG data on companies or industries for banks (Table 12). As evidenced by the insights of 80% of the participants, the lack of data was a significant barrier. In particular, when considering Small and Medium-sized Enterprises (SMEs), participants emphasized that a lack of resulted in crucial datasets going unreported. Consequently, these vital data points need to be sourced through external data vendors. This situation not only complicates the accessibility of ESG information but also affects the ability of banks to continue the financial decision-making process without adequate insights (P5, P2, P7, P4, P9, P1, P5, P6 and P3).

Similarly, sourcing ESG data from factors, including the limited experience of SMEs in collecting ESG metrics and the complexities involved in data acquisition. As highlighted by (P9): "*most banks are still looking to how to correctly source all the data that they need for that*". This inexperience poses a challenge for bankers who rely on comprehensive and reliable ESG data for sustainable financing decisions. In particular, SMEs lack standardized reporting practices, making it difficult for banks to obtain the necessary information consistently. Consequently, bankers encounter difficulties in assessing the sustainability performance of SMEs and need to invest additional resources in assisting these entities in data collection and reporting (P1, P2 and P5).

Furthermore, the challenge of quantifying ESG data arises from the inherently qualitative and context-dependent nature of certain ESG factors. Unlike quantifiable financial metrics, subjective ESG data encompasses dynamic aspects such as stakeholder relationships, and ethical behaviour which are difficult to quantify into metrics (P8 and P3). This challenge is particularly pronounced when assessing the nuances of corporate behaviour and its alignment with ESG principles. The difficulties in translating subjective data into meaningful indicators affects the integration process of such factors in the financial assessments (P3).

5.1.3 Interrelation between barriers

Based on the expert interviews and bolstered by the literature review findings, the interrelationship between the different barriers faced by stakeholders during this process is represented in Figure 13. The relationship between each node is characterized as either impairs, improves, or influences. The qualitative codes were mapped out using the research tool ATLAS Ti.

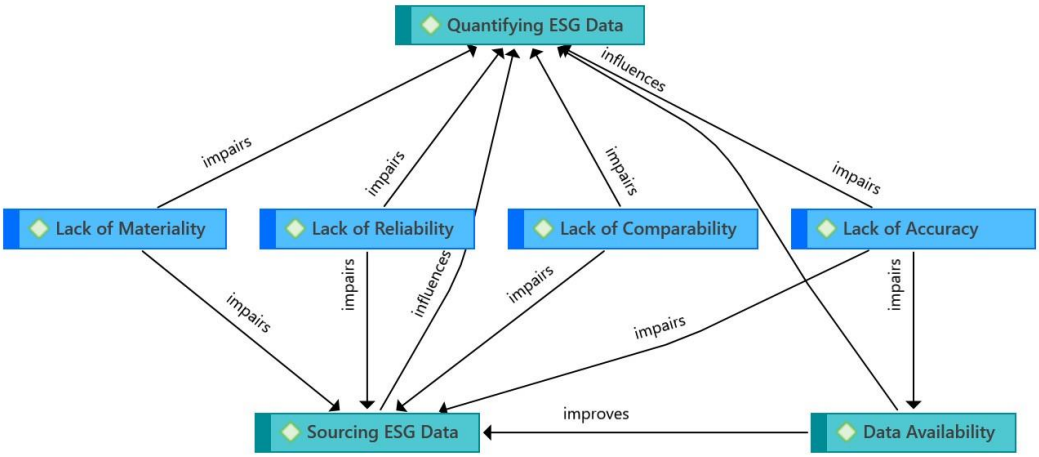

Figure 13 Network map of relationship between barriers

From the expert interviews, it was highlighted that the ESG data quality barriers (Lack of Materiality, Lack of Reliability, Lack of Comparability and Lack of Accuracy) form the basis of ESG barriers, while each quality barrier component significantly impairs the integration challenge pillars (Sourcing ESG Data, Data Availability and Quantifying ESG Data).

5.2 Effects of Barriers

While the expert participants listed down the barriers in 5.1.1 and 5.1.2, the primary implications of these barriers were listed and highlighted in Table 13.

Effects of Barriers	Overview	Experts
Data Management Effects	• Don't use ESG data from external providers • Can't take ratings in isolation • Difficult to manage and compare data • Manual and Intellectual Analysis required • Use Proxies	P1, P4, P6, P2, P5, P7,
Operations Effects	• Need to pull more data from meetings • Tough to predict and analyse • Create internal scoring methodologies • Constant calls with providers • Need more time to feel comfortable with data • Banks hold back on reporting • Process might take weeks or even months	P1, P3, P10, P5, P1 and P9

Table 13 Effects of barriers

Within the scope of this study, the effects of data management concerning ESG (Environmental, Social, Governance) data emerged as a central theme, frequently intertwined with the concept of "trust" in the reliability and relevance of such data. Participants in the interviews shed light on various strategies and challenges related to data management. Notably, as articulated by (P1), certain firms drastically reduced sourcing ESG data from external providers and instead complete their sustainability assessment by internally sourcing relevant ESG information. This approach afforded them the flexibility to tailor ESG assessment criteria in alignment with their internal standards, thereby ensuring control and transparency over the ESG data they employ. Simultaneously, interviewees emphasized the need for manual intervention in data management,

echoing the sentiment that (P1) expressed: *"We cannot take the ratings in isolation."* Additionally, (P5) highlighted the practice of employing proxies to address data gaps, acknowledging the inherent limitations of proxy usage, which may result in inaccurate analyses and suboptimal decision-making. These complexities underscore the multifaceted nature of data management challenges in the context of sustainable corporate financing within the banking sector, ultimately impacting the trustworthiness and utility of ESG data in informing financial decisions. As stated by (P2): *"Makes using ratings tricky because it brings the question What can I really take from these ESG ratings".*

In the realm of operational effects, (P3) underscored the necessity of organizing more meetings between clients and relationship managers in cases where clients are unable to provide adequate data. This serves as a fallback solution to address data shortfalls on the client's end. Notably, even with larger clients, the absence of standardized procedures necessitates a perpetual engagement with data providers, as emphasized by (P5), who noted the need *for "constant calls with providers"* to procure customized or raw data tailored to specific requirements. This intricate data landscape, characterized by a myriad of sources and data types, compels organizations to take matters into their own hands. (P10) elaborated on this, highlighting the prevailing practice of firms devising internal scoring methodologies rather than relying on external scoring systems. Collectively, these operational challenges invariably elongate the decision-making process, extending it from weeks to months, as articulated by (P5). All of these operational challenges combined extends the process to weeks or even months according to (P5) as firms require additional time to get acquainted (P9). As (P1) stated: *"it's more of preparation for the decision making that will take more time and especially with companies that are new to this."*

5.3 Conclusion of Chapter 5

SRQ3: What is the current state of the identified barriers in the sustainable corporate financing process?

The barriers investigated in the process of sustainable corporate financing were categorizations into two types. The first categorization of Data Quality barriers consisted of Lack of Materiality, Lack of Accuracy, Lack of Reliability and Lack of Comparability. The second categorization of Integration Challenges consisted of: Lack of Data, Sourcing Data and Quantification of Data**.** Consequently, interrelationships and effects of these barriers were also discussed.

As highlighted in the literature, lack of comparability was identified as a primary barrier and hence the next chapter investigates the current state of the barriers and proposes a conceptual solution to address it.

6. Barrier: Lack of Comparability

Chapter 5 discusses the different barriers that stakeholders face during the process of sustainable corporate financing but, for the aim of this chapter, the lack of comparability barrier is analysed in more detail given its importance in literature. Initially in the section 6.1, the background, and effects of the lack of comparability barrier is stated. Later on, from the expert interviews and literature, a conceptual framework is proposed in section 6.2 to discuss a potential solution to this barrier.

