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Climate Risk Disclosure:

An assessment of the South African agro-food sector

by

Koaile Monaheng

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Supervisor: Prof. Mark New

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Abstract

Climate change is one of the most pressing issues affecting humanity today and Africa is one of the region's most vulnerable to climatic shocks such as extreme weather events and climate-driven disasters. Businesses are not immune to these shocks, as profit margins and assets are affected by hazards such as floods and wind on property damage, as well as heatwaves and droughts affecting agricultural yields, water availability and commodity prices. Under the fast-growing uptake of Environmental Social Governance (ESG), companies have had to evaluate their non-financial impact on society and the environment to not only improve their long-term business sustainability, but also to mitigate the associated risks. In South Africa, ESG-related regulations and laws encouraging responsible business practice forefront sustainability as a prerequisite for value-creation and legitimacy. Whilst there has been a climate corporate accountability analysis of carbon-intensive sectors such as mining and energy in South Africa, climate-risk-dependent sectors like agriculture and food have been overlooked.

The agro-food sector not only significantly contributes to South Africa's annual gross total, but it is also one of the most exposed to physical climate risk. This research assessed the extent to which South African companies in the agro-food sector have incorporated climate change risks into their strategies and planning. The approach of this study went beyond the conventional high-carbon-intensive sectors and brought to the fore sectors that are less carbon-intensive but are also more prone to physical climate risks. Drawing from international climate disclosure frameworks such as the Carbon Disclosure Project (CDP) and the Task Force on Climate-Related Financial Disclosures (TCFD), this study developed a blended climate risk disclosure framework and sought to offer a more comprehensive understanding of sustainability and climate risk reporting in South Africa's agro-food sector. It included a benchmarking of global best practices from industry leaders in the agro-food sector as a reference for South African companies. This framework was then used to analyse climate related ESG reporting in eight of the leading companies in the agro-food sector in South Africa. According to the findings, in the agribusiness sector, most companies scored below global standards; in the food retail sector, the performance was generally better, but not matching the international standards. Overall, the study revealed that despite

sustainability, ESG topics and climate risk reporting being relatively new, they are still pretty much a work in progress in South Africa.

With the Southern African temperatures projected to rise at about 1.5 to 2 times the global rate of temperature increase, coupled with decreased water availability over much of the country, South Africa's already high vulnerability to climate change risk is likely to worsen, directly threatening environmental, social, and economic development. Taking robust action on the integration of climate change risk in comparatively low carbon-intensive yet climate-risk-dependent sectors further contributes to building climate resilience in regions at the forefront of the climate crisis.

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List of Acronyms and Abbreviations

AFOLU:	Agriculture, Forestry and Other Land Use
BUSA:	Business Unity South Africa
CERES:	Coalition for Environmentally Responsible Economies
CAT:	Climate Action Tracker
CCRF:	Climate Change Reporting Framework
CDP:	Climate Disclosure Project
CDSB:	Climate Disclosure Standards Board
CER:	Centre for Environmental Rights
DAFF:	Department of Agriculture, Forestry and Fisheries
DEA:	Department of Environment Affairs
DEFE:	Department of Forestry, Fisheries and the Environment
ESG:	Environmental and social governance
FAO:	Food and Agriculture Organization
GCCC:	Government Committee on Climate Change
GHG:	Greenhouse gas
GRI:	Global Reporting Initiative
IASB:	International Accounting Standards Board
ICC:	International Chamber of Commerce
IFRS:	International Financial Reporting Standards
INCR:	Investor Network for Climate Risk
IOS:	International Organization for Standardization
IOSCO:	International Organization of Securities Commissions
IPCC:	Intergovernmental Panel on Climate Change

JSE:	Johannesburg Stock Exchange
LTMS:	Long-term mitigation scenarios
LULUCF:	Land use, land-use change and forestry
NBI:	National Business Initiative
NCCC:	National Committee on Climate Change
NCCRP:	National Climate Change Response Policy
NDC:	Nationally determined contribution
NGFS:	Network for Greening the Financial System
PPD:	Peak, plateau, decline
PRI:	Principles for responsible investment
REIPPPP:	Renewable Energy Independent Power Producer Procurement Programme
TCFD:	Task Force for Climate-related Financial Disclosure
UNEP:	United Nations Environment Programme
UNFCCC:	United Nations Framework Convention on Climate Change
WBA:	World Benchmarking Alliance (WBA)
WBCSD:	World Business Council on Sustainable Development
WRI:	World Resources Institute

1. Introduction

1.1 Background

Various climate-related frameworks of sustainability reporting have been formed over the last few decades, with the general goal of encouraging ethical and sustainable business practices. Each framework has differed in terms of the scope of disclosure recommendations, information needs, and the target audience. The relevance of frameworks has become important not only to the corporate community, but also other stakeholders, due to the rise of non-financial sustainability-related information. Integrated reporting was arguably the most significant change to mainstream corporate reporting framework. According to Camodeca et al. (2018:3), the main aim of integrated reporting is to "overcome the limitations of 'traditional' reporting in relation to non-financial disclosure. Integrated reporting has been identified as a unified document representing both financial and socio-environmental performances." To this end, this study utilises integrated reporting as a central component in assessing the extent to which corporations in South Africa are addressing climate risk (transition and physical) in their strategies and reporting.

Two of the most used platforms for climate change reporting (or disclosure) are the Climate Disclosure Project (CDP) and, more recently, the Task Force for Climate-related Financial Disclosure (TCFD). Each of these are voluntary mechanisms by which a business discloses climate change information to a platform. The CDP supports companies in managing their carbon emissions and protecting themselves from climate risks and provides investors with more information on these portfolios prone to climate risks (NBI, 2022). Since its inception in 2001, there have been 6,300 companies worldwide that have participated in disclosing their environmental data annually, totalling nearly 15,000 companies in 2022 (CDP, 2022). The TCFD framework concentrates on wider climate-related issues by focusing on how climate change affects the company and its operations. Companies are encouraged to assess their operations under numerous climate change scenarios, preparing for transition risks and physical risks so as to ensure their sustainability in a climate constrained world, already being experienced. Since 2015, there have been over 3,900

organisations that have pledged their support for the TCFD, thereby recognising the importance climate change risks in their businesses (FSB-TCFD, 2022).

While governments could play a strong role in driving the transition towards a low-carbon development pathway, the private sector similarly has the responsibility to adapt to climate change. Despite climate action failure being ranked as a strong international risk over the last decade by the World Economic Forum (WEF) in an annual survey of business leaders, research further indicates that, among the world's largest companies, there are still companies under-preparing and under-reporting climate risks (Goldstein et al., 2018). One of the most significant insights from a recent analysis of TCFD reports of 1100 companies revealed that the magnitude of physical risk had been underestimated, whilst 'transition' risks were reported at about twice the rate as physical risks (Goldstein, 2018). The risks highlighted in the analysis included changes in crop yields and fisheries, while heat stress and increase in flood-related damage are all projected to rise twice as fast as International economic activity (Dellink et al., 2019; Jeverjevea, 2018). In the same vein, a CDP report warned that the businesses in the international food value chain industry are far from strengthening sufficient resilience against climate risks (Watkiss, 2020). To reinforce this warning, the latest WEF Global Risk Report of 2023 featured six environmental risks in the top 10 risks over the next 10 years, with the climate action failure dominating the list at rankings 1 and 2 (WEF, 2023).

The Intergovernmental Panel on Climate Change (IPCC), a scientific group assembled by the United Nations to monitor and assess all international science related to climate change, defined anthropogenic greenhouse gas emissions (GHG) in their most recent report, the *Sixth Assessment Report (AR6) Synthesis Report (SYR).* According to the AR6 SYR, anthropogenic climate change impacts are already taking place in every region of the world, from rising sea levels to more extreme weather events to rapidly disappearing sea ice (IPCC, 2023). In 2018, an IPCC report entitled *Global Warming of 1.5°C: An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the international response to the threat of climate change, sustainable development, and efforts to eradicate poverty*, concluded that an increase in global average temperature exceeding 1.5 °C could have severe impacts for

Southern Africa, which is identified as a climate hotspot. IPCC scientists have modelled and projected the likelihood of increasing average surface temperatures globally, suggesting that warming will be substantially greater in some regions of the world than it will be in others. It is one of the regions in the world that has been projected to likely become generally warmer and drier by warming at about twice the global rate of temperature increase (Scholes and Engelbrecht, 2021). In the last four decades, about 36% of the natural disasters that have occurred in Africa have taken place in Southern Africa (le Roux, 2022).

South Africa is vulnerable to climate change and has experienced an increase in the frequency of natural disasters such as droughts, floods, and storms. This increases the risk to a society susceptible to poverty, in an already physically and economically vulnerable country (NBI, 2019). According to a recent Climate Change Knowledge Portal assessment, “during the period of 1900-2017, above 100 disaster events were reported in South Africa, resulting in 2200 deaths as well as 21 million affected and totalling roughly US$4.5 billion monetary loss” (Climate Change Knowledge Portal assessment, 2022:1). Globally, as a signatory of international climate change instruments such as the Kyoto Protocol and the Paris Agreement, South Africa effectively endorses the call for a reduction of GHGs and building climate resilience into its social and economic fabric. Locally, acting through the Department of Forestry, Fisheries and the Environment (DFFE), formally the Department of Environment Affairs (DEA), the country reinforced this commitment by championing the transition to a low carbon economy. Other significant initiatives include the Johannesburg Stock Exchange (JSE) Climate Change Disclosure Guidance and the National Business Initiative (NBI) working together with Business Unity South Africa (BUSA) to collectively develop sectoral decarbonisation pathways together through a collective multistakeholder approach towards a Just Transition in South Africa (NBI, 2021).

The South African private sector has recognised the magnitude of climate change risks through their International leadership in integrated reporting by the following: firstly, local companies have established themselves as leaders in risk identification worldwide; secondly, there has been a growth of companies voluntarily responding to CDP Climate Change from the JSE Top 40 in 2007 to Top 100 in 2019 (including the heavy emitters); and thirdly, the exposure of the South African economy to transition

and physical risk is recognised by the TCFD (NBI, 2019). Despite illustrating international environmental stewardship through the support of the low carbon transition for the first decade of the CDP, recent data indicates that the integration of climate change into governance action may be faltering (NBI, 2018). The recognition of climate risk is not enough, these need to be translated into meaningful action. The NBI envisions “South African companies responding with urgent and bold action that considers the needs and activity of their stakeholders” (NBI, 2018:3).

Voluntary climate change disclosure is important for climate risk-averse sectors such as agriculture, whose sustainability is directly threatened by climate impacts to align both transition and physical risks. The intersection of these risks primarily affects agricultural production, due to impacts on crop yields and production relating to the direct disruption of the supply of raw material across the supply chain. The multiplier is an increase in price of raw materials, due to the physical impact of crop yields, as well as increased cost of energy in the production process. Even now, Southern Africa has exceeded the temperature optimum for the majority of crop and livestock production, where with projected further warming the likelihood of the demise of key crops and the livestock sector would be imminent (Scholes and Engelbrecht, 2021).

The World Benchmarking Alliance’s *2021 Food and Agriculture Benchmark*, which evaluates 350 keystone companies across the food system, revealed that the international food and agricultural sector is failing to take concrete steps towards environmental responsibility. According to the study, “only 26 companies have set greenhouse gas (GHG) emission reduction targets aligned with the Paris Agreement” (WBA, 2021:1). In addition, the report also noted a rapid decrease in ranking beyond the top performers Unilever, Nestlé and Danone (WBA, 2021), illustrating the gaps in the quality of disclosure when ranked among industry leaders. The South African companies assessed in the study scored between 14.2 and 31.9% out of 100%, illustrating the need for significant improvement.

The Agricultural and food sector remains one of the most climate-risk prone sectors in Southern Africa due to the water scarcity in the region, the deficit in water availability, the dependency of rain-fed agriculture, and the impact of extreme weather, such as floods and drought (Christensen, 2007). According to a 2019 IPCC Special Report on *climate change, desertification, land degradation, sustainable land management, food*

security, and greenhouse gas fluctuations in terrestrial ecosystems, climate change as already affected food security on an international scale, particularly in Africa, Asia and South America (IPCC, 2019). Climate change is projected to threaten the sustainability of agriculture and exacerbate the already high-level dependency on nature and agricultural resources for water, food, and income, leading to multiplier effects of widespread poverty and political instability (Ambrosino, Chandler and Todd, 2011; Kumar, 2019). The findings of the most recent 2022 IPCC Working Group II report, *Climate Change 2022: Impacts, Adaptation and Vulnerability*, concur that climate impacts and risk are likely to intensify for those communities who depend on agricultural livelihoods. Other risks include lowering families' income in parallel with rising food prices, and jeopardising food security as well as exacerbating health risks such as malnutrition (Levin, Boehm and Carter, 2022).

Despite the alarming climate risk exposure of 70% of the regional population, depending on rain-fed agriculture (Mabhaudhi et al., 2018:1), the impacts on agricultural and food sector tend to go underreported due to the preoccupation with major emitters from high-carbon intensive sectors, particularly in South Africa. Ziervogel and Ericksen (2010) reinforce that the relationship between climate change and food security is not well researched, therefore resulting in an underestimation of the magnitude of impact. A 2016 WWF Policy brief on *Climate Change Adaptation and Agriculture in SA* reinforced that, for decades there has been lack of coherency between governance structure, plans and policies and actions to tackle climate change adaptation blockades in the agro-food sector (Zwane and Montmasson-Clair, 2016). For instance, whilst government policies in Department of Agriculture, Forestry and Fisheries (DAFF) (2015) Strategic Plan 2015/16 to 2019/20 are designed to tackle climate change in the sector, there were gaps in addressing crops and livestock; and although water scarcity and drought are mentioned as cross-cutting issues, there is an absence of clear policy direction regarding how to address them (Zwane, and Montmasson-Clair, 2016).

