Exploring the future of environmental risk considerations in the banking sector

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PREFACE AND ACKNOWLEDGMENTS

Dedicated to my parents.

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ABSTRACT

Banks are exposed to environmental risks through their own operations, as well as through the activities of their clients. As financial intermediaries, banks are required to prudently manage the deposits placed in their care when issuing loans for projects and other transactions. Environmental risks form one of the many types of risks that need to be considered when banks make these financial decisions about which borrowers could get access to funding.

The increased awareness of the environmental breakdown, climate change and other severe environmental related impacts, has raised expectations by broader stakeholders like activists and investors, that banks will use the funding mechanism to direct funding into more sustainable and "green" projects in an attempt to respond to the increased environmental risks created by environmental issues, such as climate change, air pollution, droughts, or loss of habitat.

In this study the nature of environmental risk as it relates to banking is explored with the aim of understanding how banks will incorporate environmental risk considerations into their business models as a response to a perceived increase in environmental risk exposures.

The research was conducted based on a literature review that aims to describe the current topical issues within environmental risk management that affect banks. As a business, banks face direct environmental risks, and are obliged to manage these risks within the legislative requirements, like all other companies. In addition, through their role as intermediaries, banks are required to make decision on the use of funding, and manage depositors' funds prudently. This activity inadvertently exposes banks to indirect environmental risks. The literature review therefor covers both direct and indirect environmental risks.

In addition to the literature review, a qualitative study was conducted to elicit views and opinions from banking practitioners on the future of environmental risk considerations in banking.

The outcome of the research shows that environmental risk considerations are increasingly incorporated into banking, and have been for some time. There is an expectation amongst the respondents to this study that this trend towards increased environmental risk consideration within banking will continue, and that there is a growing understanding of how bank funding can either improve positive environmental outcomes. This expanding scope of environmental risk considerations within banking is also observed in the national, as well as global, climate change response that will see banks play an increased role in channelling funds towards environmentally sustainable business practices.

Significant variation and ambiguity are observed in environmental risk management protocols within banking, leading to uncertainties about measuring and quantifying environmental risk and

the banking industry regard it as a necessary and urgent progression towards more standardised methodologies for managing environmental risk. As other industries and companies are required to also adopt sustainable business practices, this will lead to a bigger burden on banks to incorporate more holistic environmental concerns into their lending decisions. The need for more consistency in quantifying environmental risk, as well as sustainability, is expected to result in the adoption of certain standards, both voluntary and regulatory, to enable this alignment amongst banks.

Keywords:

Environmental risk management

Green finance

Sustainable finance

Climate change risk

ABBREVIATIONS AND ACRONYMS

BANKSETA	Banking Sector Education and Training Authority
BASA	Banking Association of South Africa
Basel III	Basel Committee on Banking Supervision risk framework
BCBS	Basel Committee on Banking Supervision
BIS	Bank of International Settlement
C&E Risk	Climate and Environmental Risk
CAR	Capital Adequacy Ratios
Carbon Tax Act	Carbon Tax Act 15 of 2019
CEP	Corporate environmental programme
CRISA	Code for Responsible Investing in South Africa
CO_2	Carbon-dioxide
DEAT	Department of Environmental Affairs and Tourism
DEF	Department of Environmental Affairs
DFFE	The South African National Department of Forestry, Fisheries and the Environment
EA	Environmental Authorisation
EBA	European Banking Authority
ECA	Environment Conservation Act 73 of 1989
ECB	European Central Bank
EEMF	Enterprise Environmental Management Framework
EMF	Environmental Management Framework
EMS	Environmental Management System
EP	Equator Principles
EP4	Equator Principles, 4th iteration
ESG	Environmental, Social and Governance
ESMS	Environmental and social management system

ESRA	Environmental and social management system
FCA	Financial Conduct Authority
FSR Act	Financial Sector Regulation Act 9 of 2017
GFC	Global Financial Crisis
GHG	Greenhouse Gas
ICAAP	Internal Capital Adequacy Assessment Process
IMF	International Monetary Fund
JSE	Johannesburg Securities Exchange
KBA	Key biodiversity area
LCR	Liquidity Coverage Ratios
LTAS	Long term adaptation scenarios
NCCRP	South Africa's National Climate Change Response White Paper
NEMA	South African National Environmental Management Act
NEMAQA	The National Environmental Management: Air Quality Act 39 of 2004
NEMBA	The National Environmental Management: Biodiversity Act 10 of 2004
NEMWA	The National Environmental Management: Waste Act 59 of 2008
NGFS	Network for Greening the Financial System
NGO	Nongovernmental Organisation
NOx	Nitrogen-oxides
NWA	The National Water Act 36 of 1998
OECD	The Organisation for Economic Co-operation and Development
PCB	People's Bank of China
POCA	The Prevention of Organised Crime Act 121 of 1998
POP	Persistent organic pollutants
ROE	Return on Equity
SARB	South African Reserve Bank
SDGs	Sustainable Development Goals

SEMAs	Sector Environmental Management Acts
SEMS	Social and environmental management system
SOx	Sulphur-oxides
TCFD	Task Force for Climate-related Financial Disclosures
The Fed	United States Federal Reserve Board
TNFD	Task Force for Nature-related Financial Disclosures
UNEP	United Nations Environmental Programme
UNEP FI	United Nations Principles for Responsible Banking
VOC	Volatile organic compounds

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CHAPTER 1 INTRODUCTION

1.1 Background

Banks, operating in the services industry, do not generally face significant direct environmental risks (Bright & Buhmann, 2021; Chenet, 2019; Coetzee, 2013; Lee, 2001), particularly in comparison to industries in the primary and secondary sectors like mining, manufacturing, energy, and transport. It is, however, through their role as financial intermediaries that banks face exposure to indirect environmental risks due to the activities and behaviour of their clients, as well as other stakeholders that are impacted by negative environmental outcomes of economic activity (Coetzee, 2013; Lee, 2001; McKenzie & Wolfe, 2017). The impact of business activity and human actions have negative and unintended environmental consequences across multiple environmental systems, both natural and human, with negative impacts being experienced in the form of deteriorating air quality, degrading water supplies, soil degradation and erosion, deforestation and the loss of natural habitats and biological diversity, waste pollution, climate change, ocean acidification, to name just a few (Butler, 2021; Sklair & Murphey, 2020; Waters *et al*., 2016). Where these environmental impacts transfer into the banking sector as financial losses, these impacts are regarded as risks. The scale of environmental risks to banks is already substantial. Ratings agency, Moody, has estimated that $218 billion in credit extended by 49 banks in 14 African countries are exposed to environmental risks. This equates to nearly 29% of these banks' total loans (Moody's, 2021).

As financial intermediaries, banks link buyers and sellers in financial markets - banks buy deposits and sell loans. Wu and Shen (2013) view financial intermediaries, like banks, as a nexus where decisions made by a relatively small concentration of institutions and processes, have a profound impact on how financial resources are deployed into an economy, as well as the environmental consequences of these decisions. In essence, as financial intermediaries, banks make decisions on deciding whether funding is given to projects or companies that can have either favourable or detrimental environmental outcomes: banks finance those environmental impacts that create climate change, waste, pollution, and ecological degradation. Through their role as financial intermediaries, banks enable and profit from industries that are significant environmental risk creators (Bowman, 2010). As more pressure is mounted by activists, communities, regulators, and governments for banks to apply more sustainable funding practices, banks have had to adopt measures to improve their environmental performance. In addition, there is the emergence of a lender liability concept as a form of environmental liability, which argues that lenders, i.e. banks, are jointly liable for adverse environmental outcomes that are a result of the companies that borrow money from banks (Al-Tawil, 2017). Such a value-chain definition of liability is likely to impact the lending risk-assessment methodology used by banks to include consideration of the impacts of environmental risks.

The European Central Bank (ECB) views climate-related and environmental risks (C&E risks) as key risk drivers for the banking sector (ECB, 2021). This view is also expressed by South Africa's National Treasury (National Treasury, 2020), the South African Reserve Bank (SARB, 2021), the United States Federal Reserve Board (The Fed) (Brunetti et al., 2022), and the central bank of the People's Republic of China, the People's Bank of China (PCB) (Macaire & Naef, 2021). Policy documents by all these institutions regard C&E risks as systemic threats to the continued stability in their financial system, with impacts from C&E risks requiring significant changes to banking to mitigate these risks.

There are different views on the definition of environmental risks (Su *et al*., 2021), but a generalised definition can be extracted from available literature. An environmental risk is an uncertainty about the ecological, social, and economic impact of human activity on both the human and natural environments (Carriger & Glendell, 2020; Fernandes & Lima, 2021; Rajesh, 2019; Shirtcliff *et al*., 2021; Su *et al*., 2021). Environmental risks can also be defined by scope of impact, and whether the risk is systemic or not (Colon *et al*., 2020; Matejova & Briggs, 2021). Non-systemic, or idiosyncratic, risks have a defined scope of impact, and do not undermine the continued sustainability of a whole system, whereas systemic risk can cause catastrophic collapse of a system, however, non-systemic risks accumulate into a system to a point where they become systemic.

Banks are required to operate sophisticated processes to monitor credit risk and ensure they hold sufficient capital to mitigate against financial stresses of the financial and banking system (McKenzie & Wolfe, 2017). These regulations exist to ensure that banks protect their own assets, protect depositors and investors, that they remain financially secure, and to not place the larger financial system at risk (SARB, 2021). Where environmental risks impact the continued optimal performance of a bank, that bank would be required to incorporate those environmental risks into its overall risk modelling and make provisions for these risks in its capital adequacy ratios as well as liquidity ratios, which come with additional costs and reduced profits (Korzeb *et al.*, 2022).

Banks face increasing pressure from external stakeholders like governments, regulators, nongovernmental organizations (NGOs), and the public, to adapt their risk management models in ways that enable sufficient transparency about potential financial impact of environmental risks, and to enable more sustainable, green banking outcomes (Batten *et al*., 2016; Day & Woodward, 2009; Dikau & Volz, 2021; Volz, 2017). There already is a noticeable trend for banks to take a more active role in climate action and reducing environmental risk through voluntary environmental and climate governance (NGFS, 2019). A review of existing literature by Bose *et* *al*. (2018), referencing Furrer *et al*. (2012) and Thompson and Cowton (2004), found that the external pressures on commercial banks to implement environmental risk management does affect banks' environmental risk management behaviour, but that little progress has been made to formally codify environmental risk considerations into the banking sector regulations. Dikau and Volz's (2021) study of 135 central banks found that 70 out of 135 central banks have a 'direct' or 'indirect' environmental sustainability mandate, but only 20% have adopted any mandatory environmental risk management requirements within their financial regulations. The absence of regulated requirements that specify the incorporation of environmental risks into banking does not, however, pardon banks of their obligation to manage environmental risk as an emerging risk, and as such, the incorporation of environmental risk considerations into bank risk models do have a substantial history. While most banks do consider environmental risks as part of the credit appraisal process (Coulson & Dixon, 1995; Wanless, 1995), the ability to cost, price, monitor, or manage the risk out of contention, remain a challenge (Weber *et al*., 2008).

The emergence of environmental risk as a risk consideration for banks, is also evident in the plethora of agreements, models, compacts, and principles where finance in general, and banking specifically, is targeted to increase their due diligence on environmental, social, and governance (ESG) considerations in lending practices, to fund more sustainable projects, and to cease funding of environmental damaging businesses, like coal power plants. Included in this list of agreements and models are the United Nations Environmental Programme (UNEP) Principles for Responsible Banking (UNEP, 2022); the Task Force for Nature-related Financial Disclosures (TNFD) (TNFD, 2022); Task Force for Climate-related Financial Disclosures (TCFD) (TCFD 2021); the Equator Principles (EP) (Equator Principles Association, 2020); National Treasury's Financing the Green Economy Document (National Treasury, 2020); The South African Banking Association's (BASA) Principles for Managing Environmental and Social Risk (BASA, 2015); or the Paris Agreement for achieving net-zero carbon emissions (UNEP, 2022), to name a few. All of these documents detail expectations of banks to adopt business practices that improve environmental outcomes across several environmental risk areas, like reducing environmental harm, adapting to climate change, investing in sustainable and "green" projects; considering social and cultural impacts of development, and de-risking the bank, as well as the bank clients and the financial sector, from the negative consequences of environmental risk.

Within the South African market, five banks have signed the Principles for Responsible Banking (UNEP_FI, 2022), and there are four adoptees of the fourth (4^{th}) iteration of the Equator Principles (EP4) for risk management framework managing environmental risk):

Table 1 - Principles for Responsible Banking (UNEP_FI, 2022)

Signatory	Date signed

ABSA Group Limited	Sep 2019
FirstRand Group Limited	Oct 2020
Investec group	Aug 2020
Land and Agricultural Development Bank of South Africa	Sep 2019
Standard Bank Group	Sep 2019

Table 2 - EP4 Signatories (Equator Principles Association, 2022)

Signatory	Date signed
Absa Group Limited	22 Oct 2009
FirstRand Group Limited	13 Jul 2009
Nedbank Limited	10 Nov 2005
Standard Bank Group	02 Feb 2009

Due to the concentrated nature of the South African banking market, the top five banks (by assets), namely the Absa Group Limited (Absa), FirstRand Group Limited, including First National Bank (FirstRand), Investec Limited (Investec), Nedbank Limited (Nedbank) and Standard Bank Group (Standard Bank) represent 80%+ of the South African market (Simatele, 2015). It can therefore be said that, compared to the global average, more of South Africa's bank assets are being scrutinised using environmental risk protocols than in the rest of the world.

1.2 Problem statement and rationale for the study

Despite the existence of several protocols that require environmental risk considerations in banking, South Africa lacks a formal regulatory framework for integrating all environmental and climate change related risks into financial risk decisions in the banking sector (Bimha, 2020). Consensus is emerging though on the regulatory framework for formalizing relevant environmental risk considerations into the risk management processes of commercial banks (National Treasury, 2020). There is also sufficient evidence that growing threats from environmental risks related to climate change will materially impact the operations of all South African financial institutions, including banks, and that the codification of environmental risk considerations into regulations for banking is likely to come into existence (National Treasury, 2020; BASA, 2015). Within South Africa there is also a growing view that banks, and other financial service providers, have a significant role to play in the transition to a sustainable economy, which will require banks to adopt several new business models in order to adhere to these expectations that will become codified in either mandatory or regulatory, or both, requirement (BANKSETA, 2020; BASA, 2015; DEAT, 2018; National Treasury, 2020; Maze & Driver, 2016). In light of the above, the rationale for this study is to explore the future of environmental risk considerations in the South African banking sector.

1.3 Research aim and objective

The aim of this research is to explore the future of environmental risk considerations in the South African banking sector. The research will be conducted using both a literature review as well as through the use of a specific, qualitative, futures thinking methodology, namely the Seven Questions method.

1.4 Scope of the research

This study is limited to South African commercial banks with a combined market-share of more than 80%, as measured by local assets. Due to the concentration of the South African banking market, this will include at least the five (5) biggest banks in South Africa, as measured by their assets (BASA, 2018).

Since the aim of the study covers the incorporation of environmental risks into banking, the targeted respondents will be selected from positions with suitable seniority in areas with exposure to environmental risk considerations.

1.5 Assumptions and limitations

There are significant challenges for regulators to reduce the complexities of environmental risks and their impacts on practical regulations. Due to this complexity, as well as the fact that this is an emerging topic, it should be assumed that respondents from banks included in this study, will be influenced by their own perceptions of environmental risks in banking, as well as the environmental risk management models applied within their banks. The use of carbon risk as proxy for environmental risks is, for instance, common (Bimha, 2020). Carbon risk is the extent to which a company is exposed to growing costs of emitting greenhouse gasses (GHGs) expressed as price per ton of carbon dioxide equivalent of GHG emissions on which companies will be taxed, according to the South African Carbon Tax Act 15 of 2019 (Carbon Tax Act). One such exposure is a cost exposure in the form of carbon tax. The use of a single variable indicator like greenhouse gas (GHG) emissions as a proxy for environmental risk, does have practical application, however, a conscious decision was made to not reduce the scope of the study to a single proxy variable, like GHG emissions, or to one area, like climate change. Instead, the term environmental risks, as opposed to carbon risk or climate risk, is used to ensure that the scope of these risks include the broader consideration under environmental risk, which will cover both sustainability and "green" issues, as well as conventional environmental risks that can lead to losses for a bank, like regulatory compliance, reputational risks, or risks associated with environmental impacts, like pollution, waste, or air quality.

1.6 Structure and outline of the dissertation

This section provides a layout of the chapters in the dissertation:

Chapter 1: This chapter outlines the background to the study by showing the emergence of environmental risks as factors in banking, with reference to the sources of these risks as well as the pressure exerted onto banks from the outside, to adopt environmental risk management practices. In addition, Chapter 1 explains the rationale of the study, which is to understand the future of environmental risk considerations in banking. It furthermore sets out the aims and objectives of the paper, as well as assumptions and limitations.

Chapter 2: In Chapter 2 a literature review is conducted to further explore environmental risks and banking. This dissertation will use a literature review to understand and set out the background of environmental risks and their impact(s) on banking. Also included in chapter 2 is a discussion of the current methods used by banks to manage environmental risks.

Chapter 3: In this chapter the research methodology is discussed. The study is based firstly on the outcomes of the literature review set out in Chapter 2, and secondly on the use of a semi-structured interview technique. Using the Seven Questions interview technique, the views of South African banks will be determined in respect of their expectations for the formalising of environmental risk assessment in their financial decisions. Chapter 3 also sets out the research design, focusing on a description of the interview process, selection methods, questionnaire design, and data analysis techniques. There are certain ethical considerations also set out in Chapter 3, as well as the methodological assumptions and limitations.

Chapter 4: Using the Seven Questions methodology, participants' responses are discussed and analysed for common themes and trends. Responses to each question are interpreted per question separately, after which the chapter ends with a summary of the findings.

Chapter 5: This chapter concludes the study with an integration of the literature review and the research findings. An attempt is made at synthesising the results into a finding that aims to offer insights into the research question. Included in this section are also recommendations for future areas of research related to this research question of this study.

1.7 Conclusion

The purpose of this study is to explore the future of environmental risks in banking. Environmental risk management is perceived to be a growing discipline and banks will be required to incorporate more environmental risk management considerations as these risks will become more material in the future.

This study will be based on a literature review of environmental risk in banking with the aim of understanding the current nature and scope of environmental risk considerations within banking. In addition, the future of environmental risk is further explored by conducting semi-structured interviews with representatives from South African banks.