6.1 Background and Effects of Lack of Comparability

As highlighted by GRI, comparability is required for performance evaluation of corporates by banks during financial investment decision making. It is critical that information about an organization's present ESG performance be compared to its goals, prior arrangement, and, to the extent possible, the performance of other organizations (GRI 101: Foundation 2016, 2016). Furthermore, the capacity of comparability to distinguish between resemblances and variations between objects is a primary driver behind the development of accounting standards (Jia et al., 2023). As opposed to traditional and established financial analysis, integration of ESG has only recently arisen in the past twenty years, with widespread formalization taking place in the last ten years. While rating agencies are far more frequently in alignment when evaluating the traditional metrics of creditworthiness of organizations, their sustainability analysis of the same companies are divergent *(*Christensen et al., 2022). In the context of investors, according to a study conducted by Amel-Zadeh and Serafeim, 2018, 44.8% of the respondents stated that lack of comparability was one of the biggest obstacles investors must overcome in order to incorporate ESG information into their investment procedures. However, the lack of comparability barrier is multifaceted, it depends on the source of ESG data either by from sustainability reports or from ESG rating providers.

6.1.1 Sustainability Reporting

The Global Reporting Initiative (GRI) was one of the first initiatives made in this area and has since evolved into the de facto standard for revealing corporate ESG data. As a voluntary standard, it is far from being embraced by all organizations but still permits flexibility in reporting levels to address information asymmetry (Romberg, 2020). With the emergence of standards from international organizations like CDSB, CDP, ESRS, TCFD, Equator Principles, ISSB, SASB and UN-PRI, standardization pressure has been bolstered by the investors. In response, GRI, IIRC, SASB, all declared in 2020 to collaborate and harmonize their corporate reporting frameworks and standards. However, when accounting is viewed as a process of inscription, it becomes clear that initiatives to standardize accounting reporting to allow comparability hides more basic and intricate concerns regarding the quantification of metrics and face validity of the reports (Young-Ferris and Roberts, 2021).

While collaboration efforts have been recorded, sustainability reports at this stage have demonstrated a lack of comparability upon closer inspection (Jia et al., 2023). Comparing the barrier with traditional financial reports, with the collaboration of governmental entities, it is recommended that regulatory authorities participate in the oversight and analysis of financial

disclosures. Furthermore, proponents contend that the formation of such a regulatory entity would enhance the transparency of disclosure protocols (Prather-Kinsey et al., 2022).

6.1.2 ESG data providers

ESG data providers act as a necessary tool for firms when they are not able to retrieve significant enough ESG data on their client themselves. Based on the product requirements, analysts can choose between three different ESG data providers: Fundamental, Comprehensive and Specialist. As seen in Figure 14, although comprehensive data providers are ubiquitous due to their ability to provide a rating with an amalgamation of objective and subjective data, fundamental data providers who provide "raw" data and specialist providers who provide niche sets of data are uniquely prevalent (Li and Polychronopoulos, 2020).

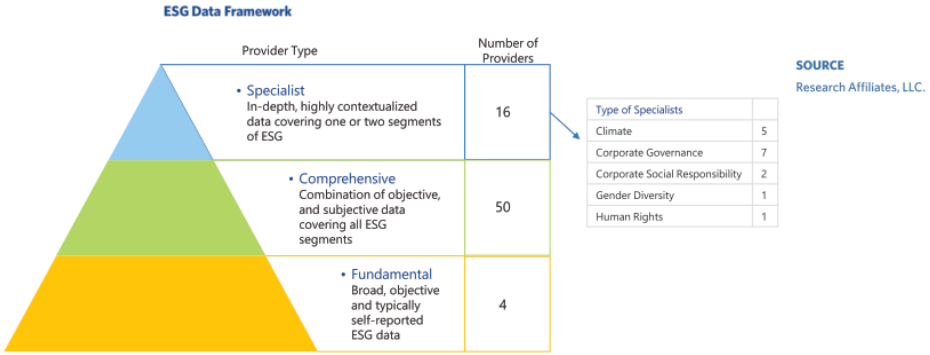

Figure 14 ESG data framework from (Li and Polychronopoulos, 2020)

However, it is recommended that analysts cultivate a thorough comprehension of the specific ESG metrics and the underlying rationale that governs the chosen methodology. Neglecting this imperative within the scope of ESG assessment may give rise to a deceptive sense of confidence among investors (Christensen et al., 2022). The negligence displayed by a few groups could be attributed to an inadequate grasp of the underlying intricacies inherent to the ESG data (Clements, 2022).

Similar to sustainability reporting, the disagreement among rating providers have been linked to the lack of a standardized definition of ESG performance metrics (Lopez et al., 2020) (Billio et al., 2021). Although ESG reporting standards are harmonizing and collaborating, ESG rating providers are still visibly divergent (Dumrose et al.,2022). Unlike traditional financial metrics, the introduction of new ESG data providers has merely contributed complexity of the diversity present in ESG data with the emergence of in excess of 600 rating agencies (Young-Ferris and Roberts, 2021).

The primary causes of discrepancies within the ESG data providers like Sustainalytics and MSCI have been linked primarily due to the difference in sourcing qualitative ESG data (Li and Polychronopoulos, 2020), proprietary quantification methods of ESG data (Clements, 2022) and the difference in interaction of variables during their assessment (Lopez et al., 2020). This barrier could lead to a single corporation exhibiting varying rankings across different rating agencies and confusing the investors in this process (Li and Polychronopoulos, 2020). As stated by (P10): *"Absence of standardized metrics makes it hard for us to compare and analyze ESG data"*

According to the participants, due to the divergence in ESG data sources, in-house scoring systems are developed (P10). Similarly (P5) highlighted *"We may not agree with the weightages of metrics assigned in the ESG ratings so we might come up with our own"*.

Furthermore, themes across trust came up during the expert interviews with a participant stating: "*Can't take ratings in isolation*" (P4) and "*Given the divergence, what can I really take from these ratings?*" (P2). As a result, another participant claimed, "*I do not use datasets a lot due to this reason*" (P1).

Hence, banks will continue to encounter difficulties when attempting precise product comparisons, and the efficient allocation of capital within this sector will remain notably demanding in the absence of a coherent, standardized, and formally regulated regulatory framework governing the evaluation and rating of ESG considerations (Clements, 2022).

6.2 Designing a conceptual framework

Meredith (1992) states that theory generation in a research study through conceptual methods can take place through: conceptual models, conceptual frameworks, and theories. In the context of the current study, a conceptual framework could describe the phenomenon and reveal its suspected relationships with other objects or processes in an exploratory context. Integration of theory recognized in the scope of ESG is a crucial aspect of a conceptual framework. The dynamic meeting environment of the theory and research method is a useful tool to generate new frameworks (or pre-theories) while challenging the established research (Ravitch and Carl, 2019).

Through the process of abduction, existing theories highlighted in section 3.1 (Stakeholder theory, Legitimacy theory and Institutional Theory) serve as a foundation for the study to lead to novel insights (Collins and Stockton, 2018). The relevance of these theories in the context of the lack of comparability barrier are highlighted below:

- **Stakeholder Theory**: This theory suggests that organizations can improve their financial performance by developing strong relationships with stakeholders (Twinamatsiko and Kumar, 2022). In the context of ESG data, involving stakeholders like investors, regulators, and customers in creating standardized reporting practices helps ensure reliable, relevant, and comparable data. Building trust, encouraging cooperation, and considering stakeholder interests allow banks to navigate ESG integration complexities, leading to better comparability and credibility in reported data. Moreover, stakeholder theory's focus on long-term perspectives aligns with the aim of standardized ESG reporting, promoting consistency and reducing actions that hinder comparability.

- **Legitimacy Theory:** Aligned with the pillars of legitimacy theory, banks strive to ensure that their operations are perceived as socially acceptable and in line with established norms. As a result, prioritizing practices that enhance societal perception and legitimacy becomes crucial. In this context, integrating ESG data gains prominence as a way to positively influence external evaluations. By adopting transparent and standardized ESG reporting practices, banks bolster their credibility and align with the societal emphasis on responsible and sustainable practices. This alignment, in both tangible activities and disclosure, reinforces their legitimacy in the eyes of stakeholders (Eliwa et al., 2021).