Agriculture constitutes one of the two sectors (along with mining) that lies at the core of South Africa's economic development, contributing to local food security, jobs, and foreign income. At the same time, in 2020, Greenhouse gas (GHG) inventories reported agricultural forestry and other land use change (AFOLU) emissions of 40 775

Gg CO2e (DFFE, 2021). Due to the sinks from forestry and other land use change (FOLU) helping to offset agricultural emissions, the net emissions from AFOLU were 14 088 Gg CO2e (DFFE, 2021). Which is not only the fourth highest emitting sector in the country but also contributes 10% of South Africa's annual gross total (DFFE, 2021). In 2021, the NBI and BUSA, as part of the Just Transition and climate pathways study for South Africa, published a chapter on *Decarbonising the Agriculture, Forestry and Land use sector in South Africa.* The overall report was intended "to leverage further engagement with sector experts and key stakeholders towards a final report that will collate the individual sector findings and provide collective insight" (NBI, 2021: 10). One aspect that is missing in the report is the role of climate disclosure from companies. This gap forms the focal point of the dissertation by putting greater emphasis on climate action from companies in the South African agri-food system.

1.2 Rationale

The focus of this study is climate risk, specifically, physical climate risk disclosure. As the introduction revealed, there is a deficit in physical climate risk reporting with actions and engagement, both internationally and in South Africa. Prior research on TCFD submissions of the world's largest companies reinforces this point, as the research indicates concern regarding underpreparing and underreporting on climate risks (Goldstein et al., 2018), with one of most significant insights revealing that the magnitude of physical risks was underestimated, whilst 'transition' risks were reported at about twice the rate of physical risks (Goldstein, 2018). In South Africa, transition risk is highly concentrated in reporting (NBI, 2019), due to the economy's exposure to international shocks, driven by climate policies and minerals-energy export dependency (Ashman, 2021). In addition, the study examines the climate change reporting data of the companies, beyond CDP climate scores, contributing to the research area as previous studies focused on the CDP scores, and not on individual company responses (Luo et al., 2012). By highlighting physical risk reporting in South Africa, the study contributes to the body of literature on ESG reporting and climate change. Therefore, this research enables a focus on climate related impacts that have cost South Africa up to 20% of per capita GDP by the end of the century (Kings, 2019; Shayegh, Manoussi and Dasgupta, 2021; CMCC Foundation, 2021) and R640bn since 1980 in Southern Africa (News24, 2022).

The conventional TCFD methodology focuses on both climate change risks and opportunities, with opportunities referring to the “potential positive impacts related to climate change where efforts to mitigate and adapt can produce opportunities for companies” (TCFD, 2017: 78). In attempting to explain the preference of transition risk over physical risk, the TCFD methodology argues that the opportunity to gain through market-based incentives is a calculated decision that companies make. However, these opportunities are context-specific, depending on region, market, and industry of operations (TCFD, 2017). Victor (2020:1) refers to turning compliance into a competitive advantage for companies as “flying blind over the physical risks of climate,” particularly in regions that are on the frontlines of the climate crisis. The dissertation seeks to rebalance the disclosure discourse toward climate risk, thereby contributing to literature solely on physical climate-related risk, as opposed to opportunities.

1.3 Aims and Objectives

The overall aim of the study is to assess the extent to which South African companies in the agro-food sector have incorporated climate change risks into their integrated reporting strategies and planning. The approach of this study is to go beyond the conventional high carbon-intensive sectors, and bring to the fore sectors that are low-carbon intensive, but more prone to physical climate risks.

In terms of specific objectives, the study will:

- Analyse the role of climate change risk and describe the way that climate risk is conceptualised and reported across different international contexts and generate a set of best practices against which to assess South African agro-food companies.
- Analyse the integration of climate change risk into corporate governance and sustainably practice of South African agro-food companies, examining transition and physical risks with specific reference to how they compare with international industry leaders in climate change governance, reporting and disclosure.

1.4 Dissertation Outline

Chapter 2 presents literature on the challenges posed by climate change and the history of climate change governance and corporate climate change. Subsequently, the chapter considers the development of South African corporate climate change disclosure, together with a discussion of international initiatives that have been applied in the South African corporate sector, demonstrating the need for deeper analysis of the agro-food sector in relation to the South African climate risk analysis framework.

Chapter 3 details the methodology used to conduct this study through a climate risk disclosure blended framework that first assesses international industry leaders in the agro-food sector to provide a scope and benchmark from which to assess the South African companies in their climate risk disclosure. Chapter 4 presents all the key findings of the in-depth analysis results obtained from the research, analysis and of the South African companies' climate change-related risk performance. It also introduces a climate risk disclosure blended framework that draws from international climate disclosure frameworks such as the Carbon Disclosure Project and the Task Force on Climate-Related Financial Disclosures (TCFD). Chapter 5 provides a summary of the key results, a discussion of implications, and suggestions for further research.

2. Literature Review

The overall aim of the study is to investigate the extent to which climate change risk is present within South African corporate agri-food sector governance, strategy, planning, integrated reporting, and disclosure.

To provide a contextual background to the study, this chapter provides a review of relevant literature. It begins by examining the meaning of climate change and its origins in the context of global governance, and reviews literature on corporate governance, climate-related disclosure, integrated reporting, and international reporting frameworks. This will be followed by a review of climate change in South Africa, the South African corporate sector and climate change, and concludes with the integration of climate change risk into the South African agro-food sector.

2.1 Climate change

Anthropogenic climate change is one of the major challenges of the 21st century. It involves stabilizing human-induced greenhouse gas emissions at a level that would prevent dangerous interference with the climate system. According to the 2022, *Intergovernmental Panel on Climate Change (IPCC) Sixth IPCC Assessment on Climate Change,* "approximately 1.1°C of warming since 1850-1900 is due to emissions of greenhouse gases from human activities" (IPCC, 2022:1). There are nine planetary boundaries which are systems and environmental processes that regulate the Earth functionality and within which humans should operate safely (Steffen et al., 2015). These include climate change, biodiversity integrity (genetic and functional diversity of ecosystems and their functions), ocean acidification, depletion of the ozone layer, atmospheric aerosol pollution, biogeochemical flows of nitrogen and phosphorus, freshwater use, land-system change, and release of novel chemicals (Steffen et al., 2015). We have currently exceeded six of these boundaries, climate change chief amongst them, and therefore pushing the earth outside its safe operating space (Richardson et al., 2023).

Climate change poses a direct threat to livelihoods and weakens humanitarian efforts to achieve sustainable development goals in the most vulnerable regions globally (Stern, 2006; IPCC, 2013). Furthermore, it is important to note that, developing

countries are affected the most by the negative effects of climate change, whereas it is the developed countries who are historically responsible (Chandani at el., 2011).

The impacts of climate change have potential to undermine progress on the Sustainable Development Agenda (Agenda 20230); a 15-year global transformative roadmap adopted by world leaders in 2015 to end poverty, protect the planet and tackle inequality. Central to Agenda 2030, are the 17 United Nations Sustainable Development Goals (SDGs) which include 169 targets (Figure 1) intended to address "the three aspects of sustainable development: the economic, social and environmental" (Preamble, 2030:5). Although, climate action (SDG 13) is one of the SDGs, the impact of extreme weather disrupts socio-economic systems therefore compromising human well-being and planetary health (Schipper et al., 2022). Furthermore, the Paris Agreement and the 2030 Agenda are closely related, both encouraging a systemic change to protect present and future generations through a Climate resilient development (CRD). Which requires not only closing the GHG emission gap but addressing climate adaptation to support sustainable development (Schipper et al., 2022). However, that window of opportunity to implement CRD is rapidly narrowing and requires urgent global action.

***Figure 1**: United Nations Sustainable Development Goals (UN, 2019)*

2.2 Climate Change Governance

Global governance emerged as a worldwide attempt to manage climate change due to its borderless impact which requires multiple country efforts. Through the development of shared ideas, norms, values and principles, organizations were established which brought together governments, NGOs, CSOs and other actors to identify, understand, and address global climate change (Weiss, Conor and Coolidge, 2013; Plesch and Weiss, 2015). In 1972, the Stockholm United Nations Conference on the Human Environment became the global attempt at climate change diplomacy orchestrated by the United Nations (UN).

The 1972 Stockholm conference produced some protocols, frameworks and institutional structures that would guide global meetings and conferences establishing roadmaps which ultimately led to a consensus based decision-making body on climate change (Elliot, 2013). In 1992 at the Rio Earth Summit, the United Nations Framework Convention on Climate Change (UNFCCC) was drafted, later coming into force in 1994 (UN 1992; Chasek, 2001, Elliot, 2013). The UNFCCC would emerge as the umbrella body, responsible for the management and implementation of global climate change governance.

2.3 Corporate Governance

One of the basic foundational aspects of official business practice was the regulation of corporate accountability (Ocasio and Joseph, 2005; Ripley, 1926). The term corporate governance is defined as the balance of power between officers, directors, and shareholders (Sale, 2004). It was popularised in the United States during the 1980s, as a response to norms and rules regarding corporations' "need to constrain managers to act in shareholders' best interests" (Well, 2010:1253). Corporate reporting, shareholder voting, disclosure of information for shareholders to participate in the management of the firm opposed minority rule, where "managers led, and directors and shareholders followed" (Pound, 1995:91). At the same time, the understanding of corporate governance was intertwined with the maximisation of shareholder's returns, echoing Milton Friedman's corporate doctrine that businesses existed solely to make money, and were therein absolved of any responsibilities or concerns for employees, customers, or broader society (Friedman, 1970).

Although Friedman's doctrine would dominate the understanding of the modern corporation and economic policy throughout the twentieth Century, some scholars opposed this profit maximisation in the conception of corporate governance. As far back as the eighteenth Century, Scottish philosopher and economist Adam Smith introduced early conceptions of the importance of the social relationship between firms and the community (Stigler, 1971; Werhane, 1991). The butcher or the baker was dependent on the welfare of the community for their business to thrive, thereby sacrificing his own private interest to the public interest of his own order or society (Smith, 1759). According to Gonin (2014: 222), "far from promoting an economic system autonomous from any societal obligations, Smith pleads for a business world in close interaction with its societal context." Similarly, in the early 1900s, Italian businessman and philosopher Adriano Olivetti echoed Smith's views. Olivetti unequivocally believed that business profits ought to be re-invested for the benefit of the community, highlighting the significance of social responsibility. Embedding of principles of justice and fairness with an intergenerational long-term thinking as well as the promotion of a sustainable society by a business before Friedman's corporate doctrine (Olivetti, 1952).

Against this background, there were two historical tipping points that permitted the eventual incorporation of climate-related issues to global corporate governance. The first was a failing US economy impacted by the 1970s recession, which orientated global corporate governance towards neglected non-US conceptions. United States executives became handicapped by the mechanisms of quarterly 'time horizons' due to financial market pressures and takeovers. Meanwhile, their counterparts were not short-term in their corporate governance systems, by focusing on long-term investment (Porter, 1992; Blair, 1995). The second was the 2008 global economic crash, attributed to a severe lack of financial supervision and regulation, which laid the foundation for a sustainable outcome aligning with long-termism. In the context of a changing external environment and societal pressure, there emerged a number of frameworks that aimed to encourage business to assess and report more on their sustainability-related information and climate-related disclosure emerged.

2.4 Climate-Related Disclosure Organisations

In 1989, the Coalition for Environmentally Responsible Economies (Ceres) was founded with the goal of encouraging ethical and sustainable business practices, including environmental performance into company reports (Ceres, 2018). One of the first initiatives proposed by Ceres was the introducing voluntary principles to encourage good environmental behaviour and a corporate commitment for companies to report on the implementation of these principles yearly (Kolk et al., 2008; Pattberg, 2012; Smith, 1993). The guidelines and principles for public disclosure by companies impacts on society, and on the environment formed the establishment of Global Reporting Initiative (GRI) by Ceres in 2001. The GRI Guidelines for sustainable reporting encourage business to assess and communicate information about their performance and impacts across four dimensions: economic, environmental, social, and governance, and provides a framework of reporting guidelines to facilitate these respective dimensions (Pattberg, 2012).

Mitigating climate change beyond nations or international institutions became governed by disclosure, understood as the acquisition and dissemination of information to influence the behaviour of actors in a desired direction (Gupta, 2010). Given the significance of 'governance through information' and the financial implication of climate change impact, carbon disclosure emerged as a strong tool for the societal purpose of reporting and accounting. Carbon disclosure "translates corporate carbon profiles into assessments of risks and market opportunities with clear financial implications for firms and investors" (Kolk et al., 2008: 228–229). Furthermore, Pattberg (2017:1444) further reinforces that "carbon disclosure uses mechanisms of transparency and accountability to influence behaviour of target actors."