CHAPTER 2 LITERATURE REVIEW

Chapter 2 examines the scope of environmental risks in banking and explores some of the approaches used by banks to manage these risks.

Section 2.1 serves as an introduction to banking and environmental risk. The purpose of this section is to establish a framework within which environmental risks and banking can be discussed.

Section 2.2 gives an overview of the types of risks a bank generally needs to contend with, and includes the regulatory requirements imposed on banks to manage their overall risks. It also touches briefly on the risk management requirements within the South African banking regulations, and the regulatory authorities that oversee the banking sector to ensure adherence to the regulations. It also references generic risks types to which businesses, as well as banks, are exposed.

This is followed by a definition of the term “environment” as it applies to South African legislation, and also how it is applied by banks, with reference to reporting on environmental risks done by banks, as well as the protocols and frameworks used by banks within their own environmental risk protocols and reports.

Section 2.3 considers the legal and governance imperative for environmental risk management. All South African companies, including banks, have exposure to environmental risks from a legislative and governance perspective due to their own business operations.

Section 2.4 sets out the links between environmental risks and bank risks. Using information from grey literature in the form of banks’ environmental risk reporting, a generic overview is given of the way in which banks incorporate environmental risk considerations into banking. Reference is made to environmental risk frameworks and environmental management systems currently deployed by banks to operationalise environmental risk management. This section uses credit risk as a model to illustrate how environmental risk is operationalised within a bank.

Section 2.5 discusses the issue of climate change, which is regarded as a significant environmental issue for the banking sector. This chapter also considers the issue of environmental externalities as market failures that describe the origin of environmental costs and how these costs are passed on to society. The existence of externalities can be regarded as the impetus for creating environmental management as a discipline.

2.1 An overview of bank risk

The scope of environmental risks and their impact on banking, is vast, and there are different ways in which environmental impacts manifest as risks for a bank. In order for a meaningful discussion of environmental risks in banking, it is firstly necessary to have an understanding of the types of risks that banks deal with. In subsequent sections the links between environmental risks and these common bank risks will be illustrated.

Of importance to this study of risks within banking are two main factors (IMF, 2021):

1. The interdependence of risks to the financial system and the clients, and markets served by banks.
2. The financial stability aims of the banking regulations.

Banks, like any business, manage risks to protect the value of its shareholders, but as financial intermediaries banks also play a role in managing systemic risks in a country's financial ecosystem as well as to protect the deposits placed with banks (SARB, 2021). Risk is an uncertainty about future outcomes in an ever changing operating environment (Lemos, 2020), which implies that risk management approaches need to change as conditions of the operating environment change. A risk can be expressed by the probability of the negative event occurring as well as the uncertainty about the scale of the impact, should the risk become a reality (Lemos, 2020). In credit risk parlance, this would be called the probability of default (on a loan), and the loss incurred should a default happen. This risk estimation model, that is based on probability alone, does have a flaw; once the conditions that allow for the calculation of that risk's probability change materially, so will the probability of the risk, and these changes can render the risk unpredictable, and unmanageable (Šotic & Rajic, 2015). Risk estimation must therefore also include considerations of uncertainty and complexity. For this reason, Lemos (2020) proposes a definition of risk that has three dimensions:

1) Risk is the potential that planned events can have an unexpected outcome and the impact of that outcome is of material scope for the risk to negatively impact the institution. This implies that risk is a consequence of uncertainty (what might happen) and exposure (how we will be impacted, and to what extent).
2) Risks, and risk impacts, have unknown unknowns, which is a consequence of complexity that cannot be reduced to probabilistic models, i.e. it cannot be quantified to a probability. This also extends risks into systemic risks where the cause and the consequence are not linked in predictable patterns.
3) Risks are also linked to the perception of utility: gains or losses. The perception of utility materially influences the perception of the risks and has bearing on the non-rationality of actors who make decisions about risks based on perceptions about risks.

The South African Reserve Bank (SARB) is mandated with banking supervision in South Africa for purposes of enforcing adequate risk management capabilities within banks. The Financial Sector Regulation Act 9 of 2017 (FSR Act), section 11, defines the South African Reserve Bank's (SARB) financial stability mandate:

1) The Reserve Bank is responsible—
   (a) for protecting and enhancing financial stability; and
   (b) if a systemic event has occurred or is imminent, for restoring or maintaining financial stability.

Section 12 of the FSR Act deals with the SARB's responsibility to monitor risks:

The Reserve Bank must—

- (a) monitor and keep under review—
  - (i) the strengths and weaknesses of the financial system; and
  - (ii) any risks to financial stability, and the nature and extent of those risks, including risks that systemic events will occur and any other risks contemplated in matters raised by members of the Financial Stability Oversight Committee or reported to the Reserve Bank by a financial sector regulator;
- (b) take steps to mitigate risks to financial stability, including advising the financial sector regulators, and any other organ of state, of the steps to take to mitigate those risks; and
- (c) regularly assess the observance of principles in the Republic developed by international standard setting bodies for market infrastructures, and report these findings to the financial sector regulators and the minister, having regard to the circumstances and the context within the Republic.

The SARB enforces this mandate through its role as supervisor of South African banks. Banks are required to adhere to several regulatory frameworks derived from different legislations that stipulate minimum risk management requirements. Of relevance to environmental risk, as will be shown in subsequent sections, is the regulation of the banking industry to protect different stakeholders against undue risk. However, the inability of financial markets to self-regulate itself into a sufficiently prudent position, was recognized as a failure that contributed to the sub-prime mortgage crises and the subsequent global financial fall-out (Bullard *et al*., 2009; Hollander & Haveman, 2021). The 2008 Global Financial Crisis (GFC) highlighted the interdependence of the real economy and the financial economy (Hollard & Haveman, 2021; Van Heerden & Van Nierkerk, 2017) in a way that illustrated shortcomings in the regulatory approaches to financial services to identify and mitigate against systemic threats. Regulatory frameworks had suffered from being siloed and lack of the ability to monitor emerging systemic risks and applying sufficient market conduct and prudential principles to manage these risks out of the system, or to create buffers against systemic collapse in the case of a crisis (Kang *et al*., 2022; Mahasela, 2020; Van Heerden & Van Niekerk, 2017).

The fallout from the GFC led to several regulatory reforms, both locally and internationally, to allow for a more integrated financial risk management framework (Adrian, 2018; Van Heerden & Van Niekerk, 2017) in what is commonly referred to as the Twin Peaks model where two (Twin Peaks) separate regulators are mandated with the functions of market conduct / consumer protection and prudential supervision respectively. The Twin Peaks are the prudential and conduct regulations respectively imposed on the financial services sector.

The SARB has adopted the Basel III model for managing prudential risk under the auspices of the Prudential Authority (SARB, 2021). At the most basic level, Basel III is a set of requirements for ensuring bank resilience, and is regarded as a key aim of risk management requirements (BIS, 2022). Basel III refers to the third version of the Basel Committee on Banking Supervision's (BCBS) framework for the prudential regulation of banks (BIS, 2022). The BCBS has 45 members comprising of central banks and bank supervisors representing 28 jurisdictions. Basel III sets standards for banks to maintain minimum capital adequacy ratios (CAR) and liquidity coverage ratios (LCR) to mitigate against the risk of potential losses. Both CAR and LCR are stress tests that give an indication of a bank's resilience to absorb losses if there are severe risk events. CAR is a measurement that expresses the value of a bank's capital as compared to a its weighted risk of its assets. Bank capital consists of common shares and retained earnings. The purpose of CAR is to show that a bank has adequate capital to cover for its weighted risks in case these risks do materialise; it determines the solvency of a bank, or its ability to absorb losses (BIS, 2022).

The objective of the LCR is to safeguard sufficient cash deposits to protect a bank from short term liquidity disruptions (BIS, 2022). Both capital and deposits are "bought" by the bank. The bank pays for capital in the form of return on equity (ROE) and dividends to shareholders, and deposits are paid for with interest to depositors. The purpose of Basel III is to determine how much capital and liquidity a bank needs to hold in reserve to protect against risks. The amounts that a bank is required to hold is determined by the riskiness of a bank's loan portfolios. Higher risk loan portfolios require more reserves. Since the bank needs to purchase capital and liquidity, it follows that there is a higher cost to the bank for issuing riskier loans. The South African Reserve Bank (SARB) is mandated to regulate, oversee and supervise the banking sector (SARB, 2021). Banks are required to maintain an Internal Capital Adequacy Assessment Process (ICAAP) that adheres to the standard set by the SARB.

Conduct risk arises when financial services companies sell products that are unsuitable for clients (Financial Conduct Authority [FCA], 2013). An example of this is when banks lend to clients without sufficient assessment of the client's repayment ability. This creates not only an issue for the client (financial distress), but as more and more loans are issued without proper repayment considerations, the size of the problem increases to become a threat to the bank itself (Hargarter & Van Vuuren, 2018). When all the banks within the system participate in high risk behaviour, a systemic risk emerges that threatens the stability of the whole financial system (Organisation for Economic Co-operation and Development [OECD], 2011, 2013).

For the financial system to be stable, it is necessary that individual institutions are stable and the stress tests within prudential regulation and the conduct requirements within the conduct risk model to be combined to ensure banks manage risks continuously and holistically to maintain their own stability, as well as that of the banking system (Goodhart & Avgouleas, 2015). Typically, banks use some type of risk topology for classifying risks in order for the relevant expertise and protocols to be utilised in managing risks (Sîrbulescu, 2016). There are numerous topologies depending on the type of banking or the type of transaction for which risk is measured. It is therefore necessary to ringfence the scope under consideration for purposes of this study. In addition to prudential and conduct risk, the following key risks, sourced from Sîrbulescu (2016), Lemos (2020), and Šotic and Rajic (2015) will be referenced:

- **Credit risk** is the risk that a loan is not repaid in full, or in time, or that the terms of the loan need to be restructured with the borrower due to the borrower's difficulty to repay. Credit risk can be caused by the borrower experiencing financial difficulties due to his / her own actions, or it can be a result of changing market conditions either in the form of competitors making the borrower redundant, or market conditions that have deteriorated for the whole economy, like currency fluctuations or interest rate changes.
- **Liquidity risk** is a short term shortage of cash flow created by an inability to raise funding, or the inability to pay short-term obligations.
- **Market risk** refers to more than one type of risk. Market risk can be changes in the price of instruments, assets or commodities. This will be represented, for instance, by changes in interest rates, or market rates for assets or commodities. Market risks can trigger credit risks. Market risk also refers to changing conditions in the market that materially impact the whole economy, like low growth or high inflation. Both these definitions of market risk are also systemic because they have a knock-on impact across the whole economy. A change in interest rates can trigger credit risks; credit risks impact purchasing power, which leads to lower expenditure and lower growth, and this reinforces and amplifies the credit risk.
- **Regulatory risks** manifest as a type of transition risk, which is the risk that current business models become redundant due to regulatory changes, or the risk of additional costs or losses due to changes in the regulatory regime.

- **Operational risk(s)** are losses due to the bank being able to operate as per current operating models and processes. This is due to human error, illegal acts, weak controls, or external events causing operating capacity to be reduced, or lost. This can be an IT system failure, or it can be a branch closure due to industrial action.
- **Compliance risk** relates to statutory and regulatory compliance to bank regulations, as well as other regulations relevant to all businesses, like environmental regulations, labour laws, or protection of personal information.
- **Legal risks** arise from disputes at contractual levels between the bank and counterparties with whom the bank has contracted, either clients or suppliers.
- **Other risks** could take several different forms, and depend on context. In different geographies, markets, countries or industries there could be specific issues that need to be considered when transacting with a counterparty that is exposed to that risk. Examples could be that clients in agriculture will have a different exposure to climate change due to different geographic regions, or clients in certain industries could be more exposed to industrial actions.
- **Reputational risks** are created when actions of the bank result in negative sentiment from the market, clients, regulators or activists, and these result in additional costs or losses to the bank.
- **Liability risk** is the risk of being held financially liable for an action or decision of the bank, or a bank representative, that resulted in losses to a third party, which could be either a client, the general public, or the state.

In summary, banks are regulated by the SARB to protect investor's capital and depositors deposits. Banks are required to formally assess risks across the business by identifying, assessing, measuring and reporting on risk levels. This includes assessing the risks associated with any counterparty with whom the bank is contracting for purposes of lending. The purpose of conduct and prudential risk is to guard against individual institutions conducting their business to the detriment of their depositors and shareholders, and ensure sufficient CAR and LCR for the types and sizes of the risks the bank is managing. Risk management is performed across several risk types of sufficient materiality to create losses to the bank and the bank is required to manage all these risks within acceptable limits.

Detailing the methodology used for managing these risks falls outside the scope of this study. What will be shown is how environmental risks link to these risks. The next section will, however, first deal with the definition of "environment".

2.2 Legal and operational definitions of “environment” and “environmental impacts”

Before linking the various bank risks to environmental risks, it is necessary to explore the concept of “environment” as used in South African law, as used by banks in their environmental risk reporting, as well as other frameworks and protocols where this concept is utilised. Referencing banks’ own reporting on environmental risks, the most common framework within which environmental risk is done, is the ESG framework. These reports include documents like Standard Bank’s Environmental, Social, and Governance Report (Standard Bank Group, 2021); Nedbank's 8th Annual Nedbank Board ESG roadshow (Nedbank, 2021); FirstRand’s Report to Society (FirstRand, 2021a) and its Climate-Related Financial Disclosure (FirstRand, 2021b); Investec’s Group Sustainability and ESG Supplementary Report (Investec, 2021); African Bank’s Environmental, Social and Governance Report (African bank, 2021); and Absa’s Environmental, Social, and Governance Report (Absa, 2020). Also evident from these reports is that banks use external frameworks and protocols as benchmarks for their own environmental risk considerations and that a definition of “environment” can be derived from these protocols.

The main legislation that deals with the environment in South Africa is the National Environmental Management Act 107 of 1998 (NEMA, 1998), which defines “environment” as: … (environment) mean(ing) the surroundings within which humans exist and that are made up of -

(iii) the land, water and atmosphere of the earth;
(iv) micro-organisms, plant and animal life;
(v) any part or combination of (i) and (ii) and the interrelationships among and between them; and
(vi) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being;

This definition of “environment” does present a certain complication, as described by Nel and Alberts (2018). It does not describe in sufficient detail the prominence of social, economic or cultural aspects when considering conflicting environmental outcomes between these considerations, nor does it define whether, or to what extent, the definition applies to the natural environment, or the built environment, or both. Nel and Alberts point out that the possibility exists that conflicting scopes can be attributed to the definition of “environment”. A restrictive interpretation of the environment can be made if it is considered that the environmental right in the constitution is not the only right which is guaranteed, and the invoking of the guarantee of other rights can, in a sense, compete with the environmental rights. However, a more extensive view of “environment” can be taken, based on the constitutional requirement to interpret the rights in a manner that will promote and democratise values based on “human dignity, equality and freedom” (The Constitution, 1996).

There also is the concept of “environment” in the South African Constitution itself (The Constitution, 1996) where the Bill of Rights enshrines the following environmental right:

Everyone has the right –

(d) to an environment that is not harmful to their health or well-being; and
(e) to have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that –
    (i) prevent pollution and ecological degradation;
    (ii) promote conservation; and
    (iii) secure ecological sustainable development and use of natural resources while promoting justifiable economic and social development.

Clarification of the scope of “environment” within the South African legal context was provided in BP Southern Africa (Pty) Limited v MEC for Agriculture, Conservation, Environment & Land Affair (BP Decision) where the court ruled that:

“…the environment is a composite right which includes social, economic, and cultural considerations in order to ultimately result in a balanced environment”.

It can therefore be said that the term environment includes both ecological components, like biodiversity and natural habitat, climate change, conservation, also known as “green” issues (Nel & Alberts, 2018); and social issues related to health, community or cultural aspects (brown issues).

Within the banking sector, a documented definition of “environment” as it applies to environmental risks within banking, is seldom, if ever, formally stated, as was also recognised in the Network for Greening the Financial System (NGFS) where the institution makes reference to this in their technical paper, Overview of Environmental Risk Analysis (NGFS, 2019). The scope of the environment within bank risks can be inferred from several protocols and standards that apply to environmental risk management within banks. Banks’ own published material refers to the concept of “environment” in several contexts. This information is obtainable from banks’ reporting of their environmental risks, which is predominantly done within the ESG model. Banks publish their ESG reports annually and reference the scope of ESG considerations in these reports. As such, banks differentiate between the E (environmental) and S (social) aspects, however, all these reports refer to the integrated nature of E & S issues and recognise the interdependencies between green and brown issues. It is also clear from the ESG reports that banks link their environmental performance to several external protocols and agreements, like the Sustainable Development Goals (SDGs) of the United Nations.

Within the ESG framework, banks use several protocols when referring to environmental risks. These include the following:

(a) Equator Principles (EP): The Equator Principles, currently in version 4 (EP4), is a risk management framework for environmental and social risk (Equator Principles Association, 2020) with 116 financial institutions signatories in 37 countries. Equator Principles Financial Institutions (EPFIs) are expected to hold their borrowers to certain standards when these institutions (banks) fund projects with environmental and social risk exposures. EP4 uses the broad definition of environment across all significant environmental and social impacts (Equator Principles Association, 2020).

(b) United Nations Principles for Responsible Banking (UNEP_FI): Five South African banks are signatories to the UNEP_FI, as on 24 August 2022, and internationally there are 290 signatories that represent approximately 45% of global banking assets (UNEP_FI, 2022). The UNEP_FI consists of six (6) principles across topics like climate change and carbon neutrality, resource efficiency and the circular economy, biodiversity and impact analysis. The purpose of the principles are to ensure that signatory banks' strategy and practice align with the vision society has set out for its future in the Sustainable Development Goals and the Paris Climate Agreement. The UNEP_FI (2021) uses a broad definition of environment to include impacts on the natural environment, earth systems, social impacts, as well as climate change.

(c) United Nations Sustainable Development Goals (SDGs): The SDGs cover 17 Sustainable Development Goals and 169 targets across social, environmental and economic spheres. In particular Goal 15 is relevant to understand the scope of "environment" in the context of the SDGs: "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss". The SDG framework also recognises the interdependence between social, economic and environmental issues and calls for an integrated approach.

(d) The Paris Agreement: The Paris Agreement is a legally binding international treaty on climate change, also signed by South Africa (DFFE, 2016). The Paris Agreement uses a broad definition for environment that includes both social and ecological aspects, including the interdependence between society and the natural environment.