- **Institutional Theory:** This theory's emphasis on how societal and cultural contexts shape organizational practices, guided by assumptions and beliefs highlights that firms chosen practices align with established norms rather than just efficiency. Crucially, it highlights the legitimacy on organizations within the institutional environment. When addressing the comparability barrier, institutional theory offers a unique approach, suggesting that aligning ESG reporting practices with societal expectations can enhance banks' perceived legitimacy. This alignment not only

aids comparability but also fosters credibility and trust among stakeholders. Hence, integrating ESG data emerges as a strategic avenue for tackling the comparability barrier, while reinforcing banks' alignment with institutional norms and bolstering perceived legitimacy in the realm of ESG integration (Galbreath, 2013).

To construct a conceptual framework a combination of conceptual induction and conceptual deduction in adopted. Conceptual induction achieves the goal of highlighting the phenomenon and the intricacies of the process. The conceptual deduction approach starts after the construction of the framework to discuss the potential implications of the framework to the target stakeholder group (Meredith, 1992). Using the prescribed steps of conceptual framework building by (Jabareen, 2009) in Appendix F and identified theories as a foundation, Figure 15 is proposed to address the barrier of lack of comparability for the banking sector during the sustainable corporate financing process. The framework facilitates the amalgamation of prior research, thus progressing from earlier investigations, and heavily rely on concrete depiction of real-world scenarios. The dependent variables (Standardization Efforts, Industry Collaboration, Regulatory Interventions, and Client Engagements) are examined to determine the characteristics of the process that cause the Independent Variables (ESG Data Comparability). Similarly, moderating variables (Transparency and Data Quality) and mediating variables (Client Industry Sector, Size of Client, and Regulatory Environment) were investigated to affect the final expected outcomes (ESG Data Interpretability and Clients Market Position Analysis). The dependent variables in the conceptual solution are explained in more detail in the below subsection:

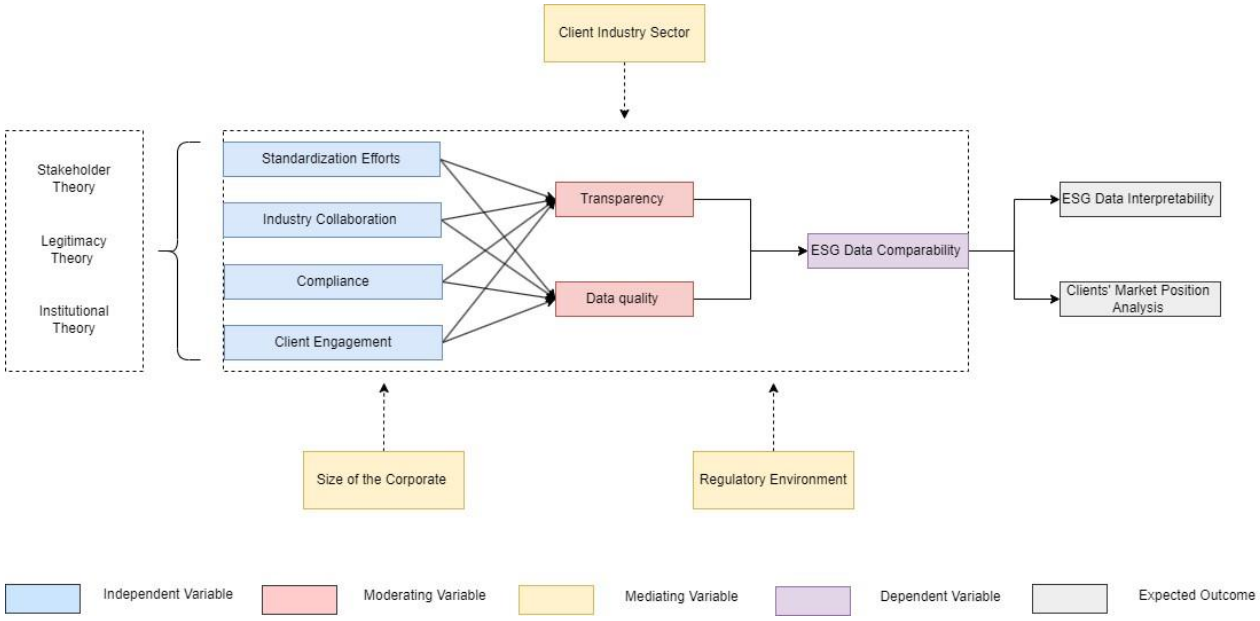

Figure 15 Lack of Comparability Conceptual Solution

6.2.1 Standardization Efforts

Derived from Stakeholder Theory and Legitimacy Theory, the pursuit of standardized Environmental, Social, and Governance (ESG) data emerges as a potential remedy to alleviate the prevailing barrier of comparability. The absence of standardization increases the possibility of investor misunderstanding and disagreements amongst financial advisors (Clements, 2022). Research substantiates the assertion that data harmonization would not only diminish reporting complexities for enterprises but also enhance the quality of the accumulated data (Lopez et al., 2020). Nonetheless, despite the introduction of standardized principles and frameworks, the

barrier persists, and an excessive emphasis on standardization could potentially erode the intrinsic value of the data. As previously expounded, the multifaceted nature of ESG dimensions engenders a persistent challenge in achieving unanimity on a universal definition.

Therefore, rather than fixating on establishing a singular definition, the focus should pivot towards fostering transparent standardization practices. It becomes imperative to acknowledge that the data requirements may fluctuate contingent on the organization's size. In the context of larger corporations, informed analysts, cognizant of the specific ESG dataset and its adherence to prescribed standards, can judiciously select data providers to procure the requisite information. Furthermore, in the absence of regulatory intervention, corporations and data providers may be disinclined to voluntarily divulge their standardization procedures (Arvidsson and Dumay, 2021). Thus, it becomes paramount to assign value to transparency emanating from the client's side, potentially manifesting as reduced costs of debt, thereby serving as a catalyst for refining standardization protocols.

6.2.2 Industry Collaboration

Under the guidance of Stakeholder Theory and Institutional Theory, the pursuit of a shared comprehension of Environmental, Social, and Governance (ESG) data emerges as a potent solution to mitigate the prevailing discord and discrepancies associated with ESG reporting (Christensen et al., 2022). It is vital to emphasize that the challenge of comparability transcends the boundaries of individual companies or sectors; it reverberates across diverse industries and thematic domains. Consequently, fostering collaboration among industry peers represents a promising avenue for streamlining decision-making processes and enhancing the credibility of ESG reporting.

Consider the financial sector as an illustrative example. In this context, banks' competitive landscape is not shaped by disparities in ESG data but rather revolves around their distinct risk preferences and proprietary risk models. Therefore, if banks were to establish a framework for transparently sharing ESG data among themselves, the resultant harmonization could significantly enhance the effectiveness of their decision-making processes. Imagine a scenario where banks, operating within a shared data ecosystem, gain access to comprehensive and standardized ESG datasets, which they can seamlessly integrate into their risk assessment and investment strategies. This strategic alignment would not only minimize redundant data collection efforts but also augment the overall quality of decision-making within the sector.

Similarly, data providers, constituting a comprehensive array of ESG data sources, can embark on collaborative initiatives aimed at the transparent exchange of data. Such collaboration can alleviate the burden of data acquisition for businesses while fostering a competitive environment where data providers vie to offer the most valuable and robust ESG datasets. Visualize a network of data providers engaging in voluntary data-sharing practices, facilitated by common standards and protocols, and guided by a commitment to elevating the quality and accessibility of ESG information.

Furthermore, the case of (P10) underscores the potency of industry collaborations, particularly in partnership with esteemed entities like the World Wide Fund for Nature (WWF). Such proactive collaboration, coupled with the elimination of intermediary assessments in the data analysis process, holds the potential to mitigate the disruptive effects stemming from comparability issues. In essence, these collaborative endeavors underscore the pivotal role of collective action, data sharing, and transparent practices in fostering a more harmonious ESG landscape. Ultimately, this collaborative ethos augments comparability and equips decision-makers with more robust and standardized ESG data, facilitating more informed and sustainable decision-making processes.