2.5 Carbon Disclosure Project (CDP)

In 2002, the Carbon Disclosure Project (CDP) was founded in the United Kingdom with the goal of encouraging business to disclose more information about their climate change exposure (CDP 2003; Kolk et al., 2008). This included asking firms to measure, manage, and disclose their own greenhouse gas emissions, and including in their broader supply chain, but call on them to disclose information about their climate change risks, strategies, and actions. The CDP primarily calls on the finance

and investment community to think of capital “as a long-term prosperity instead of having a short-term gain at the expense of the environment” (NBI, 2015: 2). Various entities, such as states, cities and companies, worldwide, are encouraged to measure and manage their environmental impact in the categories of climate change, forests, and water security (CDP, 2017a; 2017b). Since 2003, more than 570 cities, 100 states and 6 300 companies worldwide have participated in disclosing their environmental data each year to the CDP (2017b). The self-reported environmental dataset is publicly available on the CDP website, illustrating entities’ commitment towards responsible conduct (Kauffmann & Less, 2010). In addition, it is important to note the voluntary aspect at the heart of reporting. According to Meek, Roberts, and Gray (1995) voluntary disclosure refers to when companies provide information even when there is no legal requirement to disclose. As a result, by submitting to the CDP, companies are demonstrating an acknowledgment of their environmental impact, through a company-wide effort that formulates of climate change risk management strategies, policies and actions aimed at reducing GHG emissions (CDP, 2012; Doda et. al, 2015; CDP 2017a; Simpson, 2018).

Currently, CDP scoring in *Table 1* is built on its principles and values for sustainability, using a points allocation system that represents four steps of progress towards environmental stewardship, namely: 1) disclosure; 2) awareness; 3) management and 4) leadership (CDP, 2022). Points are awarded at each level through a question and response approach that converts points cumulatively into a percentage for each threshold, with a minimum score required to advance to the next level. For disclosure and awareness, points accumulated at these levels are “divided by the maximum number that could have been awarded” (CDP, 2022:6). The points accumulated per scoring category are used to calculate the final score for management and leadership levels. Each level has an alphabetical score band through a percentage threshold, as illustrated below:

Table 1: CDP Scoring Breakdown (CDP, 2022:6)

Level	Climate Change	Water	Forests	Score band
Disclosure	1-44%	1-44%	1-44%	D-
	45-79%	45-79%	45-79%	D

Awareness	1-44%	1-44%	1-44%	C-
	45-79%	45-79%	45-79%	C
Management	1-44%	1-44%	1-44%	B-
	45-79%	45-79%	45-79%	B
Leadership	1-79%	1-79%	1-79%	A-
	80-100%	80-100%	80-100%	A

The highest score that a company can achieve is an (A) in their climate change disclosure. indicating their performance across environmental leadership, a degree of understanding of a its climate change risk, and opportunities. In addition, including best practice strategies and actions across key frameworks such as the TCFD and high scores in science-based targets, and creating a climate transition plan (CDP, 2022). A score of (B-/B) indicates some evidence of its environmental impact, whilst displaying applicable good environmental *management* and action, but is not good enough to mark it out as a leader (CDP, 2022). A score of (C-/C) indicates that the company has disclosed the environmental impact of the business but varies in the level of *awareness* in its response (CDP, 2022). The fourth score of (D-/D) illustrates a level of disclosure that does not go beyond environmental stewardship with a lack of more extensive information and is awarded to companies at the starting point of their environmental journey (CDP, 2022). The lowest score is (F), which indicates the failure of a company to provide sufficient information in their CDP response for that year.

In addition, it is important to recognise the CDP and TCFD connection to other frameworks, including the S&P Global Corporate Sustainability Assessment, and the United Nations Sustainable Development Goals. The CDP “aligned its questionnaires with the TCFD’s recommendations, alongside introducing a sectoral focus and adopting a forward-looking approach to climate-risk disclosure” (CDP, 2018: 6). The sectoral focus is intended to scale up ambition and specificity in evidence of progress, which includes not only implementation, but also achievement on agreed goals (CDP, 2018).

2.6 Other climate-related disclosure frameworks

Following the CDP, the frameworks of climate-related financial disclosure became more visible with the establishment of: (i) the Greenhouse Gas (GHG) Protocol by the World Resources Institute (WRI) and the World Business Council on Sustainable Development (WBCSD); and (ii) the launch of the Investor Network for Climate Risk (INCR) by CERES, promoting the management of corporate disclosure on climate risks and opportunities. In addition, climate-related financial disclosure rose to even greater prominence with the Kyoto Protocol ratification in 2005 (Hahn et al., 2015). Under the Protocol, 38 industrialised nations committed to binding GHG emission reduction targets by an average of 5.2% by 2012 in relation to 1990 levels (Gupta and Mason, 2016; Kuh, 2018; Keong, 2021). This made it the first treaty to directly attempt to limit GHG Emissions (Barrett, 1998).

Working in tandem with Kyoto, in 2005, the Who Cares Wins Conference united business leaders and sustainability experts, highlighting the drivers of environmental and social governance (ESG) in asset management and financial research (IFC, 2005). The result was a report supported by a high degree of alignment among participants, providing recommendations on how to incorporate ESG issues into longer-term investment. In order to reinforce the growing importance of ESG issues to financial performance, the United Nations Principles for Responsible Investment (PRI) were formed in 2006 (UN, 2006). In the same year, an influential report on the economic impact of climate change titled the *Stern Review* was published (Stern, 2006).

Despite the growing prominence of climate-related disclosure in the early 2000s, there was an increasing concern regarding the low quality of the disclosed information. Some researchers questioned the overall premise of disclosure of information influencing the environmental performance of firms (Dahlström et al., 2003) as others saw the notion of ‘carbon disclosure’ as an opportunity for firms to engage in ‘greenwashing,’ as opposed to meaningful changing their corporate behaviour (Greer & Bruno, 1996). Furthermore, a study carried out between 1988 and 2005 on the US fossil fuel industry revealed that most fossil fuel companies were not forthcoming to their shareholders about the threat of climate-related material risk on the business, effectively being non-complaint with the US Securities and Exchange Commission

Guidance for disclosure (Coburn et al., 2012). As a response, numerous companies engaged in misleading campaigns of investment, rebranding their strategies of obligation to address renewable energy (Juhasz, 2013).

2.7 Integrated Reporting

Against this background, the different standards sought alignment in 2007, when CDP, CERES, the WBCSD and WRI created the joint Climate Disclosure Standards Board (CDSB). The purpose of the CDSB was to harmonise reporting practices and integrate climate information into mainstream financial reporting, following and after public consultation the Climate Change Reporting Framework (CCRF) was launched. In 2010, another reporting initiative called the International Integrated Reporting Committee (IIRC) was formed in parallel, under the same related goal of bridging the gap between consistency of information that companies were disclosing in diverse reports. Convened by the Prince of Wales' Accounting for Sustainability Project, one of the goals was to get both managers and investors on the same page regarding the long-term sustainability of firms (De Villiers et al., 2016). Therefore, the term 'integrated report' emerged as a concise explanation to call on firms to explain "how an organization [sic] creates value over time" (IIRC, 2013; 4). As indicated by the IIRC, integrated reporting is defined as the bringing:

> *"…together [of] the material information about an organization's [sic] strategy, governance, performance and prospects in a way that reflects the commercial, social and environmental context within which it operates an important role in the context of longer-term investment" (IIRC, 2013; 3).*

The IIRC framework highlights six forms of capital which are natural, social, and relationship, human, intellectual, manufactures and financial in defining corporate value creation (IIRC, 2013). The IIRC received widespread international support for including both financial and non-financial information to defining its corporate value, specifically in terms of the role that individuals from social and environmental sustainability community played in its founding (De Villiers et al., 2016).

Despite both the CCRF and the IIRC being good standardisation initiatives, they have been criticised due to the narrow focus on solely investors and excluded metrics. Similarly, in 2011, the Sustainability Accounting Standards Board (SASB) provided

sustainability standards and financial material information that formed a communication tool for investors. This has been the subject of widespread criticism, where the IIRC in particular was condemned for moving away from the principles in sustainability and accountability, to stakeholders at the core of its founding (Flower, 2015; Brown and Dillard, 2014).

The privileging of the financial community and excluding broader society led to a reinforcement of the status quo. In response, although various reporting initiatives attempted to focus on a broader audience beyond investors, there was still the issue of disjointedness and incomparability in reporting. To promote coherence in the reporting system between standards as well as corporate reporting frameworks, the IIRC introduced the Corporate Reporting Dialogue initiative (CRD) in 2014. The CRD brought together, the IIRC, CDP, CDSB, GRI and SASB, as well as global accounting bodies, the International Accounting Standards Board (IASB), and the International Organization for Standardization (ISO) (CRD, 2019:1). The robust alliance involving global accounting bodies and standards, coupled with the low quality in disclosure, meant that there was still a need for metrics, standardised language, and a generic reporting criterion.

2.8 Task Force for Climate-related Financial Disclosure (TCFD)

In search of a singular, consistent framework for climate-related financial disclosures, the G20 Finance Ministers and Central Bank Governors within Financial Stability Board (FSB). as an “international body that monitors and makes recommendations about the global financial system” (TCFD, 2021; 1) founded the Task Force on Climate-Related Financial Disclosures (TCFD) in 2015. Following the 2008 financial crisis that shook the entire global economy, the one takeaway deeply troubling the financial community was that previous assessments of financial stability had proved themselves to be inadequate. Any vulnerabilities and risks to the financial system needed to be addressed.

In line with the FSB, whose main purpose is to maintain international financial stability, the TCFD recognised climate change as a significant threat and “perhaps most understood, risks facing organizations [sic] today due to the disruptive changes across economic sectors and industry” (TCFD, 2017:2). Since 2012, the largest, most

influential financial authorities in the worldwide, Blackrock CEO Larry Fink, published annual letters to CEOs calling for greater transparency in sustainability and climate change disclosure (Whyte, 2021; Carlin, 2021). Due to the traditional short-termism of business decision making, the financial sector was exceptionally exposed to climate change (Dietz et al., 2016).

In business terms, the carbon budget concept as well as fossil fuel divestment pressure from civil society prompted the introduction of conversations about stranded assets and the financial sector (Carney, 2015). In response, the FSB understood carbon disclosure according to four fundamental aspects. Firstly, better disclosure meant that the transitioning towards a low-carbon economy would be gradual and smooth, so as to prevent any financial shocks. Secondly, it would allow for an early assessment of climate. Third, climate-related disclosure ought to be voluntary. Lastly, disclosure would strengthen understanding of the "financial sectors' exposure to carbon-related assets and climate risks" (FSB, 2015:2). Fundamentally, the FSB alluded to the reality that for any businesses that failed to decarbonise the economy, would be exposed to climate change (O'Dwyer and Umerman, 2020).

In 2015, the TCFD would emerge to "develop voluntary and consistent climate-related financial disclosures that would be useful to investors, lenders, and insurance underwriters in understanding material risks" (TCFD, 2017, p. iii). The large scope in membership and varying backgrounds of 32 different members allowed for a comprehensive climate-related disclosure framework that included non-financial firms as well (TCFD, 2018). Further to this, the TCFD brought a fundamental shift in the disclosure framework in comparison to previous initiatives. Historically, the focus was placed on how companies impact climate change, which resulted in disclosure being focused on companies with high-climate impact, such GHG emissions. Emphasis was shifted to disclosing how the company and its operations were affected by climate change. By disclosing climate-related information in their plans and strategies, the TCFD framework encouraged business to investigate different scenarios in which climate-related risks and opportunities can be identified.

Even though the threat of climate change affects most economic sectors, the level of exposure and the impact of climate-related risks is different according to sector, industry, geography, and organisation (TCFD, 2017). Furthermore, the financial

impacts of climate-related issues on organisations are driven by the specific climate-related risks and opportunities to which the organisation is exposed, as well as the strategic and risk management decisions regarding the seizure of those opportunities and the management off those risks (TCFD, 2017). Fundamentally, in order for organizations to fully grasp actual and potential financial impact caused by climate change they need to look internally at which materials risks they are prone to.

In 2017, the TCFD's final recommendations were published and included four core elements of climate-related financial disclosure as presented in *Figure 2* below: governance, strategy, risk management, and metrics and targets (TCFD, 2017). In addition to the four recommendations, there are eleven guiding reporting indicators, designed to aid companies identify climate-related risks and opportunities that are not only relevant to them but remain financially material to the business (TCFD, 2017). The TFCD framework recognises two groups of climate risk, namely: the transition risks associated with shifting to a low-carbon economy, and the physical risks of climate change (TCFD, 2017). In addition to these risks, the TCFD framework also outlines five main segments of opportunity where businesses can align climate change disclosure with the TCFD-framework, namely: resource efficiency, energy source, products and services, and markets and resilience (TCFD, 2017). Overall, these recommendations are intended to improve economic decision-making informed by clear, consistent, and reliable disclosures (Staker et al., 2017).

***Figure 2**: Core elements of recommended climate-related financial disclosures (TCFD, 2017: v).*

The emergence of the TCFD framework against the backdrop of the Paris Agreement (PA) at COP25 in Paris, was significant to the final recommendations. The central aim of the negotiations was to keep the "increase in global average temperature to well below 2°C above pre- industrial levels and pursue efforts to limit this warming to 1.5°C in relation to the same baseline" (Paris Agreement, 2015;3). Another objective involved ensuring that finance flows similarly complimented the pathway towards "low GHG emissions and climate-resilient development" (Paris Agreement, 2015;3). As a result, the TCFD would implement scenario analysis as a tool for critical strategy thinking, by assessing the resilience of the organisational strategy "under different plausible future scenarios of the world," such as a 2°C or lower scenario (TCFD, 2017; 29). Therefore, aligning the appropriate climate change responses with specific climate risks and improving the business' management of climate change risk under each different scenario (Carlin, 2020; Staker et al., 2017).