(e) Task Force on Climate-related Financial Disclosure (TCFD): The TCFD sets standards for the disclosure of climate related financial risks (TCFD, 2021). The TCFD reporting includes, Greenhouse Gas Emissions (GHG); Transition Risks; Physical Risks; Climate-Related Opportunities; Capital Deployment; Internal Carbon Pricing (the price set to Carbon emissions); and Remuneration Policies linked to Climate Change risks.

(f) Johannesburg Securities Exchange (JSE) sustainability disclosure: a mandatory requirement for listed companies, including listed banks, for reporting on environmental risk exposures for the purpose of informing investors. The scope of “environment” within the JSE disclosure model differentiates between green and brown issues, but does include both (JSE, 2022):

(i) Environmental metrics: climate change, weather security, pollution and waste, biodiversity and land-use, supply chain and materials.

(ii) Social metrics: Human rights and community development, labour standards, health and safety, customer responsibility, supply chain.

(iii) Governance metrics: Compliance and risk management, ethical behaviour, tax transparency, board composition, remuneration.

The scope of “environment” as it is applied in the context of environmental risk management within the banking sector can therefore be said to cover a broad range of considerations. These include the natural environment as well as natural systems and processes that contribute to the functioning of the environment, like the climate, biodiversity and ecosystems.

The deceptively simple definition of “environmental impact” as the consequence of human activity on the environment is inadequate for any operational purposes. While no outright definition of environmental impact is given in any of NEMA, The National Water Act 36 of 1998 (NWA, 1998), The National Environmental Management: Air Quality Act 39 of 2004 (NEMAQA, 2004), The National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA, 2004), nor The National Heritage Resources Act 25 of 1999, the concept of environmental impact is widely used throughout the legislation in context of activities that impact the social, economic, natural and cultural environments within which they operate. An environmental impact is therefore defined in the context of the activity as well as the environment that experiences impacts from the activity, like impacts on water or air quality, loss in biodiversity, or damages to heritage sites. In addition, within the South African context, impacts are described with reference to the requirement for environmental impact assessments (EIA), that are either mandated by legislation for specific listed activities, or for consideration in use for strategic environmental assessments (SEA) as policy formulation tools within government, aimed at an integrated and holistic environmental approach for the country.

Across legislation, banks’ own reporting models, as well as external agreements and protocols, it can therefore be concluded that the term “environment” generally applies to the broad spectrum of natural and human systems, and that environmental impacts are measured against multiple aspects across these systems.

2.3 The legal and governance imperatives for environmental risk management

As mentioned above, within the South African context, there is a constitutional imperative for ensuring environmental rights, with specific reference in the Bill of Rights, which gives certain environmental rights to South Africa. The Constitution further states an obligation for these rights to be fulfilled:

“This Constitution is the supreme law of the Republic; law or conduct inconsistent with it is invalid, and the obligations imposed by it must be fulfilled” (Constitution of South Africa, 1996).

In addition, the National Environmental Management Act 107 of 1998 (NEMA) was promulgated to: “… provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote cooperative governance and procedures for co-ordinating environmental functions exercised by organs of state; to provide for certain aspects of the administration and enforcement of other environmental management laws; and to provide for matters connected therewith.”

The sustainable development principles in Section 2 of NEMA sets out expectations about environmental protection, harm reduction and restoration with regard to economic development, waste management, and pollution. These principles take their point of departure from the Constitution’s environmental rights principles (Oosthuizen *et al*., 2018).

The NEMA preamble defines both an environmental status quo as well as a desired future state, as to be enabled by NEMA (Oosthuizen, *et al*., 2018). NEMA recognises that many South Africans’ environmental rights have not yet been met and that the state has a role to play in fulfilling its social, economic, and environmental obligations while enabling sustainable development and providing socio-economic benefits to previously disadvantaged citizens. The desired future state compels organs of state to enact the necessary framework that will deliver these environmental rights to citizens via an integrated environmental management approach based on the necessary legal frameworks, covering all activities of the state, and that is enforceable by the state and, critically, civil society.

Section 2 of NEMA furthermore sets these guiding principles upon which the state should base its environmental management program and decisions (NEMA, 1998). NEMA Section 2 lists 19 principles for applying the provisions of the act. Kotzé (2005) argues that the concept of sustainable development is “rooted” in Section 2 of NEMA. Kotzé adds that NEMA expands the definition of “sustainable development” to “integrate social, environmental and economic concerns into planning, development, and decision-making”. Sustainable development requires that all relevant factors are considered (Oosthuizen *et al*. 2018), but a certain flexibility is implied when applied to interpretations of environmental application and relevance and not all principles will come into play for every consideration. Section 2 can therefore be regarded as defining the necessary considerations that should be taken during initiation and implementation phases of any development that impacts the environment, or citizens that will be impacted by environmental related development (Kotzé, 2005).

A bank, like any other company, is required to adhere to the relevant environmental acts. Banks are subject to all relevant regulations within NEMA, as well as to other environmental laws, where applicable, but a few sections of relevance should be highlighted (Coetzee, 2013). The South African environmental legislation refers to certain principles that apply to activities that could impact the environment which are the precautionary principles, the polluter pays principle and the duty of care.

The NEMA principles stipulate that “a risk averse and cautious approach be applied, which takes into account the limits of current knowledge about the consequences of decisions and actions.” Other references to the precautionary principles are:

prevention of pollution and degradation of the environment,

(i) concerns for not disturbing natural habitats or causing biodiversity losses,
(ii) issues around generating waste,
(iii) issues pertaining to the disturbance of landscapes and cultural heritage sites, and
(iv) negatively impacting environmental rights

The polluter pays principles state the party responsible for the environmental harm is required to pay for remedying the damage. NEMA section 28(8) details these requirements for duty of care and remediation of environmental damage:

> (8) Every person who causes, has caused, or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.

In addition, Section 2(4)(p) of the NEMA states:

“The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.”

The National Water Act 36 of 1998 (NWA) section 19(5)(6):

> (5) Subject to subsection (6), a catchment management agency may recover all costs incurred as a result of it acting under subsection (4) jointly and severally from the following persons:
>
> a) Any person who is or was responsible for, or who directly or indirectly contributed to, the pollution or the potential pollution;

b) the owner of the land at the time when the pollution or the potential for pollution occurred, or that owner's successor-in-title;

c) the person in control of the land or any person who has a right to use the land at the time when-

   (i) the activity or the process is or was performed or undertaken; or
   (ii) the situation came about; or

d) any person who negligently failed to prevent –

   (i) the activity or the process being performed or undertaken; or
   (ii) the situation from coming about.

(6) The catchment management agency may in respect of the recovery of costs under subsection (5), claim from any other person who, in the opinion of the catchment management agency, benefitted from the measures undertaken under subsection (4), to the extent of such benefit.

Banks therefore carry a direct risk for compliance to NEMA and the Sector Environmental Management Acts (SEMAs) as it applies to several potential environmental impacts of its own operations. NEMWA Section 16, for instance, sets out the general principles for managing waste that, for a bank, would be applicable to paper, stationery, electronic, or other waste produced by banks.

The NEMA regulations also contain three sections of listed activities that require prior approval in the form of Environmental Authorisation (EA) from the relevant authorities prior to commencement of the activity. Failure to obtain the required EA, which will include other compliance stipulations like obtaining a water use license or adhering to certain rehabilitation requirements as part of approval, has resulted in prosecutions, as in the case against York Timbers.

York Timbers was found guilty of the illegal commencement of a listed activity. In York Timbers Proprietary Limited v the National Director of Public Prosecutions (2014) the company was fined R180 000,00. In addition, under The Prevention of Organised Crime Act 121 of 1998 (POCA), a confiscation order was issued against York Timbers.

In another case, BP South Africa was also prosecuted, and subsequently found guilty, in terms of The Environment Conservation Act, 1989 (ECA) and NEMA, also for the illegal commencement of listed activities.

Apart from environmental legislation that has a clear and direct implication for banks from an environmental risk perspective, there are other governance requirements that specify certain obligations to the bank for environmental related risks.

The King IV Report on Corporate Governance (Bruner, 2022), details specific environmental governance requirements for all companies. While adherence to King IV is voluntary, it is widely quoted by South African banks as a benchmark that they apply to their business (ABSA, 2022; African Bank, 2018; Nedbank, 2017; Standard Bank, 2018;). The SARB has also indicated that it supports the overarching goals of the King IV report (SARB, 2016).

Those banks that are listed, or owned by listed companies, are required to make disclosures about their environmental risks as part of the disclosure requirements of the JSE. Companies are required to measure, monitor, and report on the following:

Table 3 - JSE Environmental Disclosure Requirements (JSE, 2022)

Category	Sub-category	Description
Climate Change	Greenhouse Gas Emission	Expressed as metric tonnes of carbon-dioxide (CO_2) equivalent and measured in accordance with the Greenhouse Gas Protocol for: Scope 1, Scope 2, and Scope 3 emissions.
	Energy mix	Total energy use and share of energy usage by generation type
	Science-based targets	Define and report progress against time-bound short-, medium-, and long-term science-based GHG emissions targets that are in line with the goals of the Paris Agreement and Glasgow Climate Pact
	Just transition	Existence and nature of a "transition plan" that commits to stakeholder engagement with affected workers and communities
Water Security	Water usage	Total water consumption from all areas, and from areas with water stress.
Biodiversity and Land Use	Biodiversity footprint	Number and area of sites owned, leased, or managed, in or adjacent to areas of high biodiversity value in Key Biodiversity Areas (KBAs).
Pollution and Waste	Single use plastics	Report wherever material along the value chain is used: estimated metric tonnes of single-use plastic consumed and share (%) of single-use plastic weight of total plastic weight.
	Solid waste	Total weight of waste generated (non-recycled), with a breakdown by composition of waste, noting % directed to

		disposal (including landfill and incineration), and % diverted from disposal (e.g., reuse, recycling, recovery).
	Atmospheric pollution	Report wherever material along the value chain is used: nitrogen oxides (NOx), sulphur oxides (SOx) volatile organic compounds (VOC), persistent organic pollutants (POP), particulate matter, and other significant air emissions identified in relevant regulations.
	Water pollution	Total water discharge to all areas in megalitres, and list of priority substances of concern for which discharges are treated, including how these substances were defined; approach to setting discharge limits; and number of incidents of non-compliance with discharge limits.
Supply Chain	Suppliers	Report wherever material across the supply chain is used: mechanisms (e.g. supplier screening, and audits) to identify and address significant actual and potential negative environmental impacts, nature of these impacts, and measures to address these.
	Materials of concern	Process to identify and manage emerging materials and chemicals of concern in products (materials of concern could include conflict minerals or recognised high impact raw materials such as palm oil).

Through their own operations, banks face a compliance risk under NEMA, the SEMAs, as well as regulation supporting these acts. The reporting requirements imposed on banks also necessitate the need for active environmental risks management to satisfy, at the very least, the listing requirements of the JSE. It should also be considered that bank clients are subjected to South African legislation and regulations. Clients that are publicly trading companies, either in South Africa or elsewhere, will be subjected to similar environmental risk disclosure requirements and this has bearing on environmental risk considerations within banking, as will be shown in subsequent sections.

2.4 Linking environmental risk and banking

References to environmental risks within banking has seen a steady increase since 2008 and coincides with the use of several analogous terms, like environmental, social and governance

(ESG) risk, climate risk, climate-related risk, or climate change risk (Breitenstein *et al*., 2021). This is also observed outside banking where more companies in general have adopted some type of corporate environmental programme (CEP) in response to the need to proactively manage environmental risk exposure that can result in financial losses (Salama *et al*., 2011).

Banks significantly impact society in the role they play to make money available in the economy through loans, and how that money is applied for creating jobs, increasing output and other economic growth and developmental purposes (Beck *et al*., 2010). In addition, due to the role expected from banks to ensure the continued sustainability and integrity of the South African financial system, as regulated by the SARB's prudential requirements, the expectation is that banks can sufficiently manage all relevant risks that can impact their operating environments, including systemic risks. As mentioned, the Twin Peaks regulatory model was developed as a response to the 2007 – 2008 financial crises, which was seen as a failure by the banks to adequately make provision for taking on excessive risk (Brunnermeier, 2009; DeYoung *et al*., 2013).

In addition to the issue of excessive risk taking, there is the consideration of stakeholder interests when it comes to the impact that a bank has on society. This is in relation to the interests of non-shareholding stakeholders versus the shareholders of the bank, which can be regarded as being potentially in conflict between return maximisation for shareholders and managing secondary impacts to society (Di Tomasso & Thornton, 2020). Shareholder focused governance, it is argued, is more effective at optimising the allocation of resources because the market will ensure that the return is optimised (Barnea & Rubin, 2010). Any allocation of resources for considerations of social issues is non-optimal. By contrast, the stakeholder focused model also includes assessment of a firm's impact on the wider shareholders, like communities, clients, regulators, etc. Proponents of the stakeholder model argue that there is a positive correlation between improved ESG risk management capabilities and the financial performance of the firm, and the same is the case for banks. Ahmed *et al*. (2018) found in their analysis of banks in Bangladesh that each ESG score, based on their own ESG model, contributes towards 5.8% rise in return on total asset. They argue that more profitable banks are more conscious about ESG factors. Bauer *et al*. (2004) as well as Di Tomasso and Thornton (2020) have not found a link between ESG performance and bank performance. Studies have also been done outside banking to determine the relationship between company performance and CEP and ESG programmes. Studies conducted by Muhammad *et al.* (2015) and Verheyden *et al*. (2016) show that CEP and ESG screenings decrease the risk of losses for shares as well as share portfolios linked to companies with CEPs or ESG models in place. In terms of risks linked to climate change, studies by Huang (2021) and Nguyen (2018) indicate that companies with higher risk to climate change and climate change related risks, experience more volatility in their earnings and cashflow, and have increased probability of losses, respectively. These studies indicate that there are financial benefits to incorporating environmental risks into businesses generally, as well as into banks specifically.

The NGFS (2019) defines environmental risk as the risk of financial losses due to exposure of financial institutions and / or the financial sector to activities that may potentially cause or be affected by environmental degradation (such as air pollution, water pollution and scarcity of fresh water, land contamination and desertification, biodiversity loss, and deforestation), environmental events (floods, droughts, or cyclones), or trends related to environmental issues (like shareholder activism, signing of the Paris Agreement, or environmental risk disclosure requirements). The NGFS also describes how environmental risks could cascade to risks for the financial sector and use the example of how reduced availability of fresh water could disrupt supply chains, as was the case with the 2022 droughts in Europe (Maritime Gateway, 2022) where waterways dropped to such low levels that cargo ships could not navigate rivers. More relevant to South Africa is the interruption of supply chains due to the floods in Kwa-Zulu Natal (Bloomberg, 2022). The knock-on (cascading) effect of the floods in the banking sector, is disruption to supply chains. This will impact borrower's ability to pay back loans, leading to credit risks for the bank. In addition, where the bank had approved loans to other clients, like for vehicles, non-delivery of those vehicles to the clients due to supply chain issues, will prevent the loans from paying out, and the bank will not be able to earn interest income.

Environmental risks can be classified using different taxonomies. Case (1996), Thompson (1998) and Wanless (1995) all agree on the categories of direct risk; indirect risk; and reputational risk, defining these as follows:

- Direct risks: environmental risks faced by banks due to their own operations. These include the NEMA compliance risks mentioned in Section 2.3, environmental impacts due to bank's own operations, like waste, as well as exposure to environmental events, like floods that can impact bank operations.
- Indirect risks: banks are exposed to these through their role as intermediaries and include all potential financial losses due to environmental related issues. This is a broad category of risks that cover bank risks, defined in Section 2.1, like credit risk, market risk, etc. The transfer channels between environmental issues and these risks are further explored below. Please refer to Figures 1 and 2 for an overview.
- Reputational risks: In this taxonomy, reputational risk due to environmental risks is separate and is defined as losses due to market perception. Most commonly this translates to actions by activists and depositors that reduce bank profitability, either due to business loss, or the bank paying a premium on capital to account for the increased risk. The existence of the King IV standard for corporate governance, as well as the JSE

disclosure requirements mentioned in Table 3, should be seen as attempts to manage the reputational risk due to, amongst others, environmental risks.

Environmental risks are also reciprocal: the impacts of banks' activities result in environmental impacts that in turn feedback as risks to the bank. This is known as the inside-out / outside-in perspective of environmental risks (Ives, 2020; Vitale *et al.*, 2019). These risks operate at different levels of impact, and the relevant risk responses scale in scope and complexity as the scale and complexity of the environmental risk increases, as will be shown in the following sections.

An analysis of local banks' ESG and TCFD reports show that banks either have, or are in the process of, implementing an integrated Environmental Management System (EMS); in all instances the EMS also include the Social and Governance aspects as well, and those regulatory compliance requirements specified in section 2.3 would also be tracked within the EMS. Different banks use different terminologies; Nedbank refers to the system as the group Social and Environmental Management System (SEMS) (Nedbank, 2021), whereas First Rand Bank refers to the system as environmental and social risk management system (ESRA) (FirstRand, 2017). Standard Bank uses the term environmental and social management system (ESMS) (Standard Bank, 2021), Investec uses EMS (Investec, 2021), whereas Absa was still in the process of implementing a group-wide EMS (Absa, 2020). Evaluating available reports from these banks, it is possible to describe a generic approach to environmental risk management employed by these banks.

The scope of environmental and sustainability risks under consideration for banks are represented by figure 1.