6.2.3 Compliance/Regulatory Interventions

In the domain of regulatory compliance and interventions, the formulation of a meticulously constructed regulatory framework under the guidance of authoritative bodies necessitates comprehensive consultations with industry experts and concerted efforts aimed at achieving global harmonization. Such endeavours hold paramount significance within the ever-evolving landscape of contemporary investment sectors (Clements, 2022).

Illustratively, the European Union (EU) has introduced a significant regulatory framework known as the "disclosure trinity," encompassing the EU Taxonomy, Sustainable Finance Disclosure Regulation (SFDR), and the Non-Financial Reporting Directive (NFRD). These regulations were designed to compel companies to disclose their ESG data. However, initial scepticism prevailed, with some stakeholders perceiving these regulations as primarily motivated by marketing considerations (Câmara and Morais, 2022). Nevertheless, a transformative shift occurred when the NFRD evolved into the Corporate Sustainability Reporting Directive (CSRD), scheduled for implementation in 2024. The primary objective of the CSRD is to facilitate transparent ESG reporting by categorizing both listed and non-listed companies, a development expected to considerably simplify the task of ESG analysts in navigating investment decisions (Lykkesfeldt and Kjaergaard, 2022).

These sentiments were consistently echoed in expert interviews, with all participants concurring that CSRD holds the potential to enhance comparability between diverse data sources. As articulated by (P4), *"I believe that life is going to get easier for investors because of CSRD."* It is noteworthy that both (P5) and (P1) emphasized the sector-specific adaptability of CSRD's transparent regulations, which is anticipated to facilitate more nuanced evaluation processes. Furthermore, CSRD's ambition extends to addressing the unique challenges posed by small and medium-sized enterprises (SMEs), as both (P2) and (P1) highlighted the directive's compelling mandate for SMEs to disclose sustainability data. However, it is prudent to acknowledge, as pointed out by (P6), the potential temporal disparities in CSRD implementation, engendering a divide between early and late adopters.

Drawing upon insights from institutional theory, these compliance interventions orchestrated by regulatory authorities hold the potential to exert a profound influence in mitigating the deleterious effects of the comparability barrier. The dynamic interplay between regulatory initiatives and corporate ESG reporting underscores the need for continuous scrutiny and adaptation to ensure the seamless evolution of standardized ESG reporting practices in the academic research landscape.

6.2.4 Client Engagements

Drawing upon prior research, it becomes evident that fostering sincere and transparent dialogues between stakeholders and the target client stands as a cornerstone for executing corporate strategies and making ethically sound decisions. This approach not only positions the bank advantageously but also equips it to proactively anticipate, comprehend, and respond to evolving external demands. This proactive stance serves to mitigate uncertainty while providing a valuable opportunity for timely and pertinent disclosures (Romberg, 2020).

Within the framework of legitimacy theory, the establishment of an open, transparent line of communication between banks and their corporate clients assumes paramount importance in facilitating the ESG data sourcing process while concurrently upholding data quality standards. In alignment with this premise, (P10) affirms, "We do also engage with stakeholders such as

clients. And we conduct surveys, interviews, focus groups to understand stakeholders' perspectives."

This perspective underscores the significance of engaging in open dialogues and actively soliciting stakeholder input as a means to not only enhance the quality and comparability of ESG data but also to uphold the principles of legitimacy theory in the realm of corporate ESG reporting.

6.3 Conclusion of Chapter 6

SRQ4: Lack of Comparability was identified as a key barrier in literature, How can banks address it while utilizing ESG data?

With Lack of Comparability being identified as a persistent barrier, to answer the fourth sub research question, the background of the barrier was first analysed in terms of the ESG data sources. Later on, while using formal theory (Stakeholder theory, legitimacy theory and institutional theory) as a foundation, a conceptual framework was proposed for overcoming the lack of comparability barrier. The primary dependent variables here were identified as Standardization Efforts, Industry Collaboration, Compliance and Client Engagements that could affect the depended variable Comparability while being mediated by both transparency and data quality. This relationship was proposed to be moderated by variables such as Size of corporation, Sector of corporation and the general regulatory environment. During the course of this study, it was revealed that the introduction of CSRD will have a significant effect on decreasing the impact of lack of comparability. But for the sub research question to be completely addressed, the validation of the researcher findings is required to ensure credibility of the research.

7. Validation

The process flow diagram in chapter 4 and the conceptual framework diagram in chapter 6 and are validated in this chapter by means of expert interviews. Section 7.1 states the approach to the validation while 7.2 summarises the responses from the experts.

Validation of the findings is the final phase of the research to close the hermeneutic loop. In a qualitative study, validity relates to the assurance provided by the research report or the findings to study the phenomenon accurately and dependably (Kihn and Ihantola, 2015) devoid of which, research loses its significance, morphs into a piece of fiction, and relinquishes its applicability (Morse et al., 2002). Recognizing the need to integrate such assurances, validity has been grouped into different classifications such as internal validity and external, while other classified it into descriptive validity, interpretative validity, and theoretical validity (Hayashi et al., 2019). Given the lack of consensus on standardized validity criteria (Noble and Smith, 2015), scholarly observations frequently suggest the commitment to upholding the validity and transparency of qualitative research extends across all phases of the research process, as opposed to being confined to a singular stage. Contrary to quantitative validity, qualitative validity does not constitute a foolproof construct or a prescribed set of measures that can guarantee research validity (Morse et al., 2002). Hence as prescribed by Hayashi et al., (2019), processual operationalization of validity is adopted through the course of the research to account for all aspects of validity in a qualitative study.

7.1 Processual Approach to Validity

In the common practice of integrating validity criteria in solely the ex-post phase of the research, challenges like hindered data collection planning, reduced transparency and inefficiency in research processes arise that affect the credibility of the research (Morse et al., 2002). To integrate validity throughout the research study, validity assurance methods are adopted in Ex Ante, Durante and Ex Post phases of the study as highlighted in the sections below:

7.1.1 Ex Ante

The ex-ante validity of a qualitative research is the prediction evaluation approach that is carried out to gauge and assess the effects of potential research methodologies before the data collection phase (Remenyi and Sherwood-Smith, 2012). To supplement this criterion, various measures were implemented to enhance the credibility and transferability of the research and further provided a clear and comprehensive layout of the study. Starting from the research methodology phase, approaches adopted to answer the research question were transparently and descriptively highlighted. Construction of a suitable research methodology helped provide clear directions on the research progress. Additionally, constant communication received from the supervising committee ensured the trustworthiness and validity of the research from the outset, enhancing its overall quality.

7.1.2 Durante

The durante validity of a qualitative research is the series of approaches adopted during the data collection and data codification phases of the research (Morse et al., 2002). The criterions used in the phase are data collection from experienced interviews, memo writing, data triangulation through comparative refinement and reflexivity. Combination of a descriptive theoretical

literature review and the periodic exposure to the field via the qualitative research methodology provided two sources of data for theory triangulation. In particular, the adopted theory triangulation approach allowed the visualization of the data from different theoretical perspectives (Ritchie and Lewis, 2012). The iterative refinement of the theory generated through the different source of data by using research tools like Atlas Ti, helped achieve theoretical saturation in the data. Similarly, memo writing contributed to data organization and research transparency. Furthermore, by integrating reflexivity and feedback from the supervising committee in this phase, such validation strategies bolstered the validity of the study by identifying and addressing potential biases, confirming the precision of findings, and ensuring an authentic representation of participants' perspectives and experiences.

7.1.3 Ex Post

(Data Analysis & Discussion of Results) (Triangulation, Surprise and Feedback of informants) The ex-post validity of a qualitative research is the methodological strategy in qualitative research where the researcher assesses the validity of findings after data collection and analysis have been completed, as opposed to establishing validation criteria and strategies in prior. The facilitation of the critical examination of the data was done through two external groups. First feedback was collected and integrated from the supervising committee on the data analysis and discussion of the results through periodic meetings. Later, respondent validation was conducted as explained in the below subsection:

7.1.3.1 Expert Interviews

In the approach of respondent validation includes, three participants were invited from the previous interview pool to comment on the research findings and whether the resulting themes and concepts reflect the phenomenon being studied sufficiently (Noble and Smith, 2015).