Since its inception, four status reports have been published by the TCFD, with the most recent in October 2021. The report illustrated the magnitude of widespread international support, where an additional 1000 new organisations pledged their support for the framework (TCFD, 2021). Furthermore, this took the total number of supporters to over 2,600 globally, including 1,069 financial institutions responsible for assets of $194 trillion (TCFD, 2021). The TCFD framework has had globally significant uptake among nations as well, now spanning 89 countries. What began as a voluntary set of recommendations has transformed part of the regulatory framework in multiple jurisdictions (Deloitte, 2021). For instance, New Zealand became the first country in the world to ensure that all financial institutions with in is jurisdiction were aligned with the TCFD recommendations (Clark and Shaw, 2021). Another country was the United Kingdom, following its announcement to make TCFD aligned disclosures mandatory by 2025 (HM Treasury, 2020).

Climate change is informed by both challenges and opportunities for businesses (Kolk, and Pinkse, 2009). On the one hand, there is reputational risk, along with regulatory, physical, and financial risk. In contrast, there are opportunities associated with a low-carbon and green global economy, such as new markets and growth in renewable energy, energy efficiency, and the carbon market. This involvement encompasses mitigation (GHG reduction) and adaptation (through research, financing, innovation,

technology, and capacity building) to adapt with climate change (IISD and WBCSD, 2009).

At the international level, through negotiations, the involvement of businesses to implement effective responses to climate change originated in 2005 at G8 Gleneagles Summit, where a Plan of Action on Climate Change, Clean Energy and Sustainable Development was developed, signalling the reduction of major GHG emissions intensity in major industrial sectors. From 2007 at COP 13 in Bali, to Copenhagen (COP15) and Cancún (COP16), business engagement was driven by the World Business Council for Sustainable Development (WBCSD) and International Chamber of Commerce (ICC) (Nhamo, 2012; IISD and WBCSD, 2009). Other influential international partnerships include the World Bank, the United Nations Environment Programme (UNEP) (Van Der Merwe, 2011).

The rest of this literature review will attempt to establish the relevance of \climate change in South Africa, and roles played by corporate governance, integrated reporting, and climate risk disclosure in addressing climate change.

2.9 Climate Change in South Africa

Climate change impacts in South Africa are projected to have severe consequences on the country. According to the IPCC 5th Assessment Report “Africa is most vulnerable to the impacts of climate change due to its low adaptive capacity to respond economically, politically, and geographically” (NEPAD, 2017:2). In addition, the IPCC *Special Report on Global Warming of 1.5 °C (SR15)* indicates that even at a global average warming of 1.5 °C, other regions – Africa being one of them – warming to a degree greater than this metric (IPCC, 2018). The report concludes that the risk to economies and societies is likely to be irreversible if the temperature soars beyond 1.5 °C (IPCC, 2018; NBI, 2019).

With Southern Africa gripped by a history of water scarcity (Enqvist and Ziervogel, 2018), the projections of climate impact, such as decreased rainfall and increased temperatures, are already evident in parts of South Africa (Christensen et al., 2007). Furthermore, this will increase climate risk, where “extreme biodiversity loss and degradation of water catchment areas are likely to lead to an increased risk of heat stress leading to a decrease in human productivity and health” (WWF, 2016; 19). In

2018, the Intergovernmental Science-Policy Platform on Biodiversity reported that the world was dangerously close to exceeding tipping points that would risk extinction for millions of species. The fear of these tipping points was realised in 2021, as the IPCC released its AR6 warning that much of the damage caused by climate change was now irreversible (IPCC, 2021). This was further intensified by the continued disproportionate climatic impacts already affecting developing country regions even at a just 1.5ºC scenario.

Even as South Africa is regarded as one of the most developed African countries, it is extremely vulnerable to climate change risk, ranking seventh on the continent as reported by the Global Climate Risk Index (Kreft, Eckstein & Melchior, 2017). According to the SR15 report, parts of the country are projected to warm at twice the global rate, reinforcing both the physical and economic exposure to climate change (IPCC, 2018). Therefore, South Africa has every incentive to participate in limiting global warming to 1.5°C to prevent disastrous impacts of climate change, some of which have already arrived.

Climate change is likely to exacerbate South Africa's existing development challenges, such as elevated levels of poverty and inequality in the country (DEA, 2011b; Ziervogel et al., 2014; Leibbrandt et al., 2010). In addition to being climate vulnerable, it is a significant GHG emitter globally, due to its dependency on coal to generate electricity (NBI, 2021; Ziervogel et al., 2014). Despite the vital importance of carbon intensive industries such as mining and energy to the economy (DEA 2013), South Africa will need to transition to a sustainable, low-carbon and equitable country in a resource-constrained future (Wolpe and Reddy, 2015). In reinforcing, whilst the financial cost of immediate mitigation remains considerable, the financial cost and human cost could be greater in the long-term.

South Africa's commitment to climate action began when it became a signatory to the UNFCCC in 1993, which it ratified in 1997. The country's record within the UNFCCC is formidable, producing national responses in line with international treaties, despite developmental challenges. In 1998, it became a signatory to the Kyoto Protocol and produced its first government white paper outlining how to tackle climate change nationally (DEA, 2004). As a result, in 2004, the National Climate Change Response

Strategy emerged as a cross-sectoral response to tack climate change through policy and action (Lehman, 2016).

The 2009 Copenhagen Accord which aims to GHG reduce emissions by 34% from Business as Usual (BAU) by 2020, and 42% by 2025 is another framework which South Africa supported. This commitment under the Copenhagen Accord reflected its own national development and the Long-Term Mitigation Scenarios (LTMS) were endorsed by it the government, with a strategic carbon trajectory of a Peak, Plateau, Decline (PPD) deployed (DEA, 2011). Under PPD, it was the expectation GHG emissions would be expected to peak by 2020, plateau until 2030, and begin to decline after 2030, with the support of implementation of energy efficiency interventions (DEA, 2011). Key lead author of the LTMS, Prof. Harald Winkler, insists that the government ought to be more ambitious by taking the lead and ensuring that "mandatory not voluntary action is needed" (Lehman, 2016:4). This is particularly important for a country severely impacted by climate change, yet also a significant (GHG) emitter.

In 2011, prior to South Africa hosting COP-17 in Durban, the National Climate Change Response Policy (NCCRP), previously known as the National Climate Change Response Green Paper, was adopted, along with the National Development Plan for 2030 (DEA, 2011). Under the LTMS mitigation approach, sectoral emissions reductions via a carbon budget were introduced. A carbon budget is defined as the "tolerable quantity of GHG emissions that can be emitted in total over a specified time" (WWF, 2014:1). The introduction of the carbon tax and the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) illustrated a meaningful attempt to lower GHG Emissions. However, due to a lack of alignment and policy coherence between the carbon tax (Treasury) and carbon budgets (DEA) mitigation strategies have subsequently been delayed (Gilder and Swanepoel, 2018).

According to the 'EU 20-20-20' three-pronged policy, a successful mitigation strategy is informed by three central pillars: the limiting of GHG emissions; the replacing of "fossil fuels with renewable energy; and the efficient improvement of energy" (Lehman, 2016:5). However, in South Africa's case, some scholars lamented the lack of clarity in specification regarding an integrated roadmap and binding targets of precisely what is required to achieve the PPD trajectory in LTMS, the Green Paper and the White Paper (Lehman, 2016; Averchenkova at el., 2019). Whilst all three identify the main

GHG mitigation policy options available, translating these goals into concrete policy and legislation remains a challenge, made perverse by a series of delays, with implementation postponed indefinitely. This issue has become a roadblock for implementation of future climate change action in South Africa.

In 2015, South Africa signed the Paris Agreement, proclaiming further declaration of its promise to a transition to a low carbon economy (NBI, 2016; UNFCCC, 2017). Under the Paris Agreement framework, signatories are required to set domestic mitigation measures and targets through a process called Nationally Determined contributions (NDCs). The Agreement's objective is to limit global warming "to below 2 °C and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels" (Obergassel et al., 2016: 2). NDCs are required to be submitted once every five years and will be evaluated collectively to identify progress by a mechanism called the Global Stocktake (UNFCCC, Art 14). Regular reports on NDC implementation will be required to be submitted by Parties which will receive high level feedback from Expert Committee (UNFCCC, Art 15), and subject to international peer review via the Enhanced Transparency Framework (UNFCCC, Art 13).

South Africa has produced annual reports detailing a nation-wide monitoring and evaluation process towards its five-year emissions target to the UNFCCC (DEA, 2019). Under its NDC, South Africa states that it is important to balance developmental needs with climate change imperatives through a just transition, eliminating poverty and eradicating inequality in the process (DEA, 2015). The global temperature goal is a fundamental point noted in the NDC, with reference made to below 1.5°C considering emerging science. Although the national GHG emissions target set are 212–428 Mt CO2e by 2050, and 398–614 Mt CO2e between 2025 and 2030 (utilising 2016 as the starting point towards reduction), South Africa's NDC has been rated 'highly inefficient' by the Climate Action Tracker (CAT), an "independent scientific analysis of country progress through pledges and targets, fair share, current policy projections, and assumptions" (CAT, 2020:1). Under this ranking, South Africa's NDC is inconsistent with of 1.5°C target, and instead consistent with warming between 3°C and 4°C worldwide. This leads to severe impacts, with global average temperature increase of 2°C translating to up to 4°C for South Africa, where a 4°C world translates to an 8°C South Africa (CAT, 2020).

In 2020, the Presidential Climate Commission (PCC) was formed with an overreaching goal to raise the ambition of the country's climate change response (The Presidency, 2020). The PCC, included stakeholder representation from all facets of the economy including government, labour, business organisations, civil society, traditional leadership research institutions and academia. One of the Commissions' tasks was overseeing an updated NDC. In 2021, following further consultation as a response to nationwide criticism and public pressure, a draft updated NDC was submitted with (GHG) emission reduction targets of 274-352 MtCO2eq (factoring in Land Use, Land-Use Change and Forestry (LULUCF)). Nevertheless, this arrangement has been criticised by international organisations such as CAT and the Climate Equity Reference Project, with several civil society groups stating that it is "too conservative and unambitious [in terms of its] GHG emission ranges for 2021 to 2030" (CER, 2021; 1). Whilst the updated NDC improves on the previous submission due to increased mitigation ambition, it ranks as 'inefficient' and is still inconsistent with the Paris Agreement target of 1.5°C (CAT, 2021). It is, however, worth noting that, under the NDC update, the coal-based electricity sector was highlighted as a focal point for deep decarbonisation, due to the energy sector being the majority contributor to South Africa's GHG emissions.

From 2023 to 2024, South Africa reached a landmark milestone in its environmental policy. Following final parliamentary processes by the National Assembly and then the National Council of Provinces (NCOP), the Climate Change Bill was approved (DFFE, 2024). It is a legislative framework to effectively guide the national climate change response providing regulations and assigning responsibilities for mitigation, adaptation, and finance. It is intended to have a cross sectoral coordinated response across spheres of government under the leadership of the PCC. Overall, the South African climate governance calls on a cross-sectional collaborative climate change response from all actors in the economy. For business in particular, the government has called for environmental stewardship through the disclosure of carbon emission, quantifying carbon footprints as well as taking concrete steps and actions to reduce them.

2.9.1 South African Corporate Sector and Climate Change

Against the backdrop of the South African climate governance context, there has been an increase in the companies in the private sector within the societal and scientific climate change debate (Hanh et al., 2015). Voluntary disclosure, which refers to the voluntary provision of information by a company to its stakeholders, initially gained prominence in South Africa in the form of carbon disclosure as an aspect of sustainability reporting, through its status as signatory to the Kyoto Protocol (Hanh et al., 2015). This was later intensified when the South African private sector prominently supported the Paris Agreement as signatory, by effectively endorsing the call for reduction of GHGs (CDP, 2015).

2.9.2 South African Corporate Governance

Prior to these important developments, the foundation of voluntary disclosure was through South African corporate governance in 1994, under the establishment of the King Committee, named after former chairman Professor Mervyn King (Rossouw et al., 2002). There have been four reports published (King-I 1992-1994; King II 1994-2002, King III 2002-2016; King IV 2016 present), all with the purpose of promoting the highest standards of corporate governance. South Africa is highly ranked as one of the top performers in financial reporting quality, and a pioneer in emerging forms of corporate governance incorporating both external reporting and integrated reporting (World Economic Forum, 2018; Solomon, 2013; Atkins and Maroun, 2015; Maroun and Cerbone, 2020).

Since its establishment, the King Code called for responsive good corporate governance to reflect the principles of social equity and environment, as essential principles in South Africa (Stenzel, 2010). The need for reporting that reflected the environment in which a business operated became imperative, citing “how a company has both positively and negatively impacted on the economic life of the community in which it operated” (IOD, 2009:5). Furthermore, this was followed by the steps that the company would take to enhance the positives, and eradicate the negative aspects moving forward (IOD, 2009). The King Code’s international status was further solidified when it incorporated global challenges, such as climate change, income inequality, and political instability ahead of its global peers, the United States and Europe (Maroun and Cerbone, 2020). One of the most important recommendations of the King

Code was the compliance-based approach, which was further supported by the JSE requirements of listed companies in explaining reasons for non-compliance (IOD, 2009).

Following the 2008 global recession, which laid bare the need to transform the international financial system from detrimental short-term thinking to long-term challenges and outcomes (University of Cambridge, 2020: 14), exacerbated by the growing popularity of the sustainable development movement, the most recent version of the King IV 2016 underwent its most significant shift. King IV highlighted that "development that meets the needs of the present without compromising the ability of future generations to meet their needs" (IOD, 2016:27), thereby emphasising the importance of sustainability as a central tenet in determining a corporation's value. Furthermore, King IV recognised climate change as a driver of change, with companies expected to "apply and explain" in the implementation of corporate governance principles in instances of non-compliance that are fundamental to good governance.