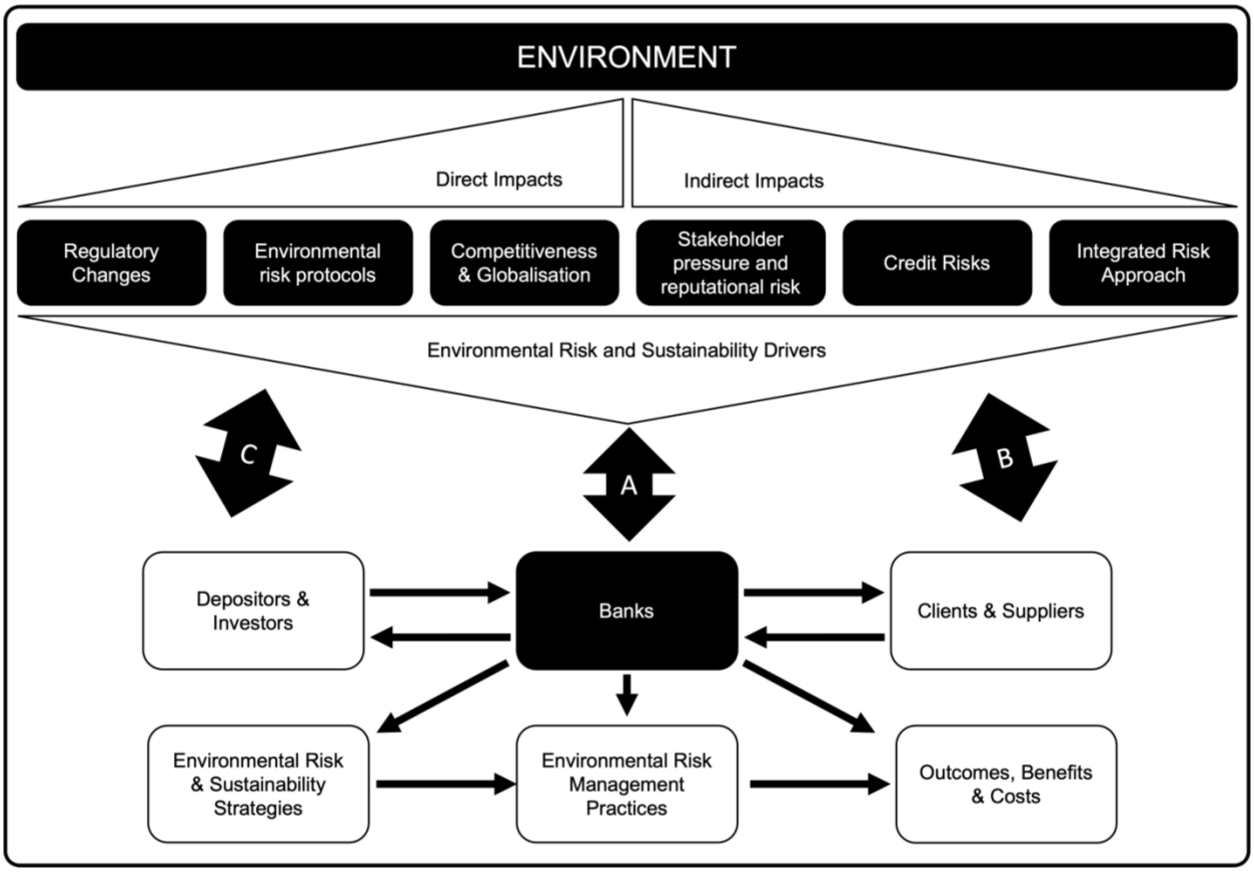

Figure 1 Environmental & Sustainability drivers (adapted from Dlamini, 2010)

Figure 1 illustrates the way in which environmental impacts have bearing on the drivers of environmental risks:

- Economic activity creates environmental impacts in the form of water and air pollution, industrial and household waste, habitat loss, soil degradation, ocean acidification, and climate change. These environmental impacts are linked to the detrimental outcomes for society i.e., reduced health outcomes (Aucamp, Retief & King, 2018), reduced agriculture output (Meyer *et al*., 2018) and climate change effects like floods and droughts (Gilder & Swanepoel, 2018).
- Direct impacts include floods, pollution, industrial hazards, health impacts and the physical effects of climate change, like rising temperatures and increased occurrence of droughts. Indirect impacts are the secondary impacts that are triggered by the direct impacts. These include regulatory changes, transition risk, credit risk, stakeholder pressure, global competition, as well as the requirement to adopt environmental risk protocols and an integrated environmental risk approach.
- The following diagram indicates how banks transfer the risk from their suppliers and clients onto their depositors and investors, but also how pressure for change from depositors and

investors impact both banks and their clients to incorporate C&E risk principles into their businesses.

Within the bank, these direct and indirect risks can, in turn, be linked to the different risks that were defined in section 2.1, as illustrated in figure 2.

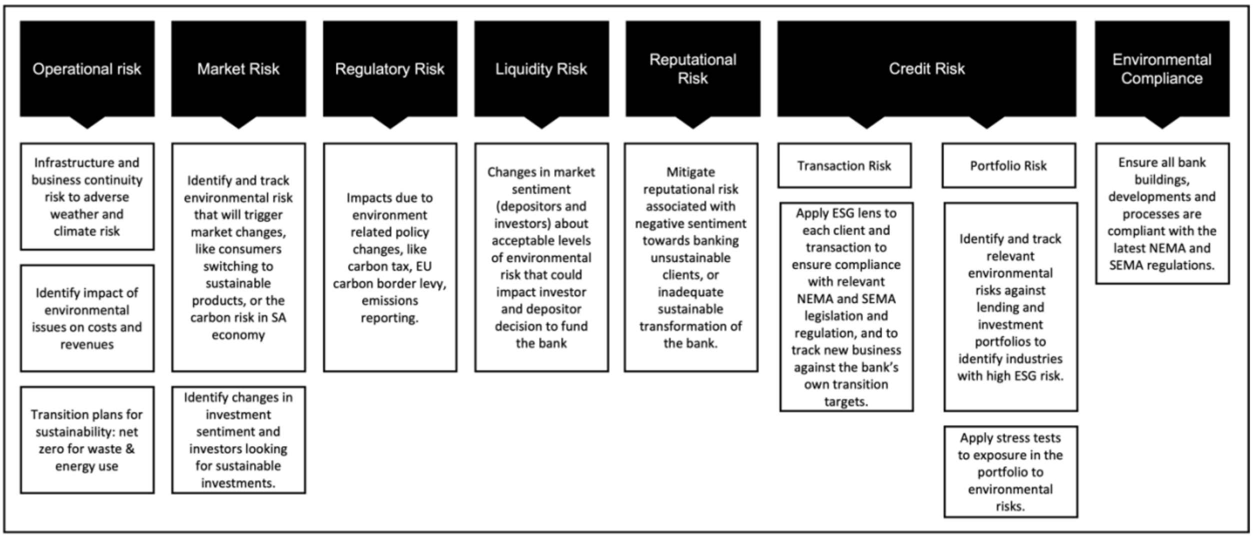

Figure 2 - Environmental risks and descriptions (adapted from FirstRand (2021b))

Figure 2 gives a concise view on the very specific mechanisms whereby an environmental risk becomes a financial risk. These risk pathways also align with the risks to the financial services sector that emanate from climate and environmental risk as recognised by National Treasury (National Treasury, 2020).

Strategically and operationally, banks enable the holistic and integrated management of environmental and climate risk across the whole organisation, taking into consideration where in the bank the risks are best managed. Each of the risks in Figure 2 needs to be managed on a continuous basis. A typical model for this is shown in Figure 3 – an integrated enterprise environmental management framework (EEMF). The ambiguity with the use of the concept "environmental management framework" needs to be pointed out. Within the context of NEMA, an environmental management framework (EMF) is one of several environmental management tools and the EMF's purpose is to provide strategic guidance about suitable developments for specific areas, considering the nature of the environment for the area, or region, under consideration (Nel & Alberts, 2018). In contrast, banks classify their environmental strategies, systems, structures, resources, processes, and protocols collectively as an EMF. To avoid confusion, this study will refer to the frameworks internal to an organisation as an Enterprise EMF (EEMF).

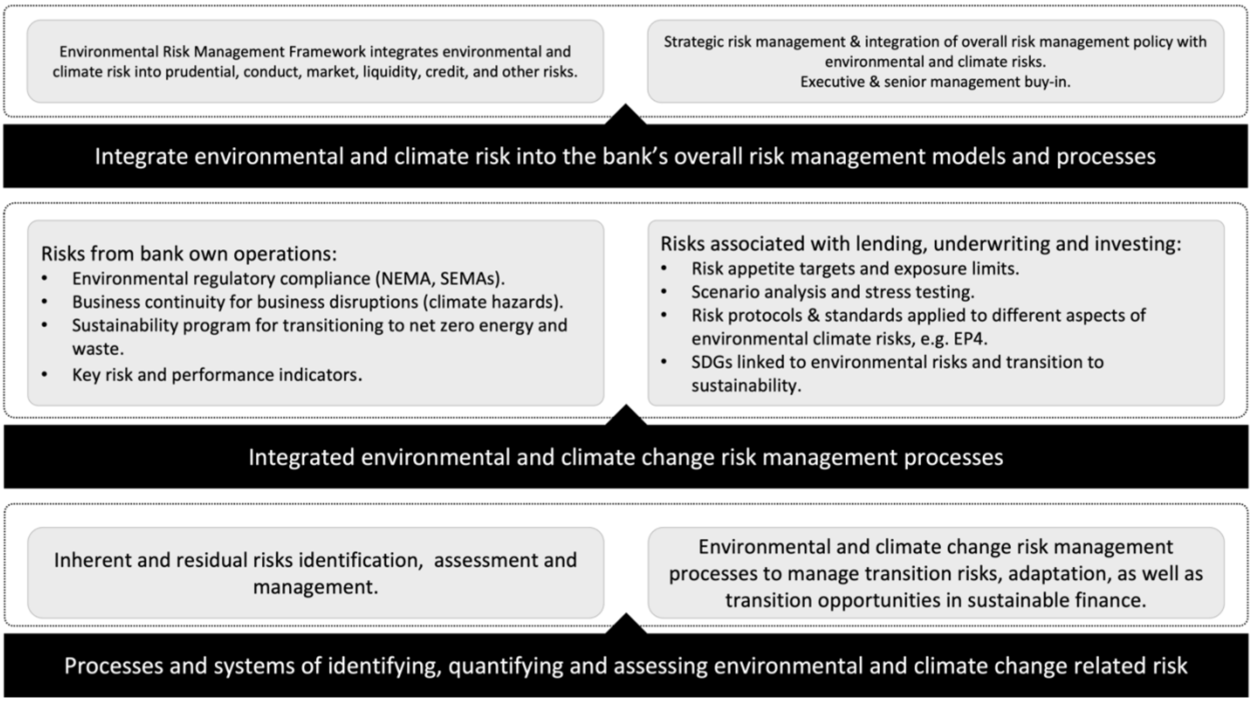

Figure 3 – Integrated Enterprise Environmental and Climate Risk Management Framework (adapted from Nedbank (2021)

The EEMF describes the scope of environmental risk within the bank. It gives a high-level description of the model used to bring environmental risk into financial risk considerations showing different levels of detail in the process, as well as the key considerations within the processes.

The following section will apply this model to credit risk.

2.5 Environmental risk considerations in credit risk

Banks, through their role as financial intermediaries, assume part of the risk of the clients and markets they serve (Wright, 2012). While this risk can manifest in various ways, for purposes of clarification, we will focus on credit risk, i.e. the risk of financial losses due to issues associated with lending (Faure, 2013). In addition, banks also have a regulated prudential obligation to ensure that they remain sufficiently liquid and hold sufficient capital to conduct its business prudently, and that it furbishes the market with financial products in a manner that does not undermine the financial stability of the financial system (SARB, 2021). This places a regulatory obligation on banks to conduct their lending practices in a way that firstly, is in line with a set of principles aimed at protecting their clients, and secondly, adheres to certain principles that aim to protect the financial system as whole.

There are several reasons why banking exists, but the main purpose, as set out by the Bank of International Settlement (BIS) is to efficiently link borrowers to savers (Tarashev, 2009). A bank intermediates between those two parties, hence the term financial intermediary. It is of course relevant to point out that, except for specific types of deals, the lender and borrower will not be known to each other. Instead, a bank aggregates all deposits into a deposit portfolio, which forms the basis of the liquidity against which the bank can issue loans. In addition, and very relevant to this study, is the expectation of the depositor about how the funds are used, something that will be discussed in due course.

Depositors could lend to borrowers directly and bypass banks. However, the depositor might not have the same ability to discover and evaluate relevant information about the lender to make an informed decision about the risk of non-payment (Faure, 2013). The lender would not be able to quantify the probability of non-payment, or the loss, should non-payment occur. This is due to information known by the borrower, but unavailable to the depositor, which is known as information asymmetry: two parties to a transaction do not have the same information about a transaction (Faure, 2013). This leaves the depositor at a disadvantage to assess the risk effectively (Faure, 2013). By intermediating between depositors and lenders, banks remove the information burden from the depositor and de-risks the depositor's decision by taking on the deposit instead (Brown & Moles, 2014).

On the lending side of the transaction, the bank still needs to decide who can borrow the money, and under what conditions. A generic decision-making model for credit extension, as shown below, will generally identify certain conditions that need to be met before credit is extended. The important point is that the decision by the bank to approve a loan is based on a calculated risk (Brown & Moles, 2014):

Table 4 - Six Conditions for extending credit (Brown & Moles, 2014)

Condition	Description
1. ***Character***	*The character of the borrower* This considers the character traits of the borrower, and attitudes about repayment obligations. These can also be covenants, terms and conditions linked to the lending agreement. A loan covenant is a condition set by the Bank on the borrower. A common example is that the borrower is required to take out insurance to cover the loan amount in case of an adverse event, like theft, or a flood.
2. ***Capacity***	*The capacity of the borrower* This is evaluated through the past track record and success of the borrower and is regarded as a predictor of repayment.
3. ***Capital***	*The borrower's capital*

	This evaluates the financial condition of the borrower; the greater the lender's net worth or own capital, the lower the risk to the bank.
4. *Collateral*	*The collateral or protection available from the borrower.* Some loans are conditional depending on the availability of collateral. Collateral can be defined as a tangible or intangible asset that a bank can seize to repay a loan should the borrower become unable to service the loan (Florêncio & de Alencar, 2020). The bank is still required to ensure that the borrower can afford (i.e., pay back) the loan even if collateral is available. Where collateral is held against the loan, the certainty with which the bank can utilise the asset to cover the loan is of importance. This certainty refers to whether the asset will still have sufficient value, or still exist, in case the bank needs to foreclose on the loan.
5. Conditions	*The conditions that affect the credit's performance* The macroeconomic and local business conditions that have a bearing on the credit's performance in the future are considered. A region, industry or product type that is in a decline stage will result in declining future revenues and increase the risk of defaults on loans.
6. Compliance	*Both the bank as well as the borrower are required to adhere to regulatory compliance.* This reviews the legality of the credit agreement and the adherence to the regulations and laws pertaining to the credit situation. Banks are typically governed by prudential and conduct regulations. Prudential regulations stipulate the liquidity and capital adequacy requirements for banks, whereas conduct aims to protect the interest of bank clients. The borrower is required to have the necessary permits, approvals, and licensing in place to ensure the purpose for which the loan is required, is allowed.

Assuming the bank is satisfied with these conditions, the next step is to price the loan. Price is a function of risk (Black & Scholes, 1973; Moles, 2013; Sharpe, 1964). In the context of lending, the bank will charge a higher interest rate for a loan that is deemed a higher risk. As part of the bank's disclosure requirements for the JSE, the TCFD and the micro-prudential CAR, the consequence for the bank is that the higher risk loan will require more capital reserves, and this impacts investor relations.

However, the ability to price for risk, presupposes the ability to determine risk (Moles, 2013). Based on the efficiency, transparency and maturity of a specific market, the market will place different levels of trust on its ability to score a particular risk (Moles, 2013). Moles (2013) offers this classification of risks, based on knowability and measurability:

1. Risks that are both known and measurable: these risks can be discovered and quantified. Sufficient information is available to develop risk assessment and statistical models to make certain predictions about future outcomes, which allows for more efficient pricing. The prudential and conduct regulations that banks are required to adhere to, would want financial risk decisions to be made within this context.
2. Risks that are known but still unmeasurable: The inability to measure the risk is due to insufficient information about the risk's cause and effect.
3. Risks that are unknown and unmeasurable: These are risks that have not manifested yet, are not perceived, and are therefore not considered by the market when setting a price. If considered in the context of lending, this is a risk that can operate at the level of a transaction, a company, an industry, or a whole economy. The risk is linked to information that could not be discovered and evaluated, or was deliberately hidden during the credit approval process.

Banks issue loans based on risks that can be estimated, within a certain range of uncertainty.

1. **Price is a function of risk**. In conditions where risk cannot be accurately determined the price-setting abilities of the market is undermined. Banks have processes and systems that bring together all relevant information for a loan to a particular borrower within a particular market condition. An accurate assessment of the risk will enable the bank to decide:
   a. if a loan should be approved or not, and
   b. at what price
2. **Being able to evaluate risk is a precondition to issuing loans**. In conditions where risks cannot be assessed, banks should not extend loans. The corollary to this condition is that if new information emerges that makes historic loans unfeasible, banks should cease to lend into that market.
3. **New information about risks become available**. The prudential obligation placed on banks necessitate the adoption of new information in the risk assessment model, which will impact risk pricing and loan affordability.

As shown in this section, information is required to price risk, and the quality of that information impacts on the ability to effectively estimate the price risk.

There are several ways in which environmental risks identified during the credit process transfer as financial risks to the bank.

Some of the conditions extending credit (table 4), can be linked to specific environmental risk considerations:

- **Condition 4, Collateral**: in a scenario where the loan is guaranteed by the backing of collateral, the bank's interest on the collateral is to ensure that the value of the collateral remains sufficient to cover the loan. Environmental risks that can impede the value of the collateral, could be environmental hazards linked to past use of a property. Land previously used for a petrol station could suffer from contamination and this information should ideally be discovered prior to making the lending decision.
- **Condition 5, Conditions**: banks have already indicated their reluctance to fund more coal fuelled power stations due to the perceived environmental risk (Ngcuka, 2021). Another example could be agricultural clients exposed to climate change related droughts. Where the whole industry is exposed to emerging environmental risks, the risk also becomes a market risk. The changes in market conditions therefore alter a bank's appetite for lending to a particular industry, or market.
- **Condition 6, Compliance**: The compliance with environmental regulations is regarded as non-negotiable, as stipulated in the EP4 requirements.

Credit risks are considered at transaction level, as well as at portfolio level. Within the risk framework, risks are classified into tiers according to their perceived severity of impact; each bank will use its own tiering model, like category A, B and C, or level 1, 2 and 3 risks, but the underlying methodologies between the banks share many similarities which allows for a generic model to be drawn up.

Each transaction and client, as part of the application process, will then be categorised by the perceived risk level.