The validation interviews were held online via MS Teams and later recorded and analysed via Atlas Ti. Since the validation meetings were shorter in duration and composed of fewer intensive transcripts, excerpts from the interview were directly tabulated instead of adopting a coding process in the interest of time. During each meeting, the participants were first made aware about the research outcomes through a presentation. The research outcomes showcased were the same throughout the validation interviews and the feedbacks received was incorporated after the validation phase. After the presentation, questions were posed to the experts in stages as per Figure 16.

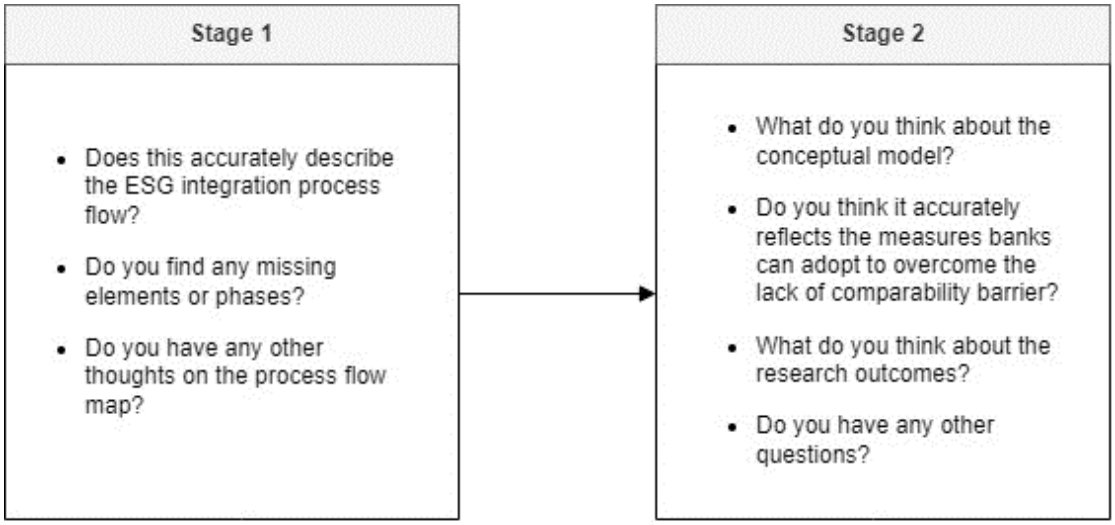

Figure 16 Stages of expert interview questions

The main takeaways from the experts which are summarized in table 14 are explained below:

Decision making process flow:
All three experts shared their positive opinions on the process flow diagram of ESG data utilization in the sustainable corporate financing process (Figure 9). (P8) suggested that utilizing the three lines of defense model as a foundation for the process flow diagram delineates the involvement of different stakeholder groups in the process. Similarly, (P1 and P5) appreciated the categorization of the phases in the process. However, the three experts also shared critical feedback on the process flow in the following ways:

- The relationship is involved in every step of the process guiding the clients and acting as intermediary point of contact between the client and the bank (P1 and P8).
- External standards are not only used in the due diligence phase but are also used in the phase where KPI's are set. The consideration of these principles in this phase assisted in setting the interest rates of the product (P1, P5 and P8).
- Although the client questionnaire was considered to be an important source of ESG data by the other interview participants, (P5) did not consider it to be source of ESG data and stated that it is only a tool during the due diligence phase.

Lack of Comparability conceptual framework:
Similarly, positive reflection was highlighted on the conceptual framework for addressing the lack of comparability framework. The experts also agreed on the discussions of the research relating to the CSRD effect on the lack of comparability barrier. They shared the notion of lack of comparability not being the primary barrier in the ESG utilization process and (P5) pointed out that lack of data and lack of sourcing data were more pertinent challenges faced by banks. But critical feedback was again shared on the conceptual framework in the following ways:

- (P5) shared that the independent variable "Regulatory intervention" can be changed to "Compliance". As within the conceptual framework, compliance is related to adhering to the rules set by the regulations.
- Similarly, (P5) also hinted concerns over the multi collinearity effect between the variables.
- (P8) was concerned over the existence of multiple dependent variables and the overlap between the different types of variables.

The responses from the participants are tabulated in Table 14:

Expert ID	Summary of Responses
P1	• The relationship manager is involved in every phase. • External standards at the setting KPI's phase and the decision phase. • Phases like due diligence are done even in traditional credit risk analysis and is not restricted to sustainability credit risk analysis. • Sometimes Corporate Sustainability assessment is done again for reviewing the client. • Due diligence phase is another pillar of Corporate Sustainability Assessment. • Size of the corporate client is an important moderating variable. • Lack of Comparability is not the most important barrier. • The conceptual solution sounds logical

P5	• Do not consider questionnaire to be a source of ESG data instead are only part of the KYC procedure • Questionnaires are standardized to a certain extant across banks but are sector specific • Relationship managers are involved in every phase maybe expect the Sustainability Assessment phase • Lack of Comparability and Lack of Reliability are not a very significant problem, instead the main problem is perhaps • Lack of Materiality is not necessarily a regulatory issue, but internal stakeholders are often not ready to adopt standard disclosure practices • Lack of Materiality and Lack of Accuracy are the biggest barriers • Lack of comparability is low risk • Agree with conclusion • The conceptual solution sounds logical • The independent variable "Regulatory intervention" can be changed to "Compliance" • There could be a multi collinearity effect between data harmonization and standardization effects
P8	• External standards are also used during the Set KPI's phase| • CSRD is part of external standards • The conceptual solution sounds logical • Mention the moderating variable as "Client industry sector" instead • Maybe reduce the number of variables and check for overlap of mediating variables

Table 14 Validation interview responses overview

The feedback provided by experts was vital to verify the validity of the process flow and the conceptual framework. Comments about the process flow diagram and conceptual framework were taken into account and updated accordingly in the earlier chapters.

However, the ex-post validation approach poses limitations and introduces potential bias issues. Recognizing these biases and continually reviewing procedures can help to guarantee that data collection and analysis are thorough and relevant (Noble and Smith, 2015). Conducting a validation round with the subset of experts from the preliminary experts' pool brings about the issue of confirmation bias. As highlighted by Morse et al., (2002), "*there is no reason for individuals to be able to recognize themselves or their particular experiences*". The homogeneity and the lack of external perspective in the validation phase could affect the credibility of the research. Similarly, the challenge of attaining and reporting an autonomous and trustworthy connection to the objective 'reality' challenges the collected interview data (Ritchie and Lewis, 2012).

To address the potential barriers, a variety of steps are adopted during the course of the research. First, the homogeneity of the interview participation limitation is mitigated by integrating the perspective not just from experts from different banks and consultancy firms, but also by recruiting interview participants from a different asset management sector. The external perspective on the usage of ESG data by another type of financial firm provides a holistic overview of the process and presents new insights on potential solutions for the barriers. To decrease the confirmation bias during the expert validation process, the validation process has

been made transparent and furthermore, the supervising committee is consulted to integrate external feedback.

7.3 Conclusion of Chapter 7

Through expert validation, the proposed process flow diagram and the conceptual framework was validated using the processual validation approach. The processual validation consisted of a continuous validation test throughout the course of the research. The ex-ante and durante validation approaches were implemented before and during the data collection phase. The ex-post validation approach consisted of validating the research findings through expert interviews.

The participants shared their agreement on the propositions and provided feedback on them as well which were considered and integrated thus completing the answer for the fourth sub research question.

8. Discussion

Throughout the course of the research, different methodologies were adopted to investigate the problem statement. Whereas this chapter aims to reflect on the findings from the scope of the banks and also reflect on the generalizability of the findings. Subsequently, the reflection on the scientific and societal relevance is highlighted and finally the chapter closes by addressing the limitations and future research direction.

8.1 Reflection on societal relevance and contribution

The understanding of the emerging theory hinges on the exploration of the reasons and mechanisms by which participants behave but in addition depend on the researcher's viewpoint (Giles et al., 2016). By reflecting and discussing the findings of the conceptualization phase, the relevance of the research can be highlighted.