In an effort to address growing pressures and based on a demand for stronger corporate sustainability disclosure, as well as companies coming under scrutiny by investors and stakeholders for their climate change mitigation efforts, the JSE in 2021 released the JSE Sustainability Disclosure Guidance. The document was intended "to help companies navigate the landscape of reporting standards explicitly for the South African context" (JSE Limited, 2021:3). The JSE Sustainability Disclosure Guidance draws on several international best practices with regards to sustainability/ESG and climate change disclosure, such as the GRI Sustainability Reporting Standards, the TCFD recommendations, the IFRS Foundation's ISSB prototypes, and the Integrated Reporting Framework (JSE Limited, 2021). Companies are now expected to take seriously their reporting on sustainability impacts and risks with the similar depth as well as precision in the way they have with financial information (JSE Limited, 2021). Of relevance to this research is to evaluate the presence of climate-change risk disclosure on the South African agro-food sector.

2.9.3 South African Corporate Climate Change disclosure

In 2011 at COP17 in Durban, South Africa foregrounded the private sector. The two most influential business associations the National Business Initiative (NBI) and

Business Unity South Africa (BUSA) were involved in these negotiations (Nhamo, 2012). BUSA serves as the official linkage between business and government in policy matters beyond climate change. Whilst the NBI plays a role in raising awareness and developing capacity on climate change strategies (Nhamo, 2012:17). The South African private sector has been directly involved in the establishment of a national policy process and climate change negotiation strategy under the Department of Environmental Affairs (DEA), National Committee on Climate Change (NCCC), Government Committee on Climate Change (GCCC) and most recently, the PCC.

The participation of business in climate change discourse came about in part due to pressure from government policies, consumers, and other stakeholders (Less & Kauffman, 2009). Civil society has been the most significant voice to promote awareness on the climate change and environmental degradation (Jumbe, 2008). Furthermore, through advocacy, civil society has made a powerful and unique contribution, bringing to public attention the importance of climate-related corporate responsibility in South Africa. Notable organisations that championed this work are Centre for Environmental Rights (CER) and Just Share SA. The CER is an NGO that was formed in 2009 by a community of activist lawyers who are committed to aiding communities and other CSO in South Africa through advocacy and litigation for environmental justice (CER, 2021). Just Share is a NPO focusing on shareholder activism, devoted to advancing issues on responsible investment in South Africa towards a just, inclusive, and sustainable economy. The pillars of their work include “research, engagement, advocacy and activism to drive urgent action to combat climate change and reduce inequality” (Just Share, 2022:1).

The CER and Just Share both lean on the Constitution as the point of departure in the legal framework and advocacy used to hold major emitters and polluters accountable. In particular, the Bill of Rights (1996), Section 24 of the Constitution, which reads as follows:

> “Everyone has the right –
>
> (a) to an environment that is not harmful to their health or wellbeing; and
>
> (b) 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 ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

Since 2015, as part of the CER Corporate Accountability and Transparency Programme, a series of reports has been published entitled the *Full Disclosure - the Truth About South African Corporate Environmental Impacts, Compliance and Disclosure*. These reports assess the South African listed companies' public disclosures with substantial climate and environmental impacts. The CER reports "analyse the extent to which these companies accurately reflect their environmental compliance records, and their environmental impacts and liabilities, in their reports to shareholders" (Full Disclosure, 2022:1). In 2019, the CER published *Full Disclosure 5*, entitled *The Truth about South African Banks' and Companies' Ability to Identify and Address Climate Risks, which was* focused on the top 10 major GHG emitters and South Africa's five largest banks (Full Disclosure, 2019; Abdinor, 2019). The companies (Eskom, Sasol, ArcelorMittal, South32, Anglo American, PPC, Sappi, African Rainbow Minerals, Exxaro, and Gold Fields), who's joint GHG emissions make up 61% South Africa's GHG emissions, typically come from the energy and mining sector (Abinor, 2019).

Similarly, Just Share builds climate change risk awareness, to encourage shareholder action in high emitting industries. By utilising shareholder activism through AGM attendance and questioning of companies' stated commitments, Just Share can leverage public accountability. They are a pioneering leader in the development of environmental, social, and governance (ESG) factors into financial analysis and decision making in South Africa, applying both the global best practice and South African legislation and regulation. Whilst some corporate entities acknowledge and take seriously the urgency of climate change risks, admittedly there is still a lag in progress, with the financial sector still funding new coal-fired power station projects and corporate silence on climate change risks (Just Share, 2018). Since its inception, Just Share's shareholder activism has been concentrated on the carbon majors' sector (energy and mining) and the finance sector (banks, pension funds and asset

management firms). This thesis, therefore, seeks to go further, and includes agro-food sector to the South African climate risk analysis framework.

2.10 Summary

Climate change is a pressing global issue characterised by significant changes in temperature patterns; extreme weather events; rising sea levels; and ecological imbalances. Its impacts are far-reaching, posing a threat to human progress, and undermines the progress of key SDGs (IPCC, 2013). Over the years, global climate change governance has evolved to address the urgency of climate change through global efforts under the UNFCCC as the primary umbrella body for international cooperation and policy negotiations on climate change, paving the way to the landmark Paris Agreement in 2015.

The recognition of the anthropogenic cause of climate change which releases greenhouse gases into the atmosphere has also highlighted the role of corporations as heavy contributors to climate change. Consequently, corporate climate governance emerged by recognising that the significant responsibility of businesses in addressing climate change. Climate-related disclosure and integrated reporting have become important tools within the realm of corporate climate governance through the practice of companies providing transparent and accurate information about their climate-related risks, opportunities, and strategies. In addition to a company's financial, environmental, social, and governance performance and the interconnectedness between these factors and the company's long-term sustainability. Two notable climate-related reporting mechanisms are the Carbon Disclosure Project (CDP) and the Task Force on Climate-related Financial Disclosures (TCFD).

In the South African context, climate change poses significant challenges, including increased droughts, heatwaves, and food security risks. The South African corporate sector is required to play a crucial role in addressing climate change, as businesses have the capacity to contribute to greenhouse gas emissions reduction, climate resilience, and sustainable development. Over the years, South African companies in high-carbon emission sectors have faced societal pressure to respond to climate change in the form of climate-related disclosure and integrated reporting. With the overarching goal of developing towards a low-carbon and climate-resilient economy,

responding to both transition and physical risks is a prerequisite. However, prior research illustrates that, not only is there a preoccupation with the high-carbon emitting sectors, but companies are biased to reporting on transition risks as opposed to physical risk, which leaves detrimental blind spots in building a sustainable climate resilient future. Therefore, this research aims to bring to the fore sectors that are low-carbon intensive, but arguably more prone to physical climate risk, such as the agro-food sector in particular, which is of great importance, as it is directly impacted by climate change, and holds significant potential for intervention.

3. Methodology

The literature review has indicated a research lacuna when it comes to the agro-food sector in the context of climate risk disclosure, and a lack of substantial reporting on physical climate risks. For South African companies, climate-related risk disclosure ought to be an imperative, given the existing climate risks and likelihood of disproportionate climate impacts in the region. Therefore, this study aims to add to the body literature by answering the following question:

To what extent have companies in the South African agri-food sector incorporated climate change risks into their strategies and planning.

To answer this question, the dissertation used a three-step process, summarised below, which is described in more detail later in this chapter.

Step 1:

Drawing from international climate risk disclosure frameworks such as the Carbon Disclosure Project (CDP) and the Task Force on Climate-Related Financial Disclosures (TCFD), this study developed a blended climate risk disclosure framework, through which it sought to offer a more comprehensive understanding of sustainability and climate risk reporting in South Africa's agro-food sector. The framework has 10 guiding measurement areas distributed across three different categories, namely: 1) TCFD Recommendations – Governance, Strategy, Risk Assessment, and Metrics and Targets; 2) Transition risks - Policy and legal, Technology, Market, and Reputation; 3) Physical risks - Acute Risks and Chronic Risks.

Step 2:

A sample of international industry leaders in the agro-food sector in Tables 2 and 3, were selected to provide a background and benchmark from which to assess the South African companies in climate risk disclosure. Under the food retailers in Table 2, the international companies selected were Unilever, Nestlé, Danone, General Mills, Sainsbury. Under the agri-business in Table 3, the companies selected were Olam International, Archer Daniels Midland (ADM), Mowi, and Kellogg's Company. The sample is a snapshot representation of diverse industries encouraging a broader

perspective and understanding of different markets. It was appropriate to classify these companies as ‘’industry leaders’ due to their exemplary CDP Climate scores, sustainability performance, high-level implementation of TCFD recommendations, and top ranking against the WBA Food and Agriculture Benchmark (WBA). As the most influential companies in the agro-food sector with respect to their contribution to the SDGs (WBA, 2021), these are companies that are recognised as international leaders.

Step 3:

An assessment was completed of these international companies’ sustainability and integrated annual reports through the blended climate risk disclosure framework. The international companies’ performance in the climate risk disclosure blended framework resulted in an international benchmark against all measurement areas, which assess South African companies. Through the achievements, practices, and solutions of leading organisations, benchmarking can also become a process of comparison to the leaders with best practice, with the purpose of gaining more in-depth knowledge, creating conditions for improvement of their own solutions and results (Babović, Raičević and Carić, 2012).

Step 4:

A mapping analysis of the 60 JSE listed companies in the agro-food sector (and food retail companies) classified under the JSE category “Consumer Goods Sector” was completed. This was followed by extracting CDP climate change submissions of the 53 agro-food sector companies who regularly submitted to the CDP over five years from 2017 to 2020. Next, a sample of eight South African agro-food companies (four agri-business and four food retailers) was selected based on size of presence in the industry and consistency of CDP climate change submissions. From the food retailers in Table 4, the companies selected included: Pick ’n Pay, Shoprite, Spar Group, Woolworths HL. Under the agri-business category in Table 5, the companies selected included: RCL Foods, Tiger brands, Oceana Group, and Tongaat Hulett. Diversity was also taken into consideration as well with both Oceana Group (South Africa) and Mowi (Norway) representing the seafood industry.

Step 5:

Finally, an in-depth content analysis was undertaken of the companies' climate-related corporate governance, integrated reporting, and disclosure through their integrated annual reports and sustainability reports from 2016–2020. This was assessed against the climate risk disclosure blended framework that included to determine the best performers through comparison and contrast, where the data was be presented graphically, and percentages converted to rank.

3.1 Data Collection

As described above, a sample of international industry leaders in terms of sustainability from the agro-food sector were selected to provide a scope and benchmark from which to assess South African companies in the context of climate risk disclosure. The tables below illustrate the sample of international and South African industry leaders selected.

Table 2: *International food retailers*

Company name	Headquarter	Industry	Group Revenue USD [2021]
Unilever	United Kingdom	Consumer goods	59,068,181,900
Nestlé	Switzerland	Food and beverage	98,476,595,800
Danone	France	Food and beverage	26,818,181,900
General Mills	USA	Consumer goods	16,865,000,000
Sainsbury's	United Kingdom	Consumer goods	41,553,846,200

Table 3: *International agri-business*

Company name	Headquarter	Industry	Group Revenue USD [2021]
Kellogg's Company	USA	Food processing	13,578,000,000
Archer Daniels Midland (ADM)	USA	Food processing	64,355,000,000
Olam International	Singapore	Food processing	35,820,000,000
Mowi	Norway	Seafood	4,272,954,600

Table 4: *South African food retailers*

Company name	Industry	Group Revenue USD [2021]
Pick n Pay	Food retail	59,068,181,900
Shoprite	Consumer goods	98,476,595,800
Spar	Food retail	26,818,181,900
Woolworths	Consumer goods	16,865,000,000

Table 5: *South African agri-business*

Company name	Industry	Group Revenue USD [2021]
RCL Foods	Food processing	R31.7b [1,781,513,372]
Tiger brands	Food processing	R34.0b [1,910,771,440]
Oceana Group	Seafood	R8.15b [458,023,154]
Tongaat Hulett	Food processing	R14,9m [837,367]

3.2 Climate risk disclosure blended framework

This section outlines the climate risk disclosure blended framework developed for this research. The climate risk disclosure blended framework in Table 10, draws from the recommendations of the TCFD.

Table 6: *Climate risk disclosure blended framework:* The Climate risk disclosure blended framework has 10 guiding reporting measurement areas distributed across three different categories: 1) TCFD Recommendations – Governance, Strategy, Risk Assessment, and Metrics and Targets; 2) Transition risks - Policy and legal, Technology, Market, and Reputation; 3) Physical risks - Acute Risks and Chronic Risks. The Scoring Approach for these measuring areas is explained below:

	Indicator	0	1	2
TCFD Recommendations				
1	**Governance**	The company does not disclose any information about climate-related risk governance or	The company discloses personnel who are responsible and equipped for the implementation of its	The company discloses its decision-making process as well as the company board's role and management of climate-related risks and opportunities.

		accountability processes.	climate-related risk and opportunities.	
2	**Strategy**	The company does not disclose any information about its towards building resilience to managing existing and potential impacts of climate-related risks and opportunities in climate-related scenarios.	The company discloses its potential impacts of climate-related risk on its strategy and operations.	The company discloses its processes towards building resilience to managing existing and potential impacts of climate-related risks and opportunities in climate-related scenarios.
3	**Risk Management**	The company does not disclose its priorities or process for climate-related risk and how they manage and control them.	The company discloses and describes their processes to identify, prioritize climate-related risk and impacts on business operations.	The company discloses the prioritisation, recognition, and process of climate-related risks and how they manage and control them.
4	**Metrics and Targets**	The company does not disclose its metrics of performance to evaluate in the context of risk management and strategy and across climate related targets.	The company discloses the metrics used to evaluate climate change related risks and opportunities with GHG emission reduction targets.	The company discloses its metrics of performance in the context of risk management and strategy and across climate related targes such as: • Aligned with 1.5°C Paris Agreement goal. • Science-based target initiative (SBTI) Reports on at least scope 1 AND 2 emissions.