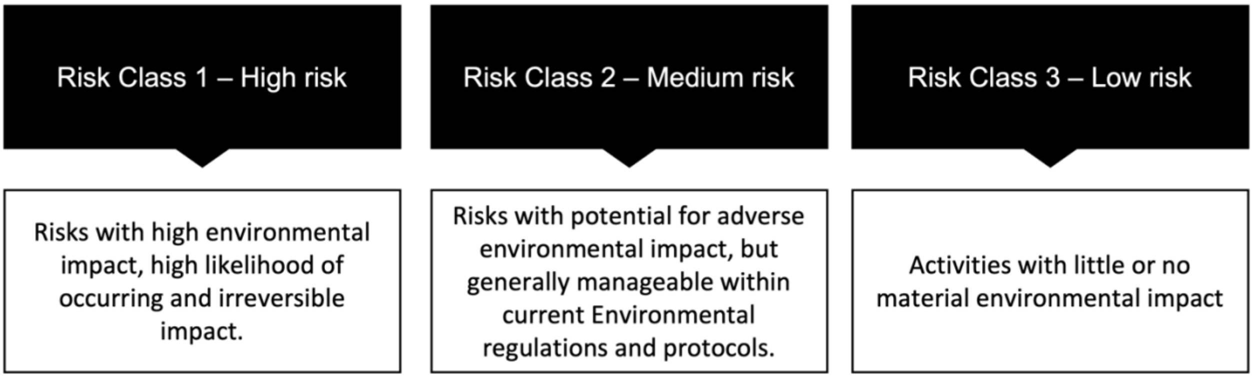

Figure 4 - A typical classification of risk levels used in banking EMS (Nedbank, 2021; Investec 2021)

The process for approval of individual deals is managed through the EMS system, as indicated in Figure 5.

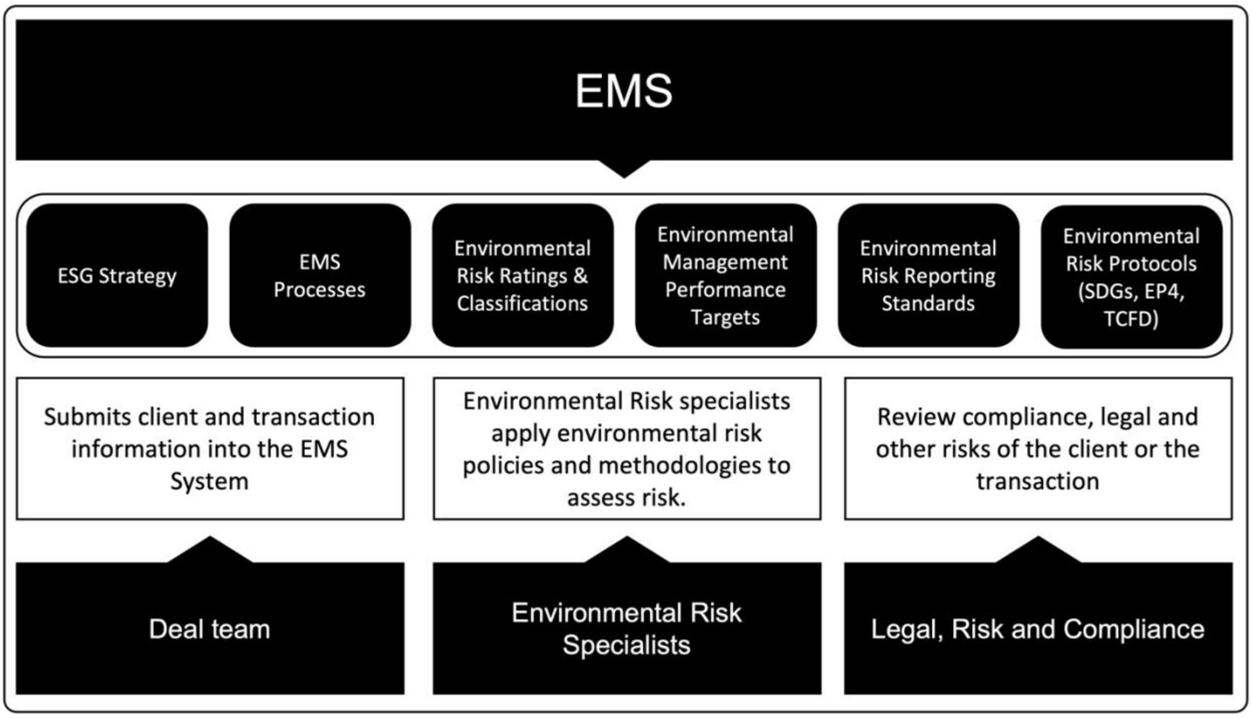

Figure 5 - Integrated EMS Model (FirstRand, 2021b; Nedbank 2021)

The function of the EMS is as follows:

1) The EMS system operationalises the environmental risk management strategies and policy.
2) Processes for new applications, data input requirements, assessment requirements, performance management, reporting standards, and international protocols are contained inside the EMS model.
3) The deal team consists of the person, or persons, that engage with the client and are required to compile the information required for assessment and submit the information into the process.

4) Depending on the risk level, the review, assessment, and approval process will require less or more input, expertise, seniority, to review and approve. Risk class 1 will therefore require more scrutiny than risk class 3.
5) Environmental regulatory compliance of the borrower is non-negotiable. Borrowers are required to submit evidence of compliance in the form of the relevant environmental authorisations, certificates of compliance, and audit reports before the transaction will be considered.
6) The environmental risk and impact of individual clients and transactions are measured against the bank's risk acceptance criteria that include the geographic distribution of the client, the industry of the client, as well as the bank's own policy for specific kinds of industries. The EMS system will maintain the thresholds for environmental risk exposure that a bank is prepared to accept for a particular environmental risk type. As mentioned previously, some banks have already announced that they will not fund new coal power plants due to the perceived high risk of exposure to that industry.
7) The EMS is linked to the environmental and climate change risk management framework, as set out in figure 3.

This model described above, shows how banks have operationalised direct and indirect environmental risks to manage and mitigate against financial losses due to impacts associated with these risks.

2.6 The role of the funding mechanism in climate risk response

The previous sections have dealt with banks' approaches to managing environmental risk. The focus now turns to the role banks are expected to specifically play in transitioning to a model where environmental and climate risks are addressed through funding and supervisory levers.

The wide ranging impacts of climate change is expected to have significant impacts across numerous economic drivers that could materially impact an economy's ability to develop, or even just maintain current production levels (Anvari *et al*., 2022). These impacts include macroeconomic impacts on energy costs, pricing of externalities, or demands for more energy efficient products and services, declining productivity of labour due to increased mortality and morbidity, or migration of people to avoid climate change impacts (Bolton *et al.,* 2020; Dell *et al*., 2014, Deryugina & Hsiang, 2014; Fankhauser & Tol, 2005).

The South African response to climate change includes the proposed Climate Change Bill; South Africa's signature of the Paris Agreement on climate change; the establishment of the Presidential Climate Commission (PCC) Just Transition framework; National Treasury's technical paper on Financing a Sustainable Economy (National Treasury, 2020); as well as South Africa's National

Climate Change Response White Paper (NCCRP) (Department of Environmental Affairs [DEF], 2011).

Climate change response is typically classified into three categories, adaptation, mitigation and transition (NCCRP, 2011).

Adaptation	Adaptation refers to strategies that will enable South Africa to cope with those climate change realities that have already become inevitable. This is aimed at immediate benefit and reduced impact of climate change (Gilder & Swanepoel, 2018). The NCCRP sets out possible long term adaptation scenarios (LTAS) that aim to estimate the scale of climate impact across the country, like estimating changes in average and maximum temperatures, rainfall patterns, as well as flood risks, drought risks and other extreme events.
Mitigation	Mitigation strategies include all activities undertaken to reduce the reliance on a carbon intensive economy, and to implement strategies across all sectors to arrive at a nett zero carbon emission state, within a targeted time-frame. In addition, mitigation also considers carbon sequestration possibilities. The primary aim of mitigation is to target GHG emissions and include carbon taxes, decommission coal powered power stations and to add renewable energy capacity.
Transition	The transition strategies consider the secondary impacts of the mitigation strategies. As the country and the world transition to a low carbon economy, there will be an impact on all industries built around the fossil fuel value chain. Regions and towns, employees and suppliers to the coal industry will be impacted by this transition. In addition, all adaptation, mitigation and transition strategies need to be funded.

National Treasury's technical paper on Financing the Green Economy sets out the ways in which banks will be impacted by the proposed adaptation, mitigation and transition risks and strategies to manage these risks. One of the challenges identified is the lack of sufficient published information to accurately assess banks' current financed risks (National Treasury, 2020). Financed risks are those climate and environmental (C&E) risks that banks are exposed to through lending practices. In order for authorities to accurately assess C&E risk, National Treasury proposes minimum requirements for sustainable finance, including long-term climate strategy and portfolio level risk management during supervision programmes. In addition, banks need to be consulted on international regulations, such as non-tariff barriers to trade, that may be a consequence of South Africa not moving fast enough to reduce the carbon-intensity of its energy system. C&E risk management policies and strategies, GHG emission reduction targets, methodologies and performance data using international standards for disclosure frameworks and science-based methodologies are required. Alignment between banks' climate risk management policies and strategies with South Africa's international climate commitments, is also required.

Additional prudential regulations will see banks incorporate climate risk in their Basel III risk calculation and measurement (SABR, 2021), with consequential impact on the bank's CAR. There are also arguments to change the risk ratings in favour of "green" assets to serve as a price signal to the market, but issues remain for the accurate estimations of green asset risks (Bolton *et al*. 2020; Carney 2015). The TCFD framework requires reporting on climate related disclosures on four spheres: governance; strategy; risk management; and metrics and targets (TCFD, 2017). As the adoption of TCFD disclosures become more common, the evaluation by investors on the potential risks associated with a bank, will also become more common, effectively driving access to capital downwards for banks with higher climate risk exposures (Krogstrup & Oman, 2019).

The UNEP_FI has also proposed certain amendments to BASEL III to incorporate additional environmental risks into the prudential management framework (Alexander, 2014).

The risk from future regulatory requirements to mitigate climate and environmental risk will impact clients and markets serviced by banks (Degryse *et al*., 2020). One of the key challenges with the future of environmental risk management within banking, relates to the uncertainty around how regulatory changes will create market risks for certain companies and industries (Batten *et al.*, 2016; Campiglio *et al.*, 2018).

The study conducted by Degryse *et al* (2020). aimed to establish a link between prospects of future regulatory risk and credit risk pricing. Their study determined that, while there is a noticeable increased cost of lending to companies with higher environmental risk exposure, the cost is not yet sufficient for these companies to embark on aggressive mitigation strategies. They ascribe this lack of action to a gaming effect: in the current economy it can be assumed that all firms face future market risk, due to expected mitigation costs, and the motivation for changing towards lower environmental risks is made redundant due to the lack of peer pressure to adapt. Their study has also shown that the adoption of the Paris Agreement raised public awareness of the materiality of climate risk and that this awareness is a contributing factor to the price differentiation. The conclusion that can be drawn, is that firms without sufficient environmental risk mitigation strategies, will face increased cost of capital due to the perceived risk.

The need to accurately determine the cost of environmental risk, stem from a bank's responsibility to be able to price risk effectively. In addition, the expectation that the funding mechanism can be used to transition to sustainable business models, assumes the ability to sufficiently verify the "greenness" of one particular client, or transaction, over the next (Degryse *et al*., 2020). There is, however, already ample evidence that the environmental risks are impacting financial decisions across a broad spectrum of scenarios. Degryse *et al.* (2020), reference several examples:

- Krueger *et al.* (2020) have shown that investors price environmental risk into their decisions.
- Javadi and Masum (2021) provide empirical evidence that firms in geographic locations with higher climate change risk already pay premiums for loans.
- Nguyen *et al.* (2021) have shown that banks charge higher interest rates on mortgages for properties with increased exposure to risk of sea-level rise.
- Chava (2014) documents that firms with environmental risks pay a higher loan spread and receive loans granted by syndicates with fewer banks.

Williams (2020) argues that the inability to accurately price for climate risk and its environmental risk impacts is a form of market failure and can partly be ascribed to the inability of the market to incorporate the long-term aspects of environmental risks into the short-term nature of financial decisions. This scenario where the price does not include the true cost of a product or service results in the diminished utility for society. Several attempts have been made to quantify this negative effect. Thopil and Pouris (2010) consolidated findings from three different studies on the electricity externalities in South Africa:

Table 5 - Environmental Externalities from Electricity (Thopil & Pouris, 2010)

Study	**Inflation adjusted externality (2006, ZAc/kWh)**	
	Coal	**Nuclear**
Dutkiewicz and de Villiers	3.23	0.90 – 2.76
van Horen	6.99 – 39.07	10.41 – 35.40
Spalding-Fecher and Matibe	2.73 – 18.12	-

Thopil and Pouris (2010) found that the externality estimates vary significantly between different studies and can be attributed to inconsistent methodologies used to quantify the cost externalities, which is a common draw-back of using a purely quantitative model for pricing externalities (Kallis *et al*., 2013).

The challenge of accounting for externalities is widely recognised (Bellver-Domingo *et al.*,2017; Nguyen *et al*., 2016; Tsur, 2020), but there are several reasons why this is necessary:

- Estimating the lifecycle cost of a production plant, or a power station, or a housing development that includes the cost of cleaning up pollutants, carbon emissions, and other environment damage, will give a true reflection of the value that the project adds to society, including both positive as well as negative contributions.
- Adding the cost of externalities to the final product for service will give a price difference between products that are more sustainable, and thereby increase the use of sustainable products and services. This uses a market-based mechanism to drive consumer choice towards sustainable products and services
- Bringing the true cost of the environmental damage onto the books of the company that creates the damage, will give a true investment valuation of that company, moving investment funds to other, more sustainable, investments.

South Africa's Carbon Tax Act 15 of 2019 sets a price of the rate of tax at R134 per ton of carbon dioxide equivalent to the greenhouse gas emissions. Another example of such a tax is the Border Carbon Adjustment (BCA), which will be levied on imports into a country or jurisdiction where the BCA applies (Keen *et al.*, 2021), which is expected to impact South Africa's global competitiveness due to South Africa's highly carbon intensive economy. Globally, South Africa is the 12th largest emitter of carbon dioxide (CO_2), and emits nearly 50% of all CO_2 in Africa (National Treasury, 2010). While the specific risk of a particular product, project or company is therefore difficult to quantify into an "true" cost as measured in environmental impact, the relative risk to South Africa, when compared to other countries, means that the South African market carries a higher environmental risk, as measured in carbon risk, than countries with less carbon-intensive economies.

The existence of negative environmental impacts is due to what is described as the market failure to effectively price these impacts into the goods and services produced by economies. These negative impacts can be described as indirect costs that are borne by society, and not by the producer of the goods. Externalities are the spill-over impact of economic activity that manifest as indirect benefit or harm to society. The costs and benefits of externalities are not accounted for within the entity that created the goods or services. The theory of externalities was first postulated by Alfred Marshal in 1890 (Sandmo, 2015) as part of his Principle of Economics (Marshall, 1890). Externalities are economic spill-over effects from economic activity and can either be positive or negative. Stated in another manner, negative externalities are costs carried by society for environmental damage, and the market price for the associated goods or service do not reflect the ”true” costs to society of externalities are included in the price (Nguyen *et al*., 2016). The buyer of the product or service does not pay for that environmental cost and the cost remains external to the product or service. The producer of the product only incorporates internal costs as input to the product or service, like energy, labour, raw materials, financing costs, etc. (Field & Olewiler, 2005). At a micro-level the spill-over is the level to which neighbouring businesses and communities benefit or suffer from the economic activity of a particular business or industry (Sandmo, 2015). The concept of an externality is the difference between the private and public / social costs or benefits of a particular product, process, company, or industry (World Bank, 1998). Arthur Pigou, in The Economics of Welfare (1929), and A Study in Public Finance (1928), further expanded on the concepts of economic externalities. Sandmo (2015) elaborates this concept using Pigou’s own example of a coal fired power station. Because the power station underestimates the social cost of its pollution, it has an incentive to expand its operation to maximise profit, which comes at the expense of the public, who bears the cost of deteriorating health as well as increased expenses of healthcare. The private cost is represented by the accounting value of the cost, as it is accounted for by the private entity, e.g. the power station, that bears the cost directly; whereas the public cost represents a negative utility transferred to society that is borne as a variety of negative impacts in the form of poor air quality and deteriorating health outcomes.

Pigou (1929) also suggested that governments should tax polluters with an amount equivalent to the cost of the harm to others. Such a tax would yield the market outcome that would have prevailed with adequate internalisation of all costs by polluters. By the same logic, Pigou agues, governments should subsidise those who generate positive externalities, with the amount that others benefit from.

Pigou discusses the ethics of economics based on welfare, which is he defines as the benefit of the economic activity to society. The benefit can be economic, or societal, meaning that the welfare output economic activity, can be limited to economics, or expanded to the whole of society (Pigou, 1929). A challenge arises when welfare is measured, because, while the economic benefit is clearly accounted for in the books of the company, the net benefit to the wider society cannot always be determined. It is then assumed that, if there is a net gain in economic welfare there is necessarily a net gain to society. This reality of total welfare gain remains untested, and it is presumed that the burden of proof to verify that the assumption was incorrect and that there is in fact a net loss to society, lies with society. This unaccounted loss is the source of economic externalities.

Externalities emerge, at least partly, because of imperfect information and asymmetric information within a market (OpenStax, 2016), and are the results of an imperfect market. Information imperfection is the real-world phenomena of just not having all the correct information available to make a decision that has economic impact (Stiglitz, 1989; Hoff, 1991). Asymmetrical information is the scenario where one party possesses more economic information than others and this allows for prices to settle at a non-equilibrium level (Keyun, 2019; Löfgren *et al.*, 2002). In the previous section the concept of information asymmetry was used where a depositor could not accurately assess the risk of lending directly to a borrower and the bank intermediates to overcome that asymmetry. As also mentioned above, risk determines price. As better or more information becomes available to the market participants, the price of the product or market will shift to a more accurate reflection of the market value. This neo-classical economic theory suggests that if externalities did not exist, free and perfectly competitive markets would be sufficient for economic efficiency and maximizing social welfare (Asquer & Krachkovskaya, 2021). This also becomes areas of regulatory intervention, like legislated air quality standards and criminalisation of non-compliance.

As mentioned before, Degryse *et al*., (2020) have determined a positive relationship between price and signalling of future cost burdens aimed at mitigating environmental risk. In addition to the market reacting to possible future risks, direct climate and environmental risk regulations are being proposed by local and international bodies, including the SARB (Anvari *et al.*, 2022); The Fed (Brunetti *et al*., 2022); and the PCB (Macaire & Naef, 2021). The proposed regulatory changes are aimed at creating sufficient visibility of future C&E risks through mandatory disclosure requirements for each bank's exposure to the C&E risk. In addition, the regulations are expected to prescribe additional capital requirements for banks as part of their CAR in an attempt to increase the resilience of the banking sector to climate risk. This increased reporting requirement will also become necessary for the markets served by banks, in order for each bank to comply with the new regulations.