8.1.1 Reflection on banks

Through the research, numerous distinctive contributions have been introduced to the scope of corporate banks. As banks are still trying to establish a standardized procedure for ESG integration, the research outcomes of the study sheds light on the current state of it. Initially, the stakeholders are categorized not just based on their power and interest but within the banking system, internal stakeholders are categorized based on their position in the risk management framework of banks. These findings help uncover the relationships and dynamics between the stakeholder groups during the decision-making process of sustainable corporate financing. Furthermore, after revealing the stakeholder relationships, the phases of this process are delineated (Figure 9). The different phases of this process reveals the stakeholder group responsibility in each phase and the dynamic role they play in the overall context. Tools and methods used to source ESG data in this process is also revealed which sheds light on the decision-making practices which have been criticized to lack transparency in the eyes of the public.

Later on in the research, the different challenges faced by banks during the sustainable corporate financing process is revealed. The barriers of lack of materiality, lack of reliability, lack of comparability and lack of accuracy are grouped into ESG data quality barriers. Similarly, the challenges of sourcing data, lack of data and quantification challenge of data are grouped as integration challenges. While classifying them based on quality challenges and integration challenges, the results reveal barriers current state of the barriers and the effects it has on the relevant stakeholders. This sheds light on the primary bottlenecks of the process that affect the effectiveness of distributing sustainable finance products to corporate clients. Furthermore, the dynamic relationship between the characterized barriers are revealed from a social perspective and a technical perspective. Given the importance of the lack of comparability highlighted in the previous research stages, this barrier was investigated in more detail. The multifaceted nature of lack of comparability barrier was revealed with respect to its ESG data source either from ESG frameworks or from ESG data providers. But an interesting discovery was uncovered during the explorative investigation of the lack of comparability barrier. Experts claimed that the lack of comparability barrier is in fact not the most pertinent barrier faced by banks. Contrary to previous discoveries, they claimed that barriers like the lack of data or challenges in sourcing data were more relevant barriers.

Following the investigation of the barriers, the conceptual framework was proposed for bankers to address the lack of comparability barrier (Figure 15). Rooted in transparency and data quality, to increase the ESG data comparability, recommendations along the themes of standardization efforts, industry collaboration, compliance and client engagements were proposed. Banks are first advised to engage in data harmonization initiatives not to establish a common definition of ESG factors but to increase transparency on standardized practices to allow for custom dataset depending on the context of the sustainable finance product. Banks are then advised to engage in industry collaboration to establish common data platforms for all financial firms to use. Following this, from the perspective of the corporate clients, banks are recommended to inform clients about the benefits of CSRD. As shared by all the interview participants, CSRD will bring forward transparent disclosure practices thereby making it easier for the banks tackle comparability issues. Hence as mentioned earlier, the introduction of CSRD is postulated to significantly affect the impact of lack of comparability barrier and banks should pay close attention to the developments of CSRD after it takes effect in 2024. Lastly, banks are recommended to engage in transparent client engagements to facilitate high quality raw ESG data directly from the clients.

To effectively overcome the challenge of lack of comparability for banks, it was noted that the proposed strategies are addressed to the stakeholders to foster better overall collaboration, but the effectiveness these strategies are limited to motivations of these stakeholders' groups to implement change. As highlighted in the chapter, a strong motivation from the regulators is required to incentivize the sustainable shift to address the lack of comparability barrier. Although the stakeholder groups involved in the process are aware of the complications of the process, as highlighted by (P10): *"legacy structures are set in place"*. Motivating the stakeholder groups to come together and address this issue collectively is a complicated task. Even given the urgency of addressing barriers like lack of comparability, without a common consensus within the industry, integration of subjective and qualitative data will continue to face challenges even after the introduction of CSRD. Given the processual approach to validity in the research, the feedback shared by the experts in the validation round were in consensus with the research findings.

8.1.2 Reflection on generalizability

Scope of research, generalizability, address validity chapter
The scope of the research was initially limited to the ESG data utilization process for sustainable corporate financing process. However, after collecting inputs from experts in both the banking and asset management industries, the conclusion reached was that though the application of ESG data of these two financial institutions differ, the process of opportunity, due diligence and sourcing as ESG data was very similar. It was observed that the process established by banks were more mature and due to the nature of banking, the risk models used by banks were more scrutinized by regulators. Though smaller banks were not recruited in the data collection phase, data collected by both the experts and literature review pointed towards the process of ESG data utilization to be drastically different for smaller banks. Smaller banks were highlighted to be in the early stages of non-financial metrics integration into financial products and hence do not have a standard procedure established yet. Similarly, the geographical context of the banks did not prove to show any change in the process flow as the study was primarily conducted in the scope of the EU. Hence, though conclusions can be made about the similarities in phases of large banks, asset management firms and possibly other large financial firms, no such conclusion can be made for smaller banks and banks outside the EU.

Similarly, findings indicated that given the similarities in process flow of both banks and asset management firms, the characterization of the barriers was relevant with the same effects for asset management firms too. In the scope of smaller banks though the data quality effects of lack of materiality, lack of accuracy and lack of reliability of ESG data apply, the effects of lack of comparability would significantly change due to the nature of sourcing ESG data. Experts shared that smaller banks do not have the necessity or sometimes resources to gather

ESG data from external sources and instead directly source ESG data from the firm and conduct their internal assessment. The other two integration challenges of lack of data and challenge of quantifying ESG data was revealed to be relevant irrespective of the size of the bank. However, the research findings revealed that regulations and compliance measures play a significant role in determining the nature and impact of the barriers hence no conclusion can be made on the generalizability of ESG barriers across countries outside the EU.

Lastly, the conceptual framework designed for addressing lack of comparability reflects its validity in other types of financial firms and across different sizes of banks. However as highlighted in chapter 6, collaboration of stakeholders even from different financial institutions could drive the push to address the barriers faced by banks.

8.2 Reflection on scientific relevance and contributions

In terms scientific contribution from the process flow diagram even international bodies like the EU commission highlighted the lack of transparency in this process. Similarly, the study undertaken by (Amel-Zadeh and Serafeim, 2018) highlighted the ways in which ESG data is used by investors but fails to provide information about the process of ESG utilization. Moreover, the study conducted by Efimova (2018) highlighted the ESG investment decision-making process of firms in the Russian stock market. But the study conducted was from the perspective of investors, was purely quantitative and did not undertake any validation criteria. Through the bibliometric analysis conducted by Galletta et al., (2022), a general gap of linking sustainability regulation on corporate financing was found Hence as Goss and Roberts., 2011 drew attention to the limited research into corporate banks in this field, by answering the research question 1.1, the research contributes to exploring the ESG data utilization process from the corporate banking perspective.

Though ample research has been conducted to reveal the different barriers experienced during the usage of ESG data, the state of the lack of comparability barrier was never investigated. While Amel-Zadeh and Serafeim, (2018) and Christensen et al., (2020) highlighted that the lack of comparability barrier was one of the most important ones to address, through the research findings, this theory has been proved wrong and results indicate lack of data and challenges in sourcing data are more persistent challenges.

In terms of constructing a constructing a conceptual framework for the lack of comparability barrier, in a study Lopez et al., (2020) highlighted the need for standardization and harmonization in ESG ratings failed to show the interlinks and complexity of the ESG comparability barrier. Similarly, Chowdhury and Paul, (2020) had called for future research to propose strategies to effectively integrate ESG data. Even Eccles et al., (2017) had pointed out that a study on ESG integration practices adopted by different investors can help point towards an effective integration strategy. Hence the above research gaps were addressed by proposing the lack of comparability barrier conceptual framework in Figure 15.

8.3 Limitations and future research direction

Similar to every research, a qualitative research approach will be equipped with limitations which are highlighted below.

- Firstly, in terms of generalizability, the course of the research has revealed similar methodology and challenges on ESG data integration across firms in the EU. However, the regulations and standards imposed by local countries are ever evolving and could

have an effect on the process and ability to deal with the lack of comparability barrier. Furthermore, the research was conducted by only interviewing experts in the Dutch banking sector while the consultants were located around the EU region. Hence there are geographical limitation concerns in this study in terms of general generalizability.