Transition Risk				
5	**Policy and legal legislation on climate**	The company does not disclose information on awareness of climate related policy and legislation.	The company describes awareness of climate related policy and legislation.	The company discloses and describes how they are impacted and makes decisions in relation to climate related policy and legislation.
6	**Technology**	The company does not disclose any information about technological advancements linked to lower emissions or in energy-efficient technology.	The company discloses information regarding its technological development towards lower emissions or in energy-efficient technology.	The company discloses information regarding the development, monitoring, and evaluation of the technological development towards lower emissions or in energy-efficient technology.
7	**Market**	The company does not disclose any climate-related information to consumers.	The company discloses climate-related information and impact in agro-food sector.	The company accepts its climate-related responsibility in the agro-food sector and recognizes climate change as a significant material risk and takes action to respond to it.
8	**Reputation**	The company does not disclose information on how it engages with its stakeholders.	The company discloses its stakeholder engagement process into its climate change and sustainability strategy.	The company discloses its stakeholder engagement process and integration into its climate change and sustainability strategy.
Physical Risk				
9	**Acute**	The company does not disclose any information on acute climate-related risks.	The company discloses information on acute climate-related risks and describes how its operations are	The company implements actions to respond to sector-specific acute climate risk actions, and how the company is impacted, alongside targets and plans and action to reduce and

			impacted by extreme weather events.	takes actions to support impacted stakeholders.
[10]	**Chronic**	The company does not disclose information on chronic climate-related risks.	The company discloses information on chronic climate-related risk information on how it is impacted by long-term chronic climate-related risks.	The company discloses information targets and plans to respond to long-term chronic climate-related risks, alongside actions to support impacted stakeholders.

3.2.1 Scoring Approach

The section outlines the scoring guidelines for the climate risk disclosure blended framework developed for this research. Each indicator is awarded a score of between 0 and 2. Typically, a score of 0 indicates that no relevant disclosure of evidence or activities relating to the indicator from the company was provided. A score of 1 is an indication of some evidence in the company's disclosure that relates to the indicator, but which is lacking concrete action to mark it out as a leader. A score of 2 reflects leading exemplary performance by the company, which indicates rigorous disclosure performance against that target, coupled with best practice strategies. The company's overall score will be equal to the average of the scores received for each of the measurement areas:

- The TCFD recommendations include four indications that evaluate climate-related risks and opportunities in organizations:

    1. Governance: disclosure of the company board's role and management of climate-related risks and opportunities.
    2. Strategy: disclosure of the company's resilience to managing existing and potential impacts of climate-related risks and opportunities.
    3. Risk management: disclosure of the company's recognition, process and management of climate-related risks and opportunities.
    4. Metrics and targets: disclosure of metrics of performance to evaluate the company's performance in the context of risk management and strategy and across these targets.

- Transition risks refer to those changes and associated financial impacts that accompany transitioning to a low carbon economy (TCFD, 2017). The four indicators included in this section are:

    1. Policy and legal legislation: disclosure of policy risks are associated with the costs of shifting policy and reporting standards in the mitigation of climate change, such as local legislation of the carbon tax, or global legislation, such as the Paris agreement. In addition, the ramifications of not adhering to relevant legislation and therefore costing the company can be considered legal.
    2. Technology: disclosure of expenses information regarding the development, monitoring, and evaluation of the technological development towards lower emissions or in energy-efficient technology.
    3. Market: The market and reputation risks are closely related, placing emphasis on consumer demands and stakeholders. The company accepts its climate-related responsibility in the agro-food sector, discloses it as a material risk and takes action to respond to it. Consumer awareness of climate and sustainability issues can place pressure on businesses to respond through relevant environmentally friendly products and services.
    4. Reputation: disclosure of how the company integrates stakeholders associated with the company expect issues of climate change and sustainability to be championed beyond the acknowledgment of crises to action. Failure to do so could impact negatively on the reputation of the company, leading to losses in revenue as investor sentiments and consumer expectations with respect to climate shift associations and preferences.

- The physical risks are divided into two separate indicators below:

    1. Acute risk: disclosure of the business' preparedness and response to extreme weather events, such as drought and flood. Examples of these costs include the destruction of property, disruption of operation, and raw materials. Forms

of acute risks have been witnessed in Southern African through recent extreme floods and drought.

2. Chronic risk: disclosure of the long-term company preparedness and response climate change, such as the financial implication of coastal companies having to shift operations due to rising sea-levels.

It is important to note that physical risks vary between sectors and is unevenly distributed across the globe (Pinkse and Gasbarro, 2016). The South Africa agro-food sector inevitability receives the 'short end of the stick', with the region already beyond the temperature optimum for most crop and livestock production (Scholes and Engelbrecht, 2021).

3.3 Opportunities, risks and global best practices in climate risk disclosure

The TCFD recommendations for companies in the Agriculture, Food, and Forest Products and the Food, Agriculture and Forest Products TCFD Preparer Forum provides industry guidance on global leadership in climate risk disclosure (WBCSD, 2020). Climate-related risks and opportunities in agriculture, food, and forest products originate from GHG emissions and water due to production practices (TCFD, 2017). Producers, such as agri-businesses, are likely to face physical risks from extreme weather as well as changes in precipitation patterns, resulting in severe financial impacts. Processors, such as food retailers, are likely to be impacted by policy and legal risk from indirect scope three emissions emanating from their distribution and supply chain. A good opportunity in this sector is lowering carbon intensity, which it is hoped will lead to energy efficiency.

In addition, global best-practice of the agro-food sector not only provides industry understanding of the disclosure of climate risks, but also contributes to the benchmarking from which to assess the South African companies:

1. Employing tools and frameworks to identify, assess, and mitigate risks include Enterprise Risk Management (ERM), scenario analysis, and modelling as tools in the risk management of climate-related potential impacts on their business.
2. International leaders provided evidence as well as detailed description of their identified risks and potential impacts with time horizons in their disclosures.

3. Industry leaders adopted GHG emissions reductions targets that were aligned with both the 1.5 °C Paris Agreement warming trajectory and science-based targets initiative (SBTi) for at least Scope 1 and Scope 2 (some for Scope 3).
4. Industry leaders adopted ownership of climate risks beyond mere awareness raising and provided distinction between physical climate risks (acute and chronic), along with appropriate responses for each.
5. Industry leaders engaged in collaborative climate risk identification and responses to increase awareness of sustainability practices and optimise partner networks to increase response efficiency (WBCSD, 2020).
6. Industry leaders supported stakeholders in addressing both mitigation and adaptation of the physical climate risk and impacts through developing relationships that helped farmers achieve greater productivity and resilience to in long-term climate variability.

4. Results and Discussion

The following chapter presents the results obtained from the study, beginning with the results of the benchmarking process of the international industry leaders, and then the assessment of the South African companies. Moreover, the key findings from the reporting and observations are also discussed in this chapter.

4.1 Benchmarking

This section will present the general results of the international industry leaders across the climate risk disclosure blended framework described in section 3.

4.1.1 CDP Benchmarking

This section will present the sample of international industry leaders' climate-related risk disclosure in each of the agro-food sector. The purpose of this is to determine global best practice approaches and the criteria for inclusion that will provide a scope and benchmark from which to assess the South African companies in the context of climate risk disclosure.

4.1.2 International industry food retailers

Among the international food retailers in Table 7, assessed in this study, Unilever, Nestlé and Danone are regarded as international leaders in the agro-food sector through the integration of world-class sustainability practices right through their operations. According to the 2021 WBA Food and Agricultural Benchmark, Unilever ranks 1st (with Nestlé 2nd, and Danone 3rd), since it exhibits leading environmental best practice and performance across key sustainability topics. On the CDP platform, Sainsbury, Unilever, Nestlé and Danone consecutively ranked top of the Climate Change 'A list', a list of top performers leading the way in environmental transparency and performance on climate change. Companies such as Danone and Unilever have gone one step further, achieving a 'triple A' rating "across the key environmental categories of Climate Change, Forests, and Water Security" (Segal, 2021:1). Regarding the TCFD performance, Unilever, Nestlé and Olam International formed part of a collaboration of business under the World Business Council for Sustainable Development (WBCSD) that shared expertise and leading practices in advancing the application of the recommendations of the TCFD Preparer Forum (WBCSD, 2020).

Table 7: *International food retailers' climate change responses to the CDP [2016 – 2020]*

Company name	2020	2019	2018	2017	2016
Unilever	A	A	A	A	A
Nestlé	A-	A	A	A	A
Danone	A	A	A	A-	B
General Mills	A	A	A	A	A
Sainsbury's	A	A	A	A-	A

4.1.3 International industry agri-business

The international industry agri-businesses in Table 8, assessed in this study are Archer Daniels Midland (ADM), Kellogg's Company, Mowi, and Olam International. They are the highest-ranking international agri-business in the 2021 WBA Food and Agricultural Benchmark (WBA, 2021). Overall, Kellogg's company ranked 11th in the benchmark, illustrating exemplary performance in several topics under governance and strategy. Although Olam International ranked 23rd, Archer Daniels Midland (ADM) ranked 37th, and Mowi 57th, they were jointly in the top 16% of companies ranked in the international agro-food sector value chain. All companies received scores between A, B, and C in the CDP climate change responses, which indicate that they are strong performers in environmental transparency and performance on climate change, but not the top performers. Nevertheless, all four of the selected international industry agri-businesses are considered world leaders.

Table 8: *International agri-business' climate change responses to the CDP [2016 – 2020]*

Company name	2020	2019	2018	2017	2016
Kellogg's Company	B	B	B	B	A-
Archer Daniels Midland (ADM)	A-	B	B-	C	B
Olam International	A-	C	B-	B	C
Mowi	A	A-	C		

4.1.4 Comparison of CDP to scores of SA companies

The latest CDP South African Climate Report, which provides an overview of South African company climate responses, is from 2018. In 2015, more than "800 of the largest listed companies around the world responded to the CDP's annual international

climate change questionnaire in favour of an international deal to tackle climate change" (CDP, 2015: 1). The private sector illustrated corporate support of the Paris Agreement at COP21, with companies understanding that commitment to emissions targets from governments "could not only be translated into ambitious reduction targets from industries but clarify their roles as drivers to a low-carbon economy" (CDP, 2015:4). Therefore, the five-year period of CDP submissions from 2016 following COP21 to 2020 in Table 9, allows for an insightful assessment of corporate ambition and commitment. South African industry food retailers, Pick 'n Pay, the Spar Group, Shoprite, and Woolworths HL averaged a score of (B-/B) good environmental management and CDP climate change responses. Some formidable mentions include Pick 'n Pay that scored A- in 2019, and A in 2016, as well as Shoprite that achieved a score of A- in 2020.

Table 9: *Food retailers CDP climate change comparison [2016 – 2020]*

International Food retailers' climate change responses to the CDP [2016 – 2020]					
Company name	2020	2019	2018	2017	2016
Unilever	A	A	A	A	A
Nestlé	A-	A	A	A	A
Danone	A	A	A	A-	B
General Mills	A	A	A	A	A
Sainsbury's	A	A	A	A-	A
SA food retailers' climate change responses to the CDP [2016 – 2020]					
Company name	2020	2019	2018	2017	2016
Pick n Pay	B	A-	B	B	A
Shoprite	A-	B	B-	C	B
Spar	B	B	B	B	B
Woolworths	B	B	B	B	B

On the international industry agri-business sector in Table 10, Olam International, Archer Daniels Midland (ADM), Mowi, and Kellogg's Company, illustrated some mixed results ranging from A, B to C in their CDP climate change responses, with the Kellogg's Company being the most consistent company. Despite not being the top performers overall, they are highly influential agro-food companies across their

operations in terms of their sustainable business practices. In comparison, the South African agri-businesses were not far off from their international counterparts, with RCL Food performing better than the industry leaders, with consecutive A score from 2016-2018 and the Oceana Group averaging a B score. Tiger Brands was the worst CDP climate change performer with scores of F and C, followed by Tongaat Hulett. As the largest food manufacturer on the continent (Tiger Brands, 2021), it stands to reason that environmental stewardship complement the scale of the company.

From this comparison with international industry leaders, South African companies performed respectably, averaging B-/B over five years of CDP climate disclosure, apart from Tiger Brands, and Tongaat Hulett. The results are consistent with the findings from the 2018 CDP South African Climate Report, which indicate that despite South African companies illustrating strong risk recognition in reporting, the data on action and engagement does not translate into progressive action (NBI, 2019). Therefore, whilst there is evidence of good reporting on climate change risk present within the South African agro-food sector, actions and implementation are needed. On an encouraging note, key findings from the 2018 CDP South African Climate Report indicate that no other international sample surpasses South African corporates in identifying more risk and opportunity (NBI, 2019).