There are, however, challenges related to the long-time horizons and uncertainty of systemic climate and environmental risks that will have bearing on the future of environmental risk management in banking. Banks face a conflict between short term profit and long term sustainability (Kay & King, 2020), and the different regulatory interventions to address C&E risk is internally contradictory, as well as being at odds with other factors that are at play. The climate risk response requires banks to shift more funding towards "sustainable" projects, based on a supporting factor that will give banks capital relief for sustainable projects (Ford, 2018). The argument is that businesses' reliance on bank finance can be a leverage mechanism to pursue sustainability, and that green funding is incentivised through lower capital cost (Coleton *et al*., 2020). In addition, the market is signalling its lower appetite for environmental risk through the pricing mechanism, and higher environmental risk industries and projects are required to pay premiums for funding (Huang, 2021). Whereas "sustainability" is well defined as an outcome, it lacks operational specificity, which leaves a substantial margin of error when decisions are being made when allocating funding, or setting a risk-based price to fund a specific project, client, or sector based on a nebulous concept of sustainability. The extent to which the funding mechanism can be used to achieve sustainable development is therefore constrained. There exists a contradiction between the stated objective of using the funding mechanism to pursue sustainability and the actual ability to measure and quantify sustainability and attempts to utilise the funding mechanism to shift towards sustainability would require this conflict to be resolved.

2.7 Chapter summary

In this chapter it was shown that environmental risk considerations are widely adopted within South African banks, but that there is also increasing pressure for banks to increase the scope of their environmental considerations to further reduce the funding of projects and industries within higher environmental impacts.

The imperative for banks to adopt environmental considerations is linked to several factors. Firstly, banks track their direct environmental risks through own environmental compliance, in line with South African regulatory standards. In addition, banks have set themselves targets for reducing their direct environmental impacts, typically through targeting nett zero energy use and waste generation. Additionally, banks face direct environmental risks through disruption of their operations as a result of environmental events, like flooding.

Secondly, as financial intermediaries, banks are exposed to risks in the markets they serve, including environmental risks that emanate from their operating environment. These indirect environmental risks are transmitted to banks through several channels and manifest as those typical risks that banks are generally exposed to, like credit, market, operational liquidity, or reputational risks.

Thirdly, there is an obligation on banks to play a role in the continued stability of the banking sector. The requirement to make provision for stresses to the banking system, is an implied sustainability requirement within the South African environmental management regulatory framework. The growing emergence of environmental risks on the other hand, are creating systemic risks to the financial system which will result in more scrutiny being applied to environmental risks. This is reflected in the way the SARB is moving towards the application of environmental risks to the Basel III model, and the concurrent requirement for environmental risk methodology to be improved for better risk assessments by the banks.

Finally, banks are expected to play an increased role in the various climate change responses of adaptation, mitigation and transitioning. The two main drivers for banks’ role in climate and environmental risk response are firstly due to the financial intermediation role that allows banks to funnel funding towards sustainable, or non-sustainable projects and companies, and secondly due to the systemic risk that climate risk is posing to the banking industry.

Due to the existence of market imperfections in the form of information asymmetries and information imperfections, as well as due to the long-term nature of environmental risks, the financial market has been unable to effectively price risks into financial decisions. The extent to which this will change will be determined by regulatory changes. Despite the absence of mandatory environmental risk management standards, banks already incorporate environmental risks as a competency across their businesses, using several protocols like EP4, TCFP, the JSE reporting standards, to name some. Environmental risks are managed through EEMFs and operationalised using EMS.

The increased risk, and the expectations of future regulatory burdens, act as signals to the market that is already affecting the cost of debt capital for borrowing companies. Information asymmetry and information imperfection continue to play a role in limiting the efficiency and efficacy with which environmental risks can be quantified and result in ambiguous interpretations of sustainability. Irrespective of this constraint, environmental risk management will continue to be an expanding concern for South African banks.

CHAPTER 3 METHODOLOGY

3.1 Introduction

This chapter describes the method used to conduct research for this study. The rationale for the choice of research methodology is discussed, covering the research design and process, data analysis methods, ethical considerations as well as methodological assumptions and limitations.

3.2 Methodology

This research was conducted using a semi-structured interview process based on the Seven Questions method in the Futures Thinking framework. Futures Thinking covers a broad spectrum of methodologies for identifying and analysing possible future scenarios for the topic under investigation (Buhring & Liedtka, 2018). Different methodologies within the futures thinking framework are combined to explore probable, possible and / or preferred future outcomes (De Smedt *et al.,* 2013). The Seven Questions methodology uses semi-structured interviews with a range of stakeholders to collect data about probable, possible and desired future states of the research topic (Government Office for Science, 2017). Futures thinking techniques, including the Seven Questions methodology, are also used to engage stakeholders for policy development.

In the context of sustainability studies, Johansson (2021), evaluates Futures Thinking in the context of its application of future scenario development, with three types of future scenarios identified (Johannsson, 2021):

- Predictive: describing likely future scenarios for a given topic based on extrapolating from a current reality.
- Explorative: developing narratives about possible future scenarios focusing on outcomes that challenge conventional assumptions, often with higher levels of uncertainty and ambiguity.
- Normative: possible future scenarios based around preferred, or desirable, future outcomes, including exploring paths that lead to these outcomes.

These types of scenarios emerge from the responses given by the interviewees and form the basis of exploring the possible future of a given topic. In the context of environmental studies, this Futures Thinking methodology has also found application within the field of sustainability studies to explore alternative types of sustainability (Johansson, 2021). As a qualitative research methodology, the semi-structured interview, a qualitative technique that uses loose-form questions to enable a conversation between the researcher and respondents to elicit information and perspectives from the respondents (Ruslin *et al*. 2022), is used. The Seven Questions method, as qualitative technique, shows the following characteristics (Merriam & Grenier, 2019):

- Qualitative research aims to explore a topic from the perspective of the respondent.
- The resulting data is richly descriptive and narrative in nature.
- Qualitative research is characterized by the search for meaning and understanding.
- The researcher is the primary instrument of data collection and analysis.
- The research follows an inductive investigative model, which means that the findings are derived from the data, as opposed to testing the validity of a predefined hypothesis.

Results were evaluated using the Interpretive framework for qualitative analysis. Merriam and Grenier (2019) describes the interpretative approach as a research methodology that is mediated through the researcher, and that this method and can use interviews, observations, and / or documents / artefacts to gather data. In addition, interpretive analysis is grounded in the literature review and integrates the data observed through the study with the literature. Its aim is to understand how participants make meaning of a situation or phenomenon using opinions and views of the target population. Data analysis is a thematic description of the findings focused on recurring patterns or common themes that cut across the responses. The findings are presented via a descriptive account using references to the literature that framed the study in the first place. The selection of questions are derived from the Seven Questions method.

This study can therefore be described as explorative from the Futures Thinking perspective, and within the Interpretive class of qualitative research whereby the Seven Questions method is used as the qualitative method for data gathering. Interpretation of the data is grounded in the literature.

3.3 Scope of the study

The identified respondents consist of senior banking representatives with a vested interest in environmental risks. The sampling frame will therefore consist of two identified respondent groups:

- The selection of banks: Banks included in this study will collectively represent a minimum of 80% market-share as measured by bank assets.
- The selection of respondents: Respondents are required to be of sufficient seniority for the concept of environmental risks to be familiar to them. The level of familiarity is not required to be consistent between different respondents because the variability in responses between different respondents is of academic value. The targeted job titles will include these and related titles:
  - Sustainable Financer
  - Senior analyst: sustainable finance

- Sustainable finance and environmental risk
- Research analyst: sustainable finance
- Treasury
- C&E Risk
- Mining & Resources

The sampling aim is to select respondents from banks that collectively represent 80% or more of the South African banking market as represented by bank assets.

3.4 Respondent selection process

The selection of banks cover 80%+ of South African banking market based on bank assets. A list of possible respondents was compiled using three main methods:

1. A respondent list compiled by the Banking Association of South Africa (BASA) that consisted of banking professionals that represent their institutions at BASA for various environmental risk and green banking industry initiatives. These respondents were contacted with assistance from BASA.
2. An additional respondent list was compiled using LinkedIn based on search criteria for environmental risk position within South African banks with the aim of augmenting the BASA list. The search was done using the following search terms, and filtered by industry, Banking, and institution, e.g. Nedbank, ABSA, or Investec:
   a. Environmental Risk
   b. ESG Risk
   c. Sustainability
3. The final additional names were obtained from respondents themselves who facilitated introductions to other banking representatives.

Respondents were contacted through the following process:

1. With assistance from BASA's Market Conduct Division, each identified respondent was contacted via email with the research proposal and ethics declaration.
2. The researcher sent follow-up emails, and contacted each bank telephonically, to arrange the sessions.
3. In those instances where the potential was identified through another participant, the introduction was done by means of an email from the participant to the next candidate.

The study covered six banks and thirteen respondents:

Table 6 - Number of respondents per bank

Bank	Number of respondents
Bank A	2
Bank B	3
Bank C	3
Bank D	1
Bank E	2
Bank F	2

3.5 The interview process

The semi-structured interview method is a qualitative approach that uses a pre-determined list of questions to elicit open ended responses from respondents (Bryman *et al*., 2014). Interviewees consented to take part in the interview, as well as for the recording of each session. Interviews were conducted using a virtual meeting service that offered recording and transcription services.

Each interview is preceded with setting the context of the study, which will include a brief overview of the origin of environmental risks in financial services. Each interviewee was also be briefed on the interview structure.

The Seven Questions method is a facilitated interview method and interviewees are not required to receive the questions in a written or printed questionnaire. To assist with the process, the interview brief and the questions were presented electronically during the interview process.

3.6 Description of the questionnaire

The following questions were be used for the interview:

1. What would you identify as the critical issue for the future of environmental risk in financial risk assessments?
2. If things went well, being optimistic but realistic, talk about your desired future for the incorporation of environmental risk into financial risk decisions?
3. In the worst possible world, what are your greatest fears for achieving your desired future for incorporation of environmental risks into financial risk decisions?
4. Looking forward, what needs to change (internal and external factors) if the outcomes for your desired future are to be realised?

5. Looking back, what would you identify as the significant events that produced the current state of things that necessitated the incorporation of environmental risk into financial risk decisions?
6. Looking forward, what are considered priority actions that need to be implemented soon / immediately to achieve your desired future incorporation of environmental risk into financial risk decisions?
7. If you had absolute authority and could do anything without constraints, is there anything else you would do?

3.7 Data analysis

All interviews were recorded and transcribed. Errors introduced by the transcription software were corrected during playback of the interview.

Key themes were identified by the researcher based on respondents' use of certain words and phrases, and references to particular topics and specific models, frameworks, processes or other principles applied within the bank for environmental risk management. The process requires several playbacks of each interview to tabulate the information per question, and per respondent. This allows the researcher to determine the importance and relevance of each theme based on the frequency it is referred to, whether the theme is referenced across multiple questions, and to what extent themes are related.

Each institution was assigned a letter, and each respondent was assigned a number, to arrive at a coding model per respondent, as shown in the Table 6 below.

Table 7 - Anonymisation table

Position	Bank	Respondent	Combined code
ESG Risk	A	1	A1
ESG Training	A	2	A2
Head of Mining & Resources	B	1	B1
Senior Carbon Specialist	B	2	B2
Head of Working Capital	B	3	B3
Head of Treasury	C	1	C1
Group Treasury	C	2	C2
Deputy CEO	C	3	C3

Senior Sustainability Manager	D	1	D1
Head of Mining & Resources	E	1	E1
Head of ESG Risk	E	2	E2
Senior Investment Analyst	F	1	F1
Head of Environmental Sustainability	F	2	F2

Analysis was conducted through the use of a table into which responses were captured. The table consisted of the questions on the horizontal axis, and the respondents on the vertical. Participants responses were summarised into the table, with key words, themes and direct quotations added.

Differences in these banks' sizes, target markets or other variables are not referenced due to the fact that differences between institutions based on their sizes or markets are not within the scope of this study. Instead, the responses are presented as trends across these institutions and while different types of responses can be attributed to underlying differences between banks, these differences could also be explained by other variables, like differences in the respondents' educational backgrounds or experience.

3.8 Anonymisation

As part of the anonymisation requirement of the study, respondents were anonymised using the coding in Table 6.

3.9 Ethical considerations

Ethical clearance (ethics number NWU-01215-22-A9) for this study was obtained from the North West University, Faculty of Natural and Agricultural Sciences Ethics Committee (FNASREC) after due consideration. This will protect the dignity of participants and ensure the research is conducted in an ethical manner, in line with the FNASREC ethical guidelines. All participants will agree to participate in this study by signing participation consent forms. All research results will be anonymised.

3.10 Limitations

The Seven Questions methodology was selected due to its suitability for the type of information required, i.e. the views and opinions from the industry on the future of environmental considerations within their industry. This means that the data collection technique should be based on the type of information that one wants to cover in the study. Because the regulatory framework is still in development, it is expected that there is a fair amount of variability between different banks in their application of environmental considerations. This renders the use of highly structured questionnaires unsuitable.

Due to the use of a semi-structured interview technique, there are several limitations to consider:

- Poor or limited responses from interviewees will undermine data completeness and quality.
- Respondents could wilfully mislead with their responses if they feel an obligation to overcompensate for their organisations' record on environmental issues.
- The level of maturity of the topic within the organisation could influence the depth and scope for the respondents' knowledge, and subsequent ability to give responses with sufficient detail.
- Confidentiality consideration within the respondents' institutions could restrict the scope of responses and impact the quality of data.
- The selection process to recruit respondents could yield respondents without sufficient knowledge of the topic.

3.11 Chapter summary

Chapter 3 sets out the research methodology as a semi-structured interview technique based on the Seven Questions model. This Futures Thinking technique is regarded as suitable for the nature of the research topic.

The scope of the study will incorporate South African banks, and the respondents are selected from these institutions, based on their suitability to navigate the topic of Environmental Risk in Banking. Each respondent will be presented with a summary as well as with the questionnaire.

This section also sets out the assumptions and limitations of the qualitative nature of this kind of research methodology.

CHAPTER 4 RESULTS/DATA ANALYSIS AND DISCUSSION

4.1 Introduction

The study was conducted to examine the future of environmental risk considerations in banking.

All banks that participated in this study regarded environmental risk as a significant risk factor within banking. While there are observed differences between responses from different participants, this study did not aim to explore underlying reasons to explain differences in respondents' perceptions and opinions. It can reasonably be assumed that respondents differed in their opinions due to several factors that are ascribed to the individual, like education, position, seniority and experience. In addition, observed differences could be explained by each bank's current environmental risk management framework, or whether a particular bank has a bigger real or perceived exposure to environmental risks.

The following section explores the responses from the participants for each question. Respondents' answers are integrated into an analysis of the main points and themes that have emerged during the interviews.

4.1.1 What would you identify as the critical issue for the future of environmental risk in financial risk assessments?

The overwhelming consensus amongst participants is that environmental risk management is progressing, and has been for several years, from a peripheral concern to a core business competency. This mainstreaming of environmental risk consideration within business decisions is not limited to banking, or financial services, but is observed across all sectors of the economy. The view was also expressed that primary industries, like mining, are traditionally associated with environmental risks, but that environmental risk management, as a competency, has quickly spread into secondary and tertiary sectors due to the fact that there are systemic and value-chain knock-on effects from environmental impacts into these other sectors. This expansion of environmental risk as core bank competency, is tightly coupled to the drivers that lead to the current models of environmental risk management. These drivers are at the same time complimentary and contradictory, and it is important to realise that the future of environmental risk considerations will continue to be impacted by a broad spectrum of forces. In addition, the mainstreaming is accelerating, with the consequential result that the current frameworks are running into significant constraints, an issue that will be referenced through this analysis. Respondent F1 quantified the scale of current environmental risk management: Looking at the top 40 JSE listed companies by market capital, 29 have top management Key Performance Indicators linked to ESG factors, 38 map businesses to 17 SDGs, 25 do TCFD reporting and 35 have net zero emission targets. These companies have to reduce their environmental risks to ensure that they can continue to raise funding. These risks include their environmental risk for pollution, waste and regulated standards, but also their future sustainability as measured by SDGs.

Respondents expressed a view that poor environmental risk management practices at a company as a general is an indicator of poor risk management capabilities. This view was expressed by eleven of the participants. The perceived link between environmental risk competence and general risk management capabilities within a company is accepted as a truism: “a company with a handle on their environmental risk is considered to be good at overall risk management”, said respondent B1. While quality environmental risk management capabilities can have a reputational value, the respondents clearly articulated that a better ESG score is seen as a proxy for better financial performance. Several respondents made reference to studies, although did not cite exact titles or authors, that indicate this link. The literature review of this study has shown that different studies have not agreed on this point. What is clear from respondents’ replies is that environmental risk consideration has become significantly more prominent across all economic sectors serviced by banks. Respondents B1, B2, D1, E1, F1, F2 made specific reference to the prominence of ESG reporting as being part of all their client engagements, and that it is almost universally expected that transactions exceeding a certain value, or clients exceeding a certain turnover, should comply with certain standards for ESG reporting. Respondent B1 indicated that, within minerals and resources sectors, health & safety is typically covered first, followed by environmental risk, even before financial indicators are discussed.

Respondents from all the banks listed environmental risk management skills and competency as a critical issue. Environmental risks emanate from multiple sources and it requires dedicated resources to continuously scan for emerging trends and new risks. The ability to practically operationalise environmental risk considerations require the use of an EEMF that integrates all relevant aspects of the discipline. As mentioned in the literature review, banks typically use an EMS into which all relevant data and trends are compiled. The EMS also manages environmental risk bases, decision-making, and reporting, by creating processes and workflows for different operational requirements. Those banks that are signatories to EP4 incorporate the EP4 standards and methodology into their EMS and use certain thresholds to trigger processes that require different levels of approval for different types, and sizes of risks. The EMS will also manage other thresholds, or exposure limits, like the percentage of exposure to coal, as mentioned above. Environmental risk considerations are also added to key performance indicators of an individual’s scorecards for performance management. The EMS can only be as effective as the quality of its inputs, as well as the accuracy of the modelling to determine risks and manage thresholds. Banks employ industry specialists who bring in subject matter expertise to both evaluate clients and transactions, but also contribute to continuous improvements in the EMS.