- The research could not record opinions from the relationship managers and the data providers who were identified as important stakeholder groups. Their input could have had a deeper impact on the findings and provided a nuanced approach on the lack of comparability barrier given their affinity with the problem statement.
- Lastly, the ex-post validation of the research was conducted by experts from the same pool of initial interview participants. Hence this confirmational bias in the research.

After analysing the results and identifying the limitations to the research the following suggestions have been made in the direction of future research:

- The research study was carried out with the environmental context of ESG data utilization in the sustainable corporate financing process. Whereas future research could explore the usage of ESG data in other field like green bonds or even analyse the barriers from the perspective of the data providers. External data providers are also part of the same ecosystem and are affected by the ever-evolving sustainability landscape. Hence gaining insights from them on the state of the barriers would be enriching.
- As stated in Chapter 6, the emergence of CSRD is going to have a significant effect on the ESG data utilization process, hence future research could investigate the direct effects of this directive on the lack of comparability barrier. A comparative research study could be held analysing the effects of the CSRD before and after it was implemented on the corporate sustainability financing process.
- As pointed out by the interview experts in Chapter 6 and 7, the effects of lack of comparability should reduce significantly after the implementation of CSRD, hence future research could investigate the other relevant barriers deeper such as challenges in sourcing ESG data lack of ESG data as they will still continue to serve as roadblocks even with the introduction of CSRD.

8.4 Reflection on MOT programme

The Master of Science Management of Technology program aims to showcase students how technology can be adopted by firms to “maximise customer satisfaction, maximising corporate productivity, profitability and competitiveness”. Reflecting on the research progress of this study, starting from the selection of research methodology to conducting & analysing the interview data and conceptualizing the derived data, a number of courses pursued in the Management of Technology (MoT) program have proved to be helpful in completing this research. The motivation to research into the concept of sustainable finance first emerged from the Cost Benefit Analysis course, which elaborated the importance of non-financial metrics in a financial analysis. Similarly, the other courses in the Finance and Economics specialization package, helped establish a background on how banks work and the broader implications of economy in a region. However, the first-year courses like Research Methods were crucial to guides to the types of research methodology and also shed light on coding and validation approaches for qualitative research. Furthermore, courses like Digital Business Process Management significantly contributed to the knowledge of visualizing a process flow of a business and Inter and Intra organization decision making course which grounded the importance of stakeholder mapping in decision making. Moreover, combined with the data visualization and report writing skills developed in the other courses, the program of MoT has served as a crucial foundation in my master thesis.

9. Conclusion

This study has concentrated on investigating the ESG data utilization process during sustainable corporate financing and then consequently proposed a conceptual solution to address the lack of comparability barrier. This final chapter addresses the primary research topic for the knowledge gap and closes by outlining the primary findings of the research study.

8.1 Layered Knowledge Gap

Over the course of literature review, two primary themes of knowledge gap were identified. The first theme that was found was that there was a general lack of knowledge in how investors use ESG data. Moreover, there was a general lack of information on how corporate ESG data enters the creditworthiness assessment process. Recent literature used quantitative research methods to explore the relationship between ESG and firm performance but there was a general lack of exploratory research investigating this field. The second theme identified was on the limited research on the lack of comparability barrier faced by stakeholders during the process. Existing works the need for standardization and harmonization but did not account for the involvement of other variables during such propositions. Hence through this research study, the above-mentioned knowledge gap themes are investigated by answering the main research question.

8.2 Primary Findings

"How can banks in the European Union (EU) utilise corporate Environmental, Societal and Governance (ESG) data in the sustainable corporate financing process?"

A qualitative research approach was adopted to investigate and answer the exploratory nature of the above main research question. Initially, a literature review was conducted to understand the background of ESG integration in the banking sector or in the general financial sector. Themes surrounding motivation, significance and geographical implications were uncovered during this phase. Consequently, regulatory initiatives and standards proposed by the EU and other international institutions were revealed. However, despite such initiatives, multiple challenges faced by stakeholders were also revealed such as lack of reporting standards, lack of materiality data reliability, low comparability, low accuracy and quantifiability, greenwashing concerns.

To investigate the finding from the literature review phase, semi structed interviews were carried out with experts in the banking sector primarily composed of sustainability experts, risk experts and consultants. Opinions were also collected from asset managers to have a wider outlook on the integration process. Using MS teams transcripts of the interview were analysed using Atlas Ti to generate preliminary codes. After analysing the themes of the codes, the process flow was mapped out identifying the following process stages during the sustainable corporate financing process: Opportunity, Due diligence, Determining need for ESG data, Sourcing ESG data, Corporate Sustainability Assessment, Set KPI's and finally the decision phase.

After investigating the process flow, the barriers and faced by stakeholders during this process and its effects was investigated based on two classifications. The first was data quality barriers consisting of Lack of Materiality, Lack of Accuracy, lack of reliability and lack of comparability. The second barriers classification was: Lack of Data, Sourcing Data and Quantification of Data. Based on literature data and the expert interviews, a conceptual framework was later proposed for banks to overcome the lack of comparability barrier. The primary themes for this framework were surrounding Standardization Efforts, Industry Collaboration, Compliance and Client Engagements with other moderating and mediating affecting the relationship with comparability. It was revealed by the interview participants that these themes would assist them with this barrier but especially the introduction of CSRD will significantly reduce the effect of lack of comparability.

After the construction of the conceptual framework, along with the process flow diagram, the research findings are validated. The processual validation approach is adopted in this study where in the ex-ante phase, the construction of research questions and research methodologies are described transparently to act as a clear foundation for the course of the research progress. In the durante phase, theoretical triangulation was achieved via recruiting experienced interviews, memo writing and reflexivity approaches. The ex-post phase of validity was done through conducting validation interviews with three of the experts originally part of the study. The feedback collected helped solidify the researcher findings but limitations and confirmational biases were addressed during this phase.

Reflecting on the research study, it's acknowledged that overcoming the lack of comparability challenges depends on stakeholders' motivation and regulatory incentives, as achieving consensus in the industry remains a complex task, even with the introduction of CSRD in 2024.

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Appendix

A. Prior Research Review Strategy

Search Keyword	Synonyms
Corporate ESG Data	ESG data, ESG, sustainability data, corporate sustainability
ESG utilization	ESG integration, ESG usage, ESG linked loans, ESG decision making
Banking	Banking sector, banks, corporate banks, financial firms
ESG barriers	ESG challenges, ESG struggles
ESG regulations	ESG compliance, ESG laws

Table 15 Keywords used during literature review

Criteria	Inclusion	Exclusion
Language	English	Every other language
Document classification	Article, conference papers, book chapters and grey literature	Informal blogs, informal articles
Subject Area	Business, Management and Accounting, Social Sciences, Environmental Science, Economics, Econometrics and Finance, Decision Sciences	Computer Science, Engineering, Medicine, Mathematics, Arts and Humanities
Relevance	Documents related to: • ESG decision making • ESG challenges • ESG regulations	-

Table 16 Inclusion and Exclusion criteria during literature review

B. Interview Protocol

Introduction:

ESG Data Utilization

- Effective utilization of corporate ESG data by firms during the investment decision-making process
- Effective management of barriers during this process

Interview Approach:

The interviewer starts with an open/reflective question, the interviewer may then probe with more specific questions. The extent of probing depends on the details given by the interviewee in open/reflective questions.

Goal:

- To understand the application of ESG data within the financial sector.
- To understand how companies' source corporate ESG data.
- To understand the stakeholders involved (Interest and Influence)
- To analyze the effect of ESG data on corporate financing.
- To analyze the investment decision-making process while utilizing corporate ESG data.
- To understand the barriers faced during this process and how they are being tackled.

Questions:

1. Could you give an overview of your role and how ESG data relates to you [open]?
    a. What is your role in the sustainability team?
    b. How long have you been involved in integrating ESG data into the investment decision-making processes?