Table 10: *Agri-business' CDP climate change comparison [2016 – 2020]*

SA agri-business' climate change responses to the CDP [2016 – 2020]					
Company name	2020	2019	2018	2017	2016
RCL Foods	B	B	A-	A-	A
Tiger brands	A-	A	A	A	A
Oceana Group	B	B	B-	B	A
Tongaat Hulett	F - NR	F- NR	C	B	B
International agri-business' climate change responses to the CDP [2016 – 2020]					
Company name	2020	2019	2018	2017	2016
Kellogg's Company	B	B	B	B	A-
ADM	A-	B	B-	C	B
Olam International	A-	C	B-	B	C
Mowi	A	A-	C		

4.2 Global best practice blended framework:

The purpose is to benchmark global best practice approaches across the frameworks' 10 guiding measurement areas: 1) TCFD Recommendations - Governance, Strategy, Risk Assessment, and Metrics and Targets; 2) Transition risks - Policy and legal, Technology, Market, and Reputation; 3) Physical risks - Acute Risks and Chronic Risks. Table 11 illustrates the global best practice examples by industry leaders across each of the guiding measurement areas that are elaborated on through the section 4.1.

Table 11: *Global best practice blended framework:* the global best practice examples by industry leaders across each of the guiding measurement areas. On the left column is the definition of the measurement area and on the right column is an indication of how international industry leaders have performed against it**.**

TCFD Recommendations		
1	**Governance:** The company discloses its decision-making process as well as the company board's role and management of climate-related risks and opportunities.	Global best practice examples: Sainsbury and General Mills' executive team not only regularly receive sustainability training and development to update their skills, but the expertise is also generated from both internal and external experts. In addition, Mowi and Unilever's remuneration policies contain key sustainability and climate change performance indicators and targets for their executive team.
2	**Strategy:** The company discloses it processes towards building resilience to managing existing and potential impacts of climate-related risks and opportunities in climate-related scenarios.	Global best practice examples: Unilever and Nestlé use scenario analysis to evaluate potential direct impacts integrated into their sustainability strategies.
3	**Risk Management:** The company discloses the prioritisation, recognition, and process of climate-related risks and how they manage and control them. .	Global best practice examples: Olam International, utilise their Climate Change Scenario Analysis project to develop a range of risk scenarios (transition and physical) and quantify how they affect supply and demand conditions. Furthermore, most industry leaders use an Enterprise Risk Management (ERM) framework to evaluate their risk, but also distribute risk management across its board in terms of expertise and knowledge, ensuring suitable representation from key functions across the company.

4	**Metrics and Targets:** The company discloses its metrics of performance in the context of risk management and strategy and across climate related targes such as: • Alignment with 1.5°C Paris Agreement goal. • Science-based target initiative (SBTI) • Reports on at least scope 1 AND 2 emissions.	Global best practice examples: Global best practice on emissions disclosure in an adoption of GHG emissions reductions targets that align with a 1.5°C Paris Agreement warming trajectory, the science-based targets initiative (SBTi) and have GHG emissions reduction targets under scope 1, 2 3. As a result, Unilever, Nestlé, Olam, Sainsbury, ADM, Mowi, and GM, have disclosed and set time bound climate-related targets on each of these categories across their full value chain.
Transition Risk		
5	**Policy and legal legislation on climate:** The company discloses and describes how they are impacted and make decisions on climate-related policy and legislation.	Global best practice examples: Nestlé, Danone and Unilever are aligned to the 1.5°C Paris Agreement goal and commitments of GHG emissions transition plans across their entire value chains.
6	**Technology:** The company discloses information regarding the development, monitoring, and evaluation of the technological development towards lower emissions or in energy-efficient technology.	Sainsbury, ADM, as well as GM are committed to building resilient supply chains, and have set a time bound target to source 100% renewable energy for their international operations. Other examples include lowering energy consumption through green buildings, increased share of renewable electricity use at processing plants, energy intensity reduction, investment in water and renewables-related R&D for new products or services to tap into new and emerging markets.
7	**Market** The company accepts its climate-related responsibility in the agro-food	Global best practice examples: Unilever is developing a lower carbon footprint product to reduce packaging, manufacturing and

	sector, discloses it as a material risk and takes action to respond to it.	transport emissions. Generally, most industry leaders also reported a soil health and agrobiodiversity, including targets to manage fertiliser and pesticide use within their entire value chain, through climate smart agriculture. Regenerative agriculture practices were widely cited to promote biodiversity and diversify crop production by all the agro-food industry leaders. In addition, time-bound targets for plastic use and waste reduction, food waste, and water stress were disclosed by most industry leaders.
8	**Reputation** The company (a) discloses its process for identifying and engaging with stakeholders; (b) discloses the outcomes of its stakeholder engagement and its integration into its sustainability strategy; (c) its stakeholder engagement covers sustainability covering climate-related risk and impacts in the agro-food sector.	Global best practice examples: Mowi undertakes a materiality analysis that evaluates how stakeholder concerns are related to climate change. Nestlé, Unilever, and ADM worked together with key customers (with a concern for climate change) in their materiality assessment and sustainability strategy. In addition, Danone and Sainsbury collaborate with smallholder farmers and other retailers in tackling climate-related risks by supporting farmers in the agricultural models aimed at reducing environmental impact across the value chain.
Physical Risk		
9	**Acute** The company implements actions to respond to sector-specific acute climate risk actions and how the company is impacted, alongside targets and plans and action to both reduce and takes action to support stakeholders to build resilience.	Global best practice examples: Kellogg's and Nestlé continually monitor the impact of acute risks on raw materials in the supply chain (especially agricultural commodities), world supplies, and prices of their raw materials. Sainsbury tracks its operations through GIS mapping software to identify stores that exist in areas at greatest risk of flooding. Unilever have not only undertaken plans to secure key resources, but they have also involved their manufactures in acquiring substitute products. Olam and Unilever

		acknowledge the impact of acute risks on operations and crops have developed tools and national initiatives to include their suppliers in sustainable resilience practices that respond to extreme weather.
10	**Chronic** The company discloses information targets and strategies prepare and react to the long-term climate-related risks and implements actions to support stakeholders in adaptation measures and resilience. ,	Global best practice examples: Change Scenario Analysis is used by most industry leaders to disclose the potential long-term impact on the availability of raw materials, water, temperature, and farmland availability. Olam collaborates in initiatives that invest in climate-related mitigation and adaptation for farmers, such as physical resilience training and infrastructure support of farmers; carbon foot-printing and water scarcity trackers for farmers. Danone's water and food cycle approach is focused on climate resilience with smallholders, whose holistic view of farming economic resilience provides modern extension services and protects the diversity of genetic resources important for adaptation.

4.2.1 TCFD Recommendations

The TCFD recommendations include governance, strategy, risk management, metrics, and targets.

Governance:

According to the global standards, companies are required to disclose their decision-making process as well as the company board's role and management of climate-related risks and opportunities. Generally, both international industry leaders in the agro-food sector are standard setters in the category of governance and issues of climate change and sustainability strategies are addressed at the highest level of the businesses. According to Unilever's 2020 integrated annual report, "the board of directors has ultimate responsibility for the oversight and implementation of its

sustainability strategy, accountability for the management of all risks and opportunities, including climate change" (Unilever, 2020: 51). Therefore, highlighting the significance of responsibility and accountability of management as well decision-making of climate risk being concentrated at the board level. In addition, the expertise and competencies of the executive team are also publicly disclosed, with firms regularly updating the skills set of their leaders.

To encourage company executives to work harder and make the best strategic decisions for the company's future regarding sustainability and climate risk, it is increasingly becoming global best-practice to link executive remuneration to these targets and goals (Ritz, 2022; Bose et. al, 2022). This development specifically aligns with Principle 6 of the World Economic Forum's Principles for Climate Governance, which aligns climate-related targets with executive incentives (World Economic Forum, 2018; Ganu and Mathur, 2021). Leading companies have incorporated sustainability and climate-linked incentive compensation in line with related key performance indicators to measure the holistic company responsibility and strengthen corporate strategy as well (Cook, Savage and Barge: 2021).

Strategy:

The TCFCD and WBCSD define strategy as "a dynamic state of preparedness for a range of different futures in pursuit of a particular state in which society lives and flourishes within the planet's climatic boundaries" (WBCSD, 2020:44). In other words, climate resilience is regarded as a focal point in the sustainability journey of a business, in developing adaptive capacity to respond to climate risks. International industry leaders use a tool called scenario analysis to guide their company strategy as well as through recognizing the potential threat of material impacts and risk of climate change on their business. Nestlé places great importance on scenarios analysis in their strategic resilience journey under different external conditions, reinforcing that "in the short-term Nestlé must navigate transition risks whilst in in the longer term, physical risks could pose a greater threat to the food and beverage industry" (Nestlé, 2020: 7).

Generally, industry leaders all have a low carbon transition plan that considers their own operations and value chain. In addition, industry leaders set time-bound commitments for most of their relevant sustainability topics, and regularly report

against them. Regarding materiality, climate scenarios analysis outcomes informed climate-related risks (both transition and physical). Furthermore, the industry leaders provided a detailed distinction between physical and transition risks, in their disclosures to the TCFD framework.

Risk Management:

In this measurement area, the company discloses the prioritisation, recognition, and process of climate-related risks and how they manage and control them. International Industry leaders used an Enterprise Risk Management (ERM) framework to evaluate their risk, but also distribute risk management across its board in terms of expertise and knowledge, ensuring suitable representation from key functions across the company. Risk Management is distributed across the entire company and requires suitable expertise and knowledge of the key functions across the company, such as the potential impact of "increased drought frequency and severity rely on different skills, as opposed to departments responding to changing consumer preferences and technological developments" (WBCSD, 2020: 21).

According to global best practice, integrated reporting and risk management is a complementary match, creating an essential element in strengthening corporate governance (IFRS, 2022:1). For instance, Nestlé's ERM approach not only "identifies, assesses, and mitigates risks to minimize [sic] their potential impact, but to also support the achievement of long-term purpose and business strategy" (Nestlé, 2020: 4). By using modelling scenarios, companies evaluated climate-related risk in terms of both direct and indirect impact on the company, as well as societal impact. Generally, companies cited the importance of "both quantitative and qualitative measures are useful tools for communicating the severity of the risk" (WBCSD, 2020: 26).

Metrics and Targets:

Global best practice under this measurement area requires the company to disclose its metrics of performance to evaluate its performance in the context of risk management and strategy and across climate related targes (Kumar, 2019). Under the guidance of the TCFD recommendations for the *Agriculture, Food, and Forest Products Group*, companies are encouraged to also focus on water, waste and GHG

emission as part of their metrics and targets specific to the industry (TCFD, 2017). Global best practice on emissions disclosure in an adoption of GHG emissions reductions targets have 3 main targets such as: alignment with the 1.5°C Paris Agreement goal, SBTi and disclosures on at least scope 1 AND 2 emissions. General Mills has set ambitious targets to decrease GHG emissions across their full value chain, while a target to reduce absolute GHG emissions (scope 1, 2 and 3) by 30% by 2030 has been set and is aligned with the 1.5-degree trajectory, and is SBTi approved (General Mills, 2020). The industry leaders disclosed information on all three scopes, as well as reporting on other aspects.

4.2.2 Transition Risks

The transition risks include policy and legal legislation on climate; technology; market; and reputation.

Policy and legal legislation on climate

Policy and legal risks are related to companies responding to evolving regulation and policy to mitigate climate change-related actions towards a low-carbon economy. Some examples include reducing GHG emissions, shifting energy usage, adopting more sustainable land-use practices, or promoting water efficiency measures. This risk involves the financial impact of orientating business operations towards a low-carbon economy policy change. Similarly, the other important risk is in climate related litigation against organisations that fail to take accountability for the consequences of climate change. Policy and legal legislation risks occur at various levels, both locally and internationally.

Industry leaders have recognised that emission reduction protocols such as the carbon taxes and different carbon trade schemes, which would result in increased operating costs. In response, they have made reduction commitments, and implemented these transition plans into their strategies in line with the international frameworks, and in the jurisdictions in which they operate. Examples including disclosing their climate related risk reporting to align with include the Paris Agreement, GHG Protocol and SBTi (CDP, 2018). The Paris Agreement for Climate Action produced 162 pledges, with “104 countries intending to make agricultural GHG emission reductions, and 126 listing agriculture as a priority for adaptation” (WBCSD, 2020:34).

Technological risks

Technological risks are associated with companies disclosing information regarding the development, monitoring, and evaluation of the technological development towards lower emissions or in energy-efficient technology. The impact of technological advancements on businesses is significant, as new displaces old technology to enable the low carbon transition, creating a competitiveness between products and services for end users. Ultimately, winners and losers will emerge, with those companies failing to adopt new technologies ultimately falling behind. Examples include transformative agricultural and forestry practices, renewable energy, investment in natural climate solutions, as cited by the international industry leaders.

Industry leaders are increasingly resorting to climate smart agriculture practices designed to restore and protect natural sinks and decrease emissions from land-use change (WBCSD, 2020). Cross-collaboration between different industries is often cited as shaping industry standards and identifying innovative solutions that create shared value. Regarding energy efficiency, industry leaders have identified lowering energy consumption through green buildings, which saves costs and reduces GHG emissions across their full value chain, as a competitive advantage. For instance, General Mills aims to source 100% renewable energy through the entire value chain for their international operations.

Market and reputation:

Market and reputation risks are strongly correlated with consumer behaviour and are closely related. International industry leaders regard these two measurement areas as opportunities to illustrate their commitment to climate action and sustainable practices. For example, Nestlé is including more plant-based products to its portfolio of product due to consumer awareness of climate change and food with lower GHG emission intensity. These industry leaders also recognised the use of fossil fuels in their operations along with co-generation technology used to reduce carbon emissions and to transition away from the coal and diesel fuel used in product distribution.