The next critical issue is the awareness of the link between banking and the environmental impact. This speaks to the role played by the funding mechanism in determining the sustainability outcomes for the country. Banks are acutely aware of the link between loans and the environmental impact, to the extent that four out of six institutions which are included in this study, are in the process of, or have concluded, measuring their environmental impact across several indicators. Whereas funded emissions are the first impact to be quantified, banks are expanding this to water use, biodiversity issues, air quality and other impacts. In addition, several banks have indicated that they have partnered with external consultants, as well as institutions like South Africa's Council for Scientific and Industrial Research (CSIR) to improve their internal EMS capabilities to identify and measure environmental impacts linked to funding. Respondents have listed several reasons why the ability to accurately track environmental risk across transactions, clients, industries and geographies, is a critical issue. The first is in preparation for expected movements by peers to disclose their funded risks, and banks are sensitive to the perceived reputational risk of not keeping up with competitors in their environmental risk transparency. There is also the real market, credit, and climate change associated risks that come with increased environmental risk exposures. Two of the respondent banks have indicated that their exposure to the Western Cape droughts were underestimated and that better geographic information based risk tracking to accurately account for exposures at that level of detail, would have enabled them the respond to the risk earlier. Also mentioned were the recent floods in Kwa-Zulu Natal that disproportionately affected business within that province, as well as the secondary impacts to supply chain disruptions that led to losses in companies and industries outside the province. Thirdly, respondents expressed the requirement to bring environmental risk exposure into their planning for climate change risk mitigation. As shown in the literature review, there is a growing expectation for banks to facilitate several of the climate risk strategies for transitioning, mitigating and adapting to climate risk. In order for a bank to accurately determine where funding should be directed to enable these strategies, it is necessary to link the current funding book to those industries that will be impacted, that need to undergo transition, or that need to be exited due to future losses associated with climate change risk. In their responses, respondents referred to research done by the National Business Initiative (NBI) to define transition plans for different industries and each bank is attempting to extrapolate its current environmental risk exposures into the possible transition paths for different industries.

Additional environmental regulations also place certain industries under strain, creating future credit risks. This can be coupled with shifts in technology, or international pressure for a rapid move away from fossil fuels, which is a particular risk to the South African economy due to the carbon intensity of South Africa's energy supply. Four of the banks made specific mention of the interdependence of the South African coal industry on the ability to export coal, and that, once the major markets for coal transition to renewables, the local market for coal is insufficient to maintain the current coal industry. This means that South Africa's continued reliance on coal is not determined by Eskom, but on whether the international sale of coal exports can subsidise the local coal value chain.

Other instances where regulations are expected to impact market and credit risks include water restrictions, carbon tax, increased protection of natural habitats, wetlands and protected areas, and specifically the enforcement of air quality standards. Eskom has already indicated that it is financially unable to meet current air quality standards, let alone more stringent ones. Respondents also made reference to some of their other clients with similar challenges. The reality for banks is that certain industries, and certain clients, will become unbankable due to these emerging trends in environmental risk considerations. The names of the companies mentioned by respondents have been removed from this report to maintain the confidentiality requirement of the ethics framework for this study.

All these factors lead to the conclusions, as was specified by all the respondents, that environmental risk will continue to alter the ability of companies to raise funding. As banks improve their ability to measure and quantify environmental risk, so will market access to funding become more limited to those borrowers with bigger environmental impacts. Conversely, companies that remain in lock-step with the changing regulatory requirements will increasingly be favoured. Even with the current capability to assess environmental risk, there are already companies with a restricted scope for sourcing funding. If it is considered that many companies are funded by both investments and bank loans and companies that cannot raise investment funding are unlikely to be able to raise loans. This has already led to banks ending relationships with certain clients. The process of determining whether a bank does not continue with a transaction, or a client relationship, can involve numerous considerations. Within South Africa, as mentioned in the literature reviews, banks have ended the financing of coal power plants, and respondents have also referenced specific clients with high risk that will not remain financially viable, unless they can transition to lower environmental risks.

The other impact on each bank is the requirement to make provision for increased risks in their CAR. This process is cyclical: the bank has a statutory obligation to manage risk using the BASEL III framework, which includes allocating capital on a risk weighted basis. As a bank's ability to assess a particular risk improves, it can more accurately link the capital cost of that risk to a particular client. Consequentially, the cost of lending for this client is raised. In addition, each bank also incorporates the improved understanding of this risk into other considerations. Those banks included in this study that do have exposure to clients in thermal coal across the value chain, e.g.

mining, power plants, logistics, are already ringfenced and tracked in terms of maximum exposure limits. Banks set maximum exposure targets in terms of percentage of total assets exposed to coal, or in terms of a maximum monetary value allocated to the industry, or sections of the industry. These thresholds also form part of banks' impact reduction targets. While the use of the coal value chain serves to illustrate the principle, the grey literature has shown that banks increasingly track these exposures across more environmental impacts, with the aim to benchmark current exposure, and to link future targets for reducing these exposures to this benchmark, as well as their peers.

4.1.2 If things went well, being optimistic but realistic, talk about your desired future for the incorporation of environmental risk into financial risk decisions?

While all respondents referenced a market-based model for managing environmental risk as the desired future, there was also universal agreement that it is not as easy as just adding an environment risk premium to those products and services that have negative environmental impacts, or incentivising those products and services with positive environmental outcomes. There is a process whereby a market-driven model should be enabled that takes into consideration the constraints within the current framework. The incentivisation to change behaviour is driven by the means to make that choice between sustainable or unsustainable products and services. The choice when the buying decision is made, should be market driven, based on price. This is true both for the buyer of goods and services, but equally true for the bank choosing between one project, transaction or client to fund versus another. Because the total societal cost of environmental impact is not incorporated into businesses, the price of a particular product or service does not truly reflect the cost of that product to society, and the seller of that product is not made to carry that cost. This is the market failure of externalities. Buyers should understand that, if they purchase a certain product, it comes with the negative consequence, and this has to be reflected in an economic sense, i.e. price.

This means that the current model for managing environmental risk is seen to be under-utilised due to certain constraints that need to be addressed. The first issue is the ability to score one option versus another in terms of its environmental desirability. As more variables are added for consideration, the decision becomes increasingly complex. The majority of respondents listed the ability to effectively measure and quantify "sustainability" or "greenness" as major constraint in dealing with future environmental risk issues. There appears to be four tiers to determining environmental risk:

1. Environmental compliance: This is the minimum requirement and is an absolute requirement; without the necessary compliance in place, the transaction, or client, will not be considered.

2. ESG: The existence of a quality ESG programme at the client's end, is regarded as a necessary condition for lending. The bank's own environmental policy plays a role in determining the desirability of the client, based on factors set out in the literature review, like the environmental sensitivity of the client's industry, the client's own environmental impacts, etc. What is relevant is whether the client enhances the bank's ESG outcomes.
3. Pricing environmental risk: The extent to which environmental risk should be allowed, should be data and science driven and this varied among respondents, even if there was general consensus that current methodologies fall short in giving an accurate view of environmental risk. This is partly due to the fact that regulatory compliance sets an outer limit to what can practically be determined as a risk, to some extent, i.e. meeting a compliance standards do not automatically translates into mitigating an environmental risk from a bank's point of view.. The second factor is the difference in measurement horizons between a financial risk and an environmental risk. The shorter term profit incentive supersedes longer term environmental impacts, which implies that the financial gain is achieved before the environmental impact occurs.
4. Sustainability: The determination of sustainability is contentious due to the nebulous nature of the term. In addition, there is insufficient consensus within the local market, as well as internationally, on quantifying sustainability. Respondents used phrases like nett-utility, nett-green, or nett-benefit score, when referencing the ability to determine whether a particular client or transaction can be measured for its long term sustainability.

While most companies, including banks, include sustainability issues into their ESG model, what is very apparent is that respondents casually differentiate between different levels of sustainability and that there is an undetermined level of sustainability towards which the decision-making models are aiming, but have not yet been achieved. The desired future for incorporating environmental risk into banking therefore goes beyond a compliance and reputational model, and beyond the current common, and ambiguous, understanding of "sustainable". What respondents are envisioning is a situation where the relevant factors that determine sustainability can be assessed and scored in a way that long term sustainability drives the decision-making. This capability requires certain necessary conditions to pre-exist:

1. Bank's EMS systems need sufficiently detailed information to build a view of the client, the impact of the client's activities, and the critical environmental factors relevant to the context of the client. This will allow for contextual decisions based on the particular risk represented by the client with sufficient differentiation between different types of risks. This will enable the bank to more accurately stress test a client, or a geographic concentration of clients, against a particular risk, based on specific environmental impacts. The decision to fund a particular transaction or client in one region will therefore be based

on different environmental considerations than funding the same activity or client in another area.

2. Environmental impact assessment of funding a client or a transaction must be based on science-driven decision-making. This requires access to sufficient data about the state of the natural environment, as well as having the relevant expertise to interpret the risk against the science.
3. Alignment is required on the standards used for estimating long term sustainability. Any expectation of enabling a just transition using the funding mechanism assumes that there can be some level of consensus on what types of projects should be funded using current criteria to determine future sustainability.
4. The deciding factor should ultimately be market-driven with the ability to use cost of capital as a driver. Funding cost should reflect the future risk and that serves as a driver for shifting funding into more sustainable options.
5. National transition targets need to be defined with sufficient clarity by the relevant national departments for a bank to make funding decisions that align to the future desired state.

The desired future is therefore based on a science and data driven model that expands on the current model.

Differences between banks' internal methodologies create a greenwashing risk where one bank might assign a lower environmental risk to a particular transaction. This then impacts the bank's ESG reporting, with consequences for investment funding. International benchmarks, like the Equator Principles, should be the standard and collectively enhanced to measure environmental risks at all levels, whether project, company, portfolio or systemic.

Respondent A2 cites the limitations of regulations like carbon tax to illustrate this point. Energy is not elastic; higher energy prices have limited scope to reduce the use of energy, and the inherent carbon risk of the South African economy is therefore not necessarily reduced significantly just from taxing carbon. Because South Africa has a carbon intensive economy, there are no substitutes to consumers. The use of fossil fuels will continue unless renewable energy is expanded in conjunction with the introduction of carbon tax. In addition, there are significant socio-economic downside risks if the coal value-chain is disrupted. In addition to carbon tax and investment in renewables, a parallel programme is required to transition towns and businesses that are dependent on coal for their livelihoods. This creates a conflict between funding companies and projects within fossil fuels to maintain economic activity versus honouring transition targets to fund renewable energy. Respondent D1 cited an example of a logistics company that supplied thermal coal that could not obtain funding due to the perceived risk of the long term ESG risk of the client.

4.1.3 In the worst possible world, what are your greatest fears for achieving your desired future for incorporation of environmental risk into financial risk decisions?

Respondents generally agreed that good business is good ESG business. There are conflicts between different aspects within the current framework that is observed from the respondent's comments. There is a continued pressure to report, but indices and reporting standards do not add benefits to operational outcomes. This is due to the fact that there still is ambiguity in the reporting requirements and standards, as well as the measurements that underpin the reporting. Instead of focusing on reporting, respondents feel that there should be a focus on the science that underpins the reporting, with a view to improve the reporting, rather than just adding more reports. There also is a reputational aspect to be seen to report on environmental risks; if competitors are reporting, then you need to do that as well. Perception might have value in using peer pressure to move banks forward with regard to environmental management, but this should not be done at the expense of quality. While it is recognised that transparency is necessary, and that transitioning to low impact and sustainable economic activities is urgently required, nuance and context are the important. Policies are not necessarily sufficiently informed with science based data to balance the environmental, economic, and developmental / social dimensions.

There is also a risk that the reputational pressure and the focus on certain issues rather than the full spectrum material risks results in excluding important environmental issues, as well as favouring certain issues over others due to popular opinions about what should, and what shouldn't, receive attention. Habitat loss and biodiversity protection has economic and social value, but might not receive the same level of attention.

The rate at which banks are required to expand the scope and depth of environmental risk concerns, is also problematic. A fast or unequal transition will create negative social outcomes in communities that cannot keep up with the pace of the transition. The transition away from fossil fuels was already cited in the previous section. Four respondents also referenced the use of natural gas as a transitionary fuel, away from coal. The risk to any bank extending funding to gas infrastructure transactions, is that these might become stranded assets depending on whether exceptions for GHG emissions for the use of gas are allowed in developing countries. While the respondents differed on whether gas should be included or not as a transitionary fuel, Respondent B1 pointed out that, because South Africa has not invested in sufficient bulk gas handling infrastructure, it is immaterial whether gas is given exception status or not because solar and wind capacity will be deployed faster, making gas redundant as an option for South Africa, and any national policy that touts the use of natural gas as an option for South Africa, is therefore not aligned to the reality of what is feasible.

This type of policy uncertainty is not contributing to a managed transition because it fails to resolve the ambiguity that impedes the funding decision. The resulting uncertainty creates insufficient capital investment for enabling all the necessary transitions. Irrespective of whether the criterium is carbon, or greenhouse gasses, or nett zero, or nett negative, or restoring biodiversity, there is a whole supporting economy (and supply chain) that is operating in the non-sustainable model, and unless the investment is made to address all material impacts and to transition across a broad spectrum of industries, the transition will create unintended consequences. Measured by regulatory targets, from the ground up, it might be possible to manage the regulatory risk around environmental issues, but that will not address systemic risks to the country, the economy, or the financial system.

Respondents agreed that environmental risk management is a necessary feature of environmental risk management, but that there are constraints within the current model and banks have limited control over economic and market factors that drive consumers. On the one hand respondents broadly elucidated banks' sophisticated environmental risk capabilities, but on the other hand there is a limitation to what can be achieved within each bank individually. This is because no single bank can dictate the agenda, or set the required standards. In addition, banks do not control the markets, nor the buying behaviour of consumers, or the industrial policies of the country, both of which are substantial forces that drive environmental risks outside banks' control.

C1: The biggest issue is ideological. Old political and capital ideologues are asked to imagine a future that does not yet exist.

B4: Banks cannot function in a dysfunctional society. The continued sustainability of the financial intermediation model, where banks receive deposits and apply risk principles to issue loans, is necessary for the sustainability of the bank itself. Climate change is therefore a disrupter that could change so much of this model that it is seen as a dominant issue. Being able to operate within the conflicting expectations of profitability and sustainability is challenging.

These comments suggest that the scope of environmental risk management, when it expands beyond project, client and portfolio level risks within a bank to include the broader systemic nature of climate change risks, is beyond the scope of banks to change without the broader involvement of stakeholders, primarily regulators. This is further supported by other respondents:

A1: There is a concern that the transition is not going to be well managed, and the policies will not be developed fast enough to allow for better decision-making.

C3: The current framework is a flawed model, and this leads to suboptimal decisions about how to address sustainability as well as the transition. Only once a risk is sufficiently quantifiable can capital allocation be accurately adjusted to compensate for that risk.

E2: Regulatory processes for dealing with environmental risks need to be sufficiently comprehensive to remove uncertainty about what role the bank is supposed to play.

D1: The worst case scenario is if the status quo remains. The current approach is marred by short-termism and is stagnant.

E1: The bank's aim is still to write the deals, but that now needs to happen in an increasingly complex environment.

These comments suggest that banks recognise the necessity of expanding environmental risk management with a broader policy and regulatory guidance and controls, but also that there are current pressures to continue to operate while their operating environments are rapidly increasing in complexity. The absence of standardised environmental risk methodologies that are sufficiently informed by data and information, also create a scenario where the efficacy of efforts towards more ambiguous terms like "sustainability", or "environmentally friendly", cannot be properly assessed. When considering the outlook for profitability versus sustainability, there is a conflict between the profit objective to write deals, and the need for broader environmental risk considerations. Due to the lack of alignment in methodology, as well as the uncertainty about regulatory developments required to inform the alignment, room is allowed for opinioning about sustainability, or environmental friendliness. This creates the scenario where perceptions about the sustainable nature of a transaction is uncertain, and the opportunity to misrepresent the true nature of the risk leads to a false market perception about the sustainability of a bank's loan portfolio, or a particular deal. Respondents referred to this as the greenwashing risk: exaggerating the sustainability of a certain transaction, portfolio, or client.

This particular concern of greenwashing does not bode well for the expanding need of environmental risk concerns within banking, particularly in the light of movements by regulators to incorporate sustainability metrics into prudential risk requirements, as well as climate transition strategies.

4.1.4 Looking forward, what are considered priority actions that need to be implemented soon / immediately to achieve your desired future for the incorporation of environmental risk into financial risk decisions?

The preceding sections have detailed the progression of environmental risk consideration from being a peripheral to a core business concern. Respondents expressed confidence that their environmental frameworks and policies are progressing in line with the emergence of environmental risk as a consideration for banks. Within that scope, there are certain priority actions that can be taken to improve this model:

Internal actions related to organisational purpose and structure:

- Environmental risk performance indicators must be expanded to all levels of the organisation. Respondent D1 used the terms “purpose” and “profit” performance measurements and stated a required 50:50 split in the weighting between these two dimensions.
- The board composition must include expanded environmental and climate risk expertise. This view was expressed by respondents A1, A2, C1, D1, E2 and F2.
- Environmental risk management as a discipline has to be established. Respondents A1, B1, B2, C1, D1, E1, E1, F1 and F2 made reference to the requirement of environmental risk professionals that can manage complexity into risk decisions. The range of skills include social, environmental, ecological, engineering, scientific, and financial expertise. Environmental Risk Management can be formalised into a bespoke profession with South African National Qualifications Authority standards and dedicated training streams. This will ensure a pipeline of trained professionals to manage the expected increased demands, and also set standards by which competence can be determined independently.

The following actions, while not directly related to internal operations and structures, are also within banks’ control:

- To fast-track reporting on financed risks, and publish the results publicly. Respondents were divided on whether standards should be agreed upon prior to reporting, but there is consensus that it is important for banks to report on their environmental exposures. Indicators from two respondents where that they intend to publish their financed GHG emissions based on what they view as sufficiently accurate numbers, and the expectation is that other banks will follow. Exposure to other environmental issues, like the biodiversity impact, water use, etc., will also be made transparent as the ability to measure these improve.
- To proactively consult directly with clients in the industry on measures to de-risk industries and companies from current and future environmental risk. In line with proposed transition models like those published by the NBI, the National Treasury programme for funding the green economy, as well as bank’s own estimates on future environmental risk, like border carbon levies, pro-active action to facilitate this transition is regarded as a necessity.

External actions outside banks’ control, but within their sphere of influence, include the following:

- To consult with government on the alignment of environmental risk considerations within banking. The view from respondents was that different clusters within government are required to set their expectations, but also to sufficiently align so that the current vastly contradictory expectations between Department of Mineral Resources and Energy on one side, and Department of Forestry, Fisheries and the Environment (DFFE) and National Treasury on the other can be minimised.
- To participate in programmes to set local and international standards for environmental risk management within banking. As mentioned, banks in this study are consulted by National Treasury for the financing the Green Economy as part of the Sustainable Finance Initiative.