2. How is ESG data being used by your company? (Direct vs Indirect)
    a. What is its application?
    b. Where is this ESG data sourced from? (Internal or External) [Probe later]
    c. Could you explain the typical investment decision-making process followed by banks when considering ESG factors?
    d. How did the process change after ESG was introduced?
    e. What are the key criteria or indicators the bank considers while evaluating ESG data for potential investments?
    f. How does the bank weigh ESG considerations against other financial metrics during this process? (What if they clash?)

3. Who are the different stakeholders involved? How do they influence the process? [open]
    a. Which departments teams are involved? (Loans, Sustainability, Credit Analyst) [probe]
        i. What is the responsibility of each department?
        ii. How is information communicated between these departments?
    b. Involvement of Corporates? What is of importance to them?
    c. What is the effect of regulatory bodies? (Standards)
    d. Are there any specific tools, models, or frameworks that the banks employ to assess and integrate ESG data into investment decisions?

4. What according to you are the major challenges while utilizing ESG data? [open / reflect]
    a. What challenges do you see specifically with respect to data? How does it affect the investment decision? [probe]
    b. Do you find it challenging to compare the ESG data, if so then what is its **impact** on the decision-making process?
    c. What do you think about the involvement of regulatory bodies in this space, do they pose a challenge, or do they help streamline this process? [probe]
    d. Challenges related to handovers/communication between teams? How are the teams structured? Does it affect the process? [probe]

5. How are these barriers being tackled now? [probe]
    a. How is the appropriate ESG dataset selected?
    b. How is the issue of subjectivity in ESG data being tackled?
    c. Have you come across any promising practices or industry initiatives that aim to enhance the comparability of ESG data?
    d. How do you think this process is going to evolve in the future?

6. Is there any other questions that you think I should have asked you?

C. Codebook

The codebook describes the codes, categories, and themes that were used to analyse qualitative data for the interviews and for their observations. A codebook was used to organize, manage, and interpret the data, as well as to ensure consistency and transparency in the analysis.

- Application
- Assessment
- Communication and Collaboration
- Communication and Collaboration: External
- Communication and Collaboration: Internal
- Comparability issue
- Compliance
- CSRD
- Current/Best Practices
- Data Quality Issues
- Data Source
- Double materiality
- Due diligence
- Effect of barriers
- External Standards
- Frameworks/Models
- Greenwashing
- Internal Standards
- Knowledge sharing
- Motivation
- Opportunity
- Prediction
- Process
- Qualitative Assessment
- Quantitative Assessment
- Risk Management
- Stakeholder groups
- Stakeholder groups: External
- Stakeholder groups: Internal
- Tools
- Trust

D. Research Ethics

The TU Delft Human Research Ethics Committee (HREC) mandates all research involving human participants. The procedure makes sure that the human subjects are at ease and that the GDPR criteria are followed during the data gathering process. For this research, it goes as follows:

1. A checklist is used by the HREC to evaluate the amount of risk associated with the research. Are the participants members of vulnerable groups? Does the research require deceiving the participants? Can taking samples from participants cause discomfort or stress? are some of the items on the checklist.

2. Appropriate informed consent forms must be issued to potential participants prior to their interviews because the research includes interviews and the collection and storage of audio/video or other personally identifiable information of human subjects. Information sheets and consent form options make up the two components of informed consent forms. The goal of the interview and the participants' freedom to leave the interview are both disclosed in the consent forms. The participants are also informed about how their data will be handled, used, and safeguarded.

3. A data management plan (DMP), which has been approved by the respective faculty's data supervisor, must also be distributed. The DMP contains information about how the data will be gathered and stored, including whether it will be on secure servers or in a safe place. The author's TU Delft OneDrive account was used to save the data that was gathered for this study. This made guaranteed the information was secure, wasn't kept offline, and could only be viewed by the thesis's author.

4. The HREC's online portal must receive the check list and consent forms. The committee meets once a week to discuss applications and decide whether to approve them or make revisions. This study underwent one revision.

E. Consent Form

Informed Consent Form

The information provided on the Participant Information document accurately describes the risks and possible consequences of participating in the study conducted by Rishab Ganapathy Subramanian Sankaran (Corresponding Researcher) under the supervision of Aleksandrina Ralcheva (Responsible Supervisor).

The study aims to understand the usage of ESG data in the corporate banking sector and understand the barriers encountered by stakeholders during this process. As part of this study, a recording of the interview and a summary of the interview will be collected and stored in TU Delft's OneDrive systems which would be accessible only by the corresponding researcher and the responsible supervisor. For the purposes of the research, the personal research data will be stored for a month after the completion of the study and will subsequently be deleted after this period. Only the anonymized data from the interview will be shared in the appendix section of the final thesis report. The summary of the interview will be shared with the participants after the interview and please contact the corresponding researcher (r.ganapathysubramaniansankran@student.tudelft.nl) if you have any questions or require any corrections on the summary.

Herewith I confirm, the undersigned, that I give permission to participate in the aforementioned study. In connection with this, I declare the following:

PLEASE TICK THE APPROPRIATE BOXES	Yes	No
A: Taking part in the study		
1. I have read and understood the information above dated [/ /], or it has been read to me.	☐	☐
2. I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	☐	☐
3. I am sufficiently informed about the nature, purpose and procedure of the interview.	☐	☐
4. I agree to be video-recorded while taking part in the interview.	☐	☐
5. I understand that the interviews will be transcribed.	☐	☐
B: Use of information in the study		
6. I understand that the information I provide will be used in reports and presentations in an anonymous way (i.e. by hiding any personal information).	☐	☐
7. I agree that my information can be quoted in research outputs in an anonymous way (i.e. by hiding any personal information)	☐	☐
8. I understand that taking part in the study also involves collecting specific personal information, such as my name and my email address, and will not be shared beyond the graduation committee.	☐	☐
9. I understand that the original transcripts will be anonymized and only the summary of the anonymized transcripts will be made publicly available through TU Delft education Repository. (summary will be sent and further contact would possible)	☐	☐
C: Further use and reuse of the information		
10. I understand that the video recording and the transcript of my interview will be deleted after 4 weeks of thesis defense.	☐	☐

Figure 17 Informed Consent Form Page 1

Signature

I have read the Information Sheet carefully and understand what I freely agree with.

Name of participant	Signature	Date

Figure 18 Informed Consent Form Page 2

F. Steps in constructing a conceptual framework

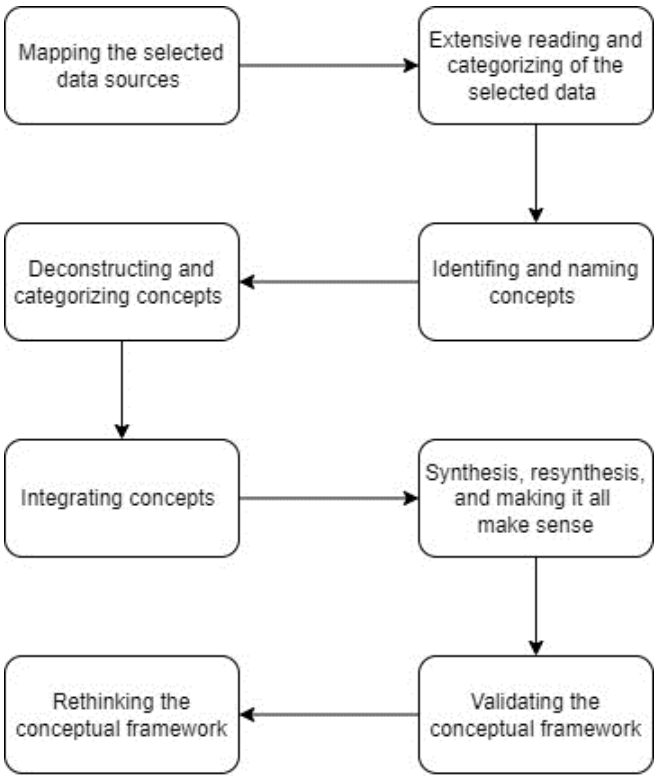

Figure 19 Steps in constructing a conceptual framework inspired from Jabareen (2009)