4.1.5 Looking back, what would you identify as the significant events that produced the current state that necessitates the incorporation of environmental risk into financial risk decisions?

Environmental risk management practices within banking evolved along with perceived and real risks within the operating environments of banks. Banks suffered losses due to non-compliance of environmental regulations and systematically incorporated more environmental considerations into their decision-making processes. As pressure mounted on companies, including banks, to be transparent about risks, different protocols emerged to address these issues. EP4, the JSE standards, TCFD, etc. were incorporated into risk frameworks. The increased complexity, over time, has led to the establishment of dedicated environmental risk capabilities within banks, and the adoption of formal EEMFs, EMS, ESG and other tools with which they manage the increased scope of environmental risk considerations in banking. The next iteration of this evolution for banks to leverage the funding mechanism is to direct funds towards more sustainable environmental outcomes, and it is within this context that most of the concerns arise.

Beyond the scope of a bank's own environmental compliances, reducing its own environmental impact in the form of energy and waste targets, and implementing increasingly sophisticated risk environmental risk management tools, respondents have universally expressed concern about the constraints of their current models for environmental risk considerations. The constraints define the limits of the current approach to environmental risk management within banking, and also indicate the areas where changes are required for the discipline to evolve into its next phase.

The current way in which environmental risk is considered in banking, progressed due to pressures from different sources:

1. Environmental regulations (NEMA & SEMAs) and the requirement placed on borrowers to adhere to the regulations.

2. The adoption of external environmental risk assessment methodologies like EP4 and TCFD.
3. Disclosure requirements imposed by investors, as well as the JSE disclosure standards.
4. Activist activities, like JustShare, that track and report on banks and their environmental commitments.
5. Pro-active adoption of sustainability principles, usually driven by key individuals within the bank.

The continued evolution of environmental risk management as a bank competency and the internal adoption of environmental risk management tools.

4.1.6 Looking forward, what needs to change (internal and external factors) if the outcomes for your desired future are to be realised?

"Regulation moves first", said respondent B4.

"If the bank is required to report on sustainability of its funding, then the ability to accurately account for this is necessary for the market, regulators, or activists to accurately assess whether the bank's disclosure is a fair reflection of the risk" - Respondent A1

The absence of standards for environmental risk measurement and reporting has bearing across multiple dimensions of environmental risk considerations. All respondents made reference to the lack of agreed standards and the consequential impacts.

All the respondents specifically mentioned access to data and information, as well as agreed standards for quantifying risk based on the information, as major issues for determining "sustainability". There are several factors at play. There is a high degree of variability in data availability and data quality and there is no agreed standard for measuring impact, both positive and negative. In an idealised world, all relevant data is geo-referenced and quantified in terms of environmental impact. This is not currently the case. When future feasibility is further applied to a specific transaction, the ability to accurately assess how the environmental risk might change over time is not possible. Three respondents related scenarios where their current models are unable to give a risk estimate within acceptable levels of uncertainty that will allow them to make a decision on whether to proceed with a transaction, or not. The number of instances, or the value of these transactions might not yet be of sufficient concern. As more risk perspectives are added to a particular project or client, and as the risk horizons are extended, the uncertainty increases, resulting in a further reduction to assess risk. Therefore, as more and more different environmental impacts are added to the list of concerns, and as the idea of a sustainable outcome over longer horizons become a necessary consideration for banks, the level of uncertainty about the risks are further reduced.

This issue is further exacerbated by the overabundance of methods and modelling techniques to quantify "environmental" risk, more than 200, according to Respondent B2. Respondent B3 illustrated this ambiguity in measurements with the following example: In this specific case of a tobacco company, the local subsidiary has significantly higher negative environmental impacts than the parent company. However, based on the CDP scores, the local company gets a better rating. CDP is a non-profit voluntary scoring model that measures year-on-year improvement in environmental outcomes. For the local company to continue receiving a high CDP score, and therefore appear to be doing a lot for sustainability, all it needs to do is to start measuring from a low base. It might take the subsidiary 20 years to reach the same level of overall sustainability to the parent company, but just by improving a bit per annum, they benefit from a false perception of sustainability.

Banks compete for business, and it would be economically detrimental should one bank impose more stringent environmental considerations. It then becomes a balancing act to honour its risk management obligations, profit objectives, and societal expectations about sustainable finance. Capital markets are also global, with large concentration of foreign ownership in the primary sectors where bigger environmental impacts are present. The local banks can therefore not impose a regulatory arbitrage on itself to pursue higher standards of environmental targets when those clients can easily raise funding offshore without the same stringent requirements. In the global market for resources, imposing more stringent requirements on local producers beyond what regulation require, is likely to shift investment in those sectors to other countries.

Respondents agreed that regulation moves first. The current model for environmental risk at client and transaction level, will as a minimum consider current regulatory requirements. Similar to the point above, it is unfeasible for one bank to expect higher requirements, firstly due to the regulatory arbitrage effect, but also because banks depend on third party information for verification of compliance. As pointed out by respondent E1, these third parties certify current compliance requirements; banks that impose a higher standard would therefore need to obtain secondary certifications, which is restrictively expensive and cumbersome.

The next major constraint was tied to the uncertainty about transition targets, which also has multiple dimensions. The first issue relates to GHG emission targets and South Africa's current trajectory to reach nett zero. The view expressed was that, at the current rate, South Africa will not achieve its international obligations under the Paris Agreement, but the bigger concern amongst participants was the view that even the committed targets are insufficient to de-risk South Africa from GHG emissions and the use of coal. The high carbon content within the local economy is expected to place constraints on South Africa's exports as other jurisdictions start to impose carbon border levies on imports. While there might seem to be some expectations that developing countries will negotiate some respite from these levies, the lack of concrete commitments remain an uncertainty. In addition, the carbon intensity of South Africa's economy is so high that, even with some leeway for developing countries, South African exporters might still be impacted. Respondents from five of the targeted institutions included in this study have specifically mentioned their programmes to consult with their exporting clients to find ways to de-risk themselves from this possibility. Beyond GHG emissions and carbon risk, other transitionary expectations are opaque. These could be questions such as what the correct pace is at which carbon needs to be sequestrated out of the atmosphere, or at what rate fresh water sources can be consumed, or whether an off-set programme offers enough benefit to compensate for the negative environmental impact. The issue under consideration here is whether the environmental risk impact assessment of a particular client or transaction can accurately determine if it aligns to a "just transition" or a sustainable outcome.

A further complication is the perceived lack of political will, as well as ambiguity between stated objectives between the Department of Minerals and Energy on one side, and that of Environmental Affairs and National Treasury on the other. Coal fired power stations are already stranded assets, but there seems to be a reluctance within government to accept that the transition to a low carbon economy has to be accelerated.

A general consensus also emerged that government policies are not necessarily sufficiently informed with science based data to balance the environmental, economic, and developmental / social dimensions. A fast transition will create negative social outcomes in communities that cannot keep up with the pace of the transition.

Respondent F2 stated: "Banks are being asked to change into uncertainty. The perception is that the current business model is what is (already) known and understood, whereas untangling complex climate risks into a financial view of the risk of the borrower, is not a very scientific process at the moment."

4.1.7 If you had absolute authority and could do anything without constraints, is there anything else you would do?

Due to the fact that climate change and carbon risk are cited as their biggest concerns, the majority of respondents view that renewable energy must be fast-tracked to de-risk the South African export economy from border levies on carbon. In addition, the energy market needs to be deregulated so that South Africa can develop more carbon off-set opportunities. The transition to renewables are regarded as a significant socio-economic opportunity for economic growth, job creation, as well as a carbon mitigation strategy. This move will allow a shift in the environmental risk approach towards one that is more equally concerned with the opportunities presented by the transition. Respondents B1 and E1 made specific reference to the opportunity within South

African mining and resources that need to be leveraged to build the components required for renewable energy.

South Africa’s advanced financial services sector is regarded as an opportunity for environmental risk management. The substantial scope for creating carbon off-set assets presented by South Africa’s renewable energy transition, can be leveraged by the banking sector to create funding opportunities for these energy projects.

CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This study aimed to uncover the future of environmental risk considerations in the South African banking sector. A literature review was conducted to understand the factors that drive the incorporation of environmental risk into banking for the purpose of contextualising the research section of the study. Research was conducted using the Seven Questions method within the Futures Thinking school of methodologies. The Seven Questions guide respondents in a semi-structured interview, using seven carefully constructed questions aimed at uncovering and understanding the views and perceptions of respondents for a possible future state of the topic. Respondents were selected from several competencies within banking, but with preference to candidates who have exposure to, or knowledge, of environmental risk aspects.

The purpose of this chapter is to reach an understanding of the research question based on an integration of the literature, the research, and the research analysis. To that extent, the study so far managed to explain the nature of environmental risk management within banking, and to cast a light on the possible future developments of this discipline. It is envisaged, over time, with the given suggestions of how to improve the research framework, that the exploration of this topic can continue and offer opportunities for expanding the research scope as well as the discipline itself.

5.2 Conclusions

The motivation for this study stemmed from the perceived increased expansion of environmental issues in society that manifest in severe impacts like climate change, air pollution, deteriorating water supplies, and habitat loss, that in turn feed back into the banking sector as risks and financial losses via several transmission channels.

Banks face direct and indirect environmental risks (Bright & Buhmann, 2021; Chenet, 2019; Coetzee, 2013; Lee, 2001), but it is predominantly through their role as financial intermediaries that banks face increased risks via indirect environmental risk exposures (Coetzee, 2013; Lee, 2001; McKenzie & Wolfe, 2017). Pressure from different stakeholders have led to the adoption of environmental risk management frameworks and standards in attempts to mitigate these risks, and banks have operationalised their integrated environmental risk management models through the adoption of internal frameworks. As shown in the grey literature, banks' enterprise environmental management frameworks use environmental management systems through which their environmental risk management strategies are deployed throughout the organisation. These EEMFs also utilise external frameworks and standards as benchmarks against which banks measure their environmental performance. The Equator Principles are applied to credit decisions, whereas banks link SDGs to their own environmental risk strategies. In addition, disclosure standards, like the JSE disclosure requirements and the TCFDs, are applied internally by banks and also reported to various stakeholders, like investors and activists. In particular, the ESG model based on the stakeholder model of risk management is applied, taking into consideration the environmental impacts across the broader social, economic and natural environments. This broad environmental scope is used by banks to define the environment and also aligns with the broad definition of the environment as set out in NEMA, as well as other reference guides, like EP4 (Equator Principles Association, 2020), as well as the Principle for Responsible Banking (UNEP, 2020).

The general risk management expectation placed upon banks through regulatory requirements in the form of prudential and conduct regulation, as well as other stakeholders like shareholders and activists, necessitated the adoption of environmental risk management as an internal competency within banks. This sentiment was commonly expressed by the respondents and is supported by the literature. Participants in the interview process had shown that banks regard this field as expanding, and that their current risk management frameworks include forward-looking dimensions that allow for the continued expansion of their environmental risk management frameworks to incorporate emerging risks. This is not only observed from the responses given by participants, but also by the grey literature that, to some extent, goes into the detail of environmental risk management within banks that sets out some of the methods adopted by banks to operationalise environmental risk management within their organisations (African Bank, 2021; Absa, 2020; FirstRand, 2021a; Investec, 2021; Nedbank, 2021, Standard Bank, 2021).

The nature of environmental risks management within banking is also changing. While the original assertion that banks face predominantly indirect environmental risks (Bright & Buhmann, 2021; Chenet, 2019; Coetzee, 2013; Lee, 2001) remains true, the most significant observed change is in the environmental risk management role expected of banks. This can be seen as a progression from idiosyncratic risk management towards systemic risk management that goes beyond the scope of the individual bank into a function that needs to stabilise the banking system from environmental risks, as well as a role that requires proactive involvement by banks to steer funding towards "green" initiatives. Respondents expressed significant uncertainty about how the funding mechanism should be used to drive sustainability and climate change risks. This uncertainty stems from several observed trends. The requirement for accurate and complete information for adequate risk decision making (Stiglitz, 1989; Hoff, 1991) was discussed sections 2.5 and 2.6. While the EP4 principles describe the environmental compliance requirement for the borrower, the challenge of accounting for externalities limits a bank's ability to apply capital cost incentives and penalties. In addition, the practicality of applying standards beyond compliance, as well as the risk of regulatory arbitrage, places restriction on the scale to which lower capital cost can be used for incentivising green projects and other sustainability and climate change mitigation and adaptation initiatives. (Coleton et al., 2020). The adoption of environmental risk within this BASEL III framework, as proposed in Alexander (2014), will should see the formalisation of environmental risk into the prudential framework of the SARB.

It would therefore appear that there are several forces that will converge to ultimately decide the future of environmental risk within banking:

1. Banks will pursue profitable business in a manner that aligns with their regulatory obligations for systemic and idiosyncratic risk management, which includes current and future environmental risk concerns. The expanding scope of banks' environmental risk management frameworks will continue to reduce information asymmetry and imperfections. As a better understanding about these risks emerge, and the ability to effectively quantify the risk improves, it will lead to better decisions against future environmental risks.
2. The market's continued incorporation of environmental risk into investment decisions is already adding a risk premium to transactions and companies with higher environmental risk (Degryse *et al*., 2020). Similar to the ability to price risk mentioned in point one above, this trend will expand as the understanding about environmental risks improve, leading to sources of funding other than loans from banks being directed towards lower environmental risk opportunities. This, in turn, will feed into banks' environmental risk frameworks and adjust and improve their internal models, and direct funding in response to the risk appetite of the bank that will increasingly consider environmental risk.
3. The extent to which environmental concerns are incorporated into financial risk decisions is still constrained by the scope of regulatory compliance. Inadequate and insufficient regulations will therefore not necessarily be sufficient to address the fundamental aim of reducing environmental impact, nor will it attain sustainability. In addition, both prudential as well as climate risk regulatory responses, require several outcomes to align:
    a. Measuring and quantification of environmental risk needs to be sufficiently developed to allow for accurate CAR adjustments for environmental risk. Apart from the actions taken by each bank to improve their risk management capabilities, expanding the scope of environmental risk management into prudential regulation will require a model based upon industry consensus.
    b. Effective allocation of funding to the right type of transaction requires consensus about what "sustainable" means. Minimising the risk of greenwashing will require improved transparency about the underlying environmental risks contained in banks' portfolios. As indicated by respondents, there are already movements by

some participants to measure their funded carbon risk with the view of disclosing these risks to the market. In addition, banks are casting wider than just carbon risk, but also aim to address issues of biodiversity and water use, to name just two dimensions. The ability for banks to adopt these measures, and expand on their precision and efficiency, will result in increasing environmental risk management capabilities and resources within banks.

c. South Africa's international climate obligations, the local regulatory framework, as well as the country's mitigation, adaptations, and transitioning strategies need to sufficiently align to guide decision-makers on how to systematically manage embedded risk out of the system. This issue speaks to concerns raised by responses about the urgency to move away from carbon based energy that should be balanced with a transition to ensure industries in the coal value chain also to transition into other viable business models.

The challenge to effectively measure and quantify environmental risk, is increasingly problematic due to the emerging requirement for funding to be directed towards "sustainable" developments. The ability of the banking sector to make a meaningful impact on sustainability is constrained by the absence of a standardised methodology to measure and quantify sustainability. This should not come as a surprise considering the established fact that economic externalities exist as a market failure and that information asymmetry and information imperfection. The perception is that these factors have an interdependence that creates a level of complexity which leaves the future of environmental risk considerations in banking opaque.

When considering the two main factors for consideration in the study of environmental risks (IMF, 2021), namely 1) the interdependence of risks to the financial system and the clients and markets served by banks, as well as 2) the financial stability aims of the banking regulations, it is in the interest of the South African banking sector to actively pursue strategies to resolve the impasse. Based on answers provided by respondents to describe their preferred future for the environmental risk consideration in banking, what emerges is the need for further professionalisation of the field of environmental risk managers for the purpose of integrating the disparate fields of engineering, banking, finance and the various ecological sciences in a manner that can start to resolve those critical concerns raised by respondents, in particular, the development of methodologies to measure environmental risks and translate it into decisions about future sustainability. Furthermore, due to the fact that the scope of environmental impacts and the causes of environmental risks far exceed the banking industries' reach to achieve climate and environmental risk outcomes, there is a need for the private and public sector to collectively develop and agree on the regulatory frameworks that are needed to resolve some of the constraints faced by the banking industry for the incorporation of broader environmental risk concerns into banking.

5.3 Recommendations and areas of future research

The research has shown that banks regard environmental risk considerations in banking as a core competency. There were several areas related to the future of environmental risk considerations in banking that left room for further exploration.

- Pricing environmental risk: Banks expressed concern that applying unscientific models to pricing environmental risks could impose an unnecessary regulatory arbitrage on the cost of funding. This not only impacts a bank's completeness, but it also undermines the efficacy of the risk pricing model. Further research on different approaches to environmental risk pricing is required to explore policy options for this approach, as well as scientific approaches to ensure that the methodologies are valid for the risks that are being addressed.
- Climate change transition risk: Several respondents made reference to the perception that regulation is a key driver to change, and that alignment between different regulatory frameworks, or national departments, is a concern. This has an impact on several fronts, one being the view expressed about policies not being sufficient to reach committed targets for decarbonisation, and also that the policies are working against each other. Specific reference was made to South Africa's carbon risk and the potential impact this will have on the country's competitiveness. This opens up several avenues for further study, the first being to investigate the alignment of South Africa's pace of transition against the rate necessary to achieve committed targets, as well as whether the targets are sufficiently ambitious to enable a transition to sufficiently de-risk South Africa against climate change.
- Environmental risk practices between banks: This study made some reference to the ways in which different banks approach environmental risk management, but due to the absence of formal regulations, making a direct comparison between the different banks can only be done through the types of reports banks publish, which is based on their own interpretation of some of the criteria used to score the risk. A comparative study between South African banks that uncovers more detail about each bank's scores in environmental risk, will be valuable in aligning methodologies, which will in turn reduce greenwashing risks, and will serve to inform policy decisions.
- Environmental risk perceptions: It would be reasonable to assume that the perceptions about environmental risk amongst bank employees can vary significantly based on several factors, like demographics, exposure to the topic, or levels of education. The value in

understanding the difference between the different types of employees will enable the industry to develop training protocols that match current levels of understanding of the topic.

Environmental Management Systems: A topic not explored in this study, is whether the environmental management systems used by banks adhere to any standards, like ISO 14001, or to what extent the EMS systems from different banks share similarities

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