Generally, companies accept their climate-related responsibility in the agro-food sector and are taking measures to respond to it to retain their reputation. Actions beyond GHG reductions included: water intensity reduction; food waste reduction;

plastic use and packaging waste; and innovative climate smart agricultural practices. For instance, General Mills and Sainsbury's both disclosed their target to reduce food waste by 50% by 2030 as an acknowledgment of sustainable practices and climate responsibility. In addition, a distinctly important aspect of reputation is stakeholders and international industry leaders who are committed to supporting farmers in devising appropriate agricultural models, such as new farming practices, technical support, towards transition to a regenerative agriculture model. These companies understand that climate change impacts are a threat to their entire value chain and their stakeholders.

4.2.3 Physical Risks

Physical risks are divided into acute and chronic risks.

Acute risks

Acute risk involves the disclosure of the business' preparedness and response to extreme weather events, such as drought and flood. Examples of these costs include the destruction of property, disruption of operation, and raw materials. As a response, global best practice has prompted industry leaders to adapt, diversify and secure alternative resourcing methodologies to survive the extreme weather events. For example, Unilever has implemented the forward-buying of commodities to manage price risks by also substituting their products with alternatives to ensure continuity. Stakeholders are essential in building resilience to acute risk. Nestlé works with key customers and stakeholders in the materiality process to identify risks and build close connections through their Rural Development Framework (RDF) and Response-Inducing Sustainability Evaluation (RISE). To manage the severity of extreme weather events, Olam International has developed tools through local and national initiatives, such that the development of their Cool Farm Tool and Food Loss and Waste Calculator to evaluate and guard against climate change impacts on their volume of crops.

Chronic risks

Chronic risk arises from much longer-term trends on climate, such as sea level rise; gradual aridification or shifts in agroclimatic zones, where industry leaders are preparing for raw material production and stakeholders. Nestlé works with a number

of experts in climate, agriculture and finance to develop their scenario analysis to explore the climate-related impacts on their raw materials and impacts on farmers, technological development, and biodiversity impacts, across a variety of scenarios. In addition, their analysis generates data related to specific commodities in relation to changing rainfall patterns and temperatures. For Unilever, the collection of scenario analysis data has allowed the company to prioritise their responses under different scenarios in its supply chain.

Regarding stakeholders, industry leaders leaned on collaboration and recognised the importance of building climate resilience with training and support for smallholder farmers, meaningfully including them into materiality assessments and sustainability strategies. Through agrotechnology, Olam International has increased several weather stations in emerging markets for small-scale farmers, giving them tools to both mitigate and adapt to impacts. Furthermore, Sainsbury collaborated with other retailers to jointly address climate-related risks by sustainable sourcing across the industry, growers and supplier's networks to combine expertise and share solutions.

4.3 Climate risk disclosure blended framework SA company results

This next section presents results regarding SA companies' performance against the blended framework with the goal of referring to the question that explores the extent to which companies in the agro-food sector incorporated climate change risks into their strategies and planning.

4.3.1 TCFD Recommendations

The TCFD recommendations include governance, strategy, risk management, metrics, and targets.

Governance

Within the governance measurement area, all 7 out of the 8 agro-food sector companies described the governance of their climate-related risks, disclosing that decision-making on sustainability rests with the highest body of the company. They all scored 2, besides Tongaat Hulett with a score of 0. The company mentions the importance of managing risk associated with climate change but does not disclose any personnel responsible and equipped for its implementation. Overall, the results for the 7 out of the 8 companies illustrated that they are quite well-versed in providing

beneficial information on the responsibilities of management in their reports. At the same time, they also need to be more descriptive on climate-specific responsibilities. Decision making on climate change and accountability was held by the executive committee and supported by committees such as the Sustainability Steering Committee and Social and Ethics Committee.

Companies included the experience of their board members to make well-informed climate change decisions. Pick ’n Pay indicated the number of Board of directors with climate change experience to be merely half, or 8 out of 16 (Pick ’n Pay, 2020: 86). However, there could have been more detail for companies to further expand on the skill set, as the international industry standard tends to contextualise these competencies as part of sustainability governance (WBA, 2021). In addition, some companies described their organisational structures and climate change decision-making processes, which is on par with international industry standards. Furthermore, whilst companies listed climate change as a material risk, very few were able to connect it to strategic board decisions, apart from RCL Foods, Oceana Group, Woolworths and Pick ’n Pay. Encouragingly, companies such as Shoprite had set in motion plans “to identify and understand the potential impact of climate change risk on business strategy” (Shoprite, 2020:77).

Table 12: *Governance Scores*

SA food retailers		**Agribusiness**	
Company name	**Score**	**Company name**	**Score**
Pick ’n Pay	2	RCL Foods	2
Shoprite	2	Tiger Brands	2
Woolworths	2	Oceana Group	2
Spar	2	Tongaat Hullet	0

Strategy

Within the strategy measurement area, companies are encouraged to disclose their process towards building resilience to managing existing and potential impacts of climate-related risks and opportunities in climate-related scenarios. The results favoured the food retailers who all scored 2, with the rest scoring 1 and Tongaat Hulett scoring 0. The company did not disclose any information regarding its own

sustainability strategy in any of its reports. Whilst the agri-businesses noted the significance of climate risk as a material concern, they failed to provide sufficient descriptions of the risk, and how it impacts over time horizons. In instances where climate risk is described, no time horizons were included by the companies. Overall, there is a weak connection between the company's strategy and climate risk, which is consistent with international industry data on climate risk strategy disclosure, with only 12% of companies in the Agricultural and Forestry sectors fulfilling all criteria (Kumar, 2019).

In contrast, all four food retailers performed well by including the scope of climate risks in their climate change strategies and in their own operations, specifically including its effect on the supply chain, as well differentiating impacts from direct and indirect impact on the business. In addition, they all included time-horizons despite not linking these to scenario analyses, which constitute the industry standard. Industry leaders undertake "the use of scenario analysis to assist in decision-making strategy, considering climate related scenarios, including a 2°C or lower scenario" (TCFD, 2017:16).

Table 13: *Strategy scores*

SA Food Retailers		**SA Agribusiness**	
Company name	**Score**	**Company name**	**Score**
Pick n Pay	2	RCL Foods	1
Shoprite	2	Tiger Brands	1
Woolworths	2	Oceana Group	1
Spar	2	Tongaat Hullet	0

Risk Management

Results in the risk management measurement area followed the same trend as the previous strategy measurement area, with all four food retailers scoring 2. In contrast, Tiger Brands and Tongaat Hulett scored 0 by not disclosing any information on how they recognized, managed, and controlled climate-related risk and impact in their businesses. Oceana Group scored 1 due to insufficient elaboration of their risk management decision-making process, whilst RCL Foods was the only agri-business to score 2. Overall, due to the interconnectedness of the TCFD recommendation, it

was not surprising for companies that performed poorly in strategy similarly performed poorly in risk management. Whilst the companies noted climate-change as a material risk, there was a misalignment between materiality determination and related climate risk management. The companies that performed well in this area utilised the Enterprise Risk Management (ERM) framework in their businesses. It is aligned with global best practice and all the local firms have also integrated the ERM framework into companies' long-term business strategies. A noteworthy finding was that the Spar Group went a step further by complementing ERM with an Integrated Reporting (IR) framework (Spar Group, 2020).

Table 14: *Risk Management scores*

SA Food Retailers		**SA Agribusiness**	
Company name	**Score**	**Company name**	**Score**
Pick n Pay	2	RCL Foods	2
Shoprite	2	Tiger Brands	0
Woolworths	2	Oceana Group	1
Spar	2	Tongaat Hullet	0

Metrics and targets

Under the metrics and targets measurement area, there were only four of the eight companies (Shoprite, Woolworths, RCL Foods and Oceana Group) that received a 2 scoring. The rest of the companies scored 1, with Tiger Brands the only one to score 0 in this measurement area. Global best practice under this measurement area requires the company to disclose its metrics of performance to evaluate its performance in the context of risk management and strategy and across climate related targes (Kumar, 2019). Under the guidance of the TCFD recommendations for the *Agriculture, Food, and Forest Products Group*, companies are encouraged to also focus on water, waste and GHG emission as part of their metrics and targets specific to the industry (TCFD, 2017).

Global best practice on emissions disclosure in an adoption of GHG emissions reductions targets have 3 main targets such as: alignment with the 1.5°C Paris Agreement goal, SBTi, and disclosures on at least scope 1 and 2 emissions. The top performing companies satisfied 2 of the 3 GHG emissions reductions targets and had

set clear metrics and targets. Whilst those who scored 1 satisfied only one of the three, and Tiger Brands satisfied none of the requirements. Overall, most companies only disclosed information on Scope 1 and 2 emissions, describing targets under 2°C or well-below 1.5°C scenario. Industry leaders who reported on scope 3 partnered with their suppliers and stakeholders across their supply chains. In line with global best practice, Woolworths, RCL Foods and Oceana Group aligned their GHG emission reduction targets with the 1.5°C Paris Agreement target and additionally, reported on Scope 3 emission reductions.

Companies disclosed information on water reductions, but most had not set water consumption reduction targets. Most companies did, however, refer to the Cape Town drought, recognising water security as one of the most significant environmental risks. Food waste and landfill management was mentioned as a target, but there was no evidence that companies engaged with their value chain. Also, recycling and packaging was noted, with re-usable or recyclable packaging reported as a significant target throughout the sector. An encouraging finding was that most of the South African agro food sector utilised local sustainability certifications and global compliance initiatives to accelerate climate action (see section 4.2).

Table 15: *Metrics and targets*

SA Food Retailers		**SA Agribusiness**	
Company name	**Score**	**Company name**	**Score**
Pick n Pay	1	RCL Foods	2
Shoprite	1	Tiger Brands	1
Woolworths	2	Oceana Group	2
Spar	1	Tongaat Hullet	1

4.3.2 Transition risks

There are measurement areas under transition risks against which the SA agro food sector will be assessed, namely policy and legal, technology, market and reputational risk. The TCFD recommendations encourage organisations to disclose both climate-related risks and business opportunities. However, for the purposes of the study, only climate-related risk disclosure will be analysed.

Policy and legal legislation on climate

Under the policy and legal legislation on climate indicators, South African companies performed well, with six out of the eight companies scoring 2, and the remaining two scoring 1. Overall, companies indicated a good awareness of climate-related policy and legislation in their disclosures at the local level, demonstrated by references to the Greenhouse Gas Protocol, the South African Carbon tax, and the Draft Climate Change Bill. However, differences were notable in their disclosure of how they are impacted and make decisions in relation to climate-related policy and legislation. For the food retailers, examples included direct impact on operations and suppliers across their supply chain, due to carbon budgeting, while agribusinesses focussed on their annual reporting and sustainability disclosure in relation to the carbon tax. Notably, Tiger Brands began implementing an internal carbon price to enable their business to understand the potential impact of the carbon tax on their operations (Tiger Brands, 2020). Whilst some companies regarded South Africa's NDC target as good measure of limiting GHG emissions, it is important to note that the country's NDC climate targets and commitment target is rated as 'insufficient' to meet the global 1.5°C target (CAT, 2021).

According to TCFD recommendations *on Agriculture, Food, and Forest Products*, industry standards and the WBCSD climate-related risks disclosure on water proves crucial due to its role in production practices. Generally, companies identified water security as a significant risk to their businesses, acknowledging the regulatory risks pertaining to water management in drought risk operations areas through reference to the 2017-2018 Western Cape drought. The top performers responded by setting operational water efficiency targets, by regularly reporting on water reduction though water-stress assessments and collaborating suppliers and stakeholders to reduce water consumption.

Table 16: *Policy and legal legislation on climate scores*

SA Food Retailers		**SA Agribusiness**	
Company name	**Score**	**Company name**	**Score**
Pick 'n Pay	2	RCL Foods	2
Shoprite	2	Tiger Brands	2

Woolworths	2	Oceana Group	2
Spar	2	Tongaat Hullet	2

Technology

The technology indicator is associated with expenses incurred through technological development, such as cost to lower emissions, or investments in energy-efficient technology. All companies scored 2/2 in this measurement area. The top-performing companies in this measurement area recognised low carbon economy as an imperative for building climate change resilience within their business and are exploring opportunities to transition their business to cleaner energy to offset local energy supply challenges. A notable mention is Woolworths, who have set a target to achieve their goal to source 100% renewable energy by 2030 by implementing technological advancements in solar and other technologies to support reductions in the company carbon footprint and energy use. Whilst some companies do cite the importance of the role of renewable energy and energy efficient equipment to decrease GHG emissions, their targets could be more ambitious. For example, Pick ’n Pay have set the renewable energy target of becoming 50% renewable by 2030, and 70% renewable by 2040.

Overall, companies in South Africa, seem to be driven towards renewable energy due to load shedding impact on operations, as opposed to meeting climate change goals. Overall, moving away from fossil fuel energy such as coal for electricity generation proves to be a challenge for many of the companies in the agro-food sector, despite investments in renewable energy. Beyond energy efficiency, water-efficient technology across company operations, such as rainwater harvesting, re-use and alterative sourcing, such as groundwater, evidences itself to be global best practice. Woolworths is a leader in this regard, and their approach to energy-efficient technology through their green buildings monitoring, with 190 stores outlets achieving a certified five-star rating by the Green Building Council South Africa (GBCSA). Overall, the companies do disclose information regarding the development, monitoring and evaluation of new technologies needed to manage transition risk.

Table 17: *Technology scores*

SA food retailers		**SA agri-business**	
Company name	**Score**	**Company name**	**Score**
Pick n Pay	2	RCL Foods	2
Shoprite	1	Tiger Brands	2
Woolworths	2	Oceana Group	2
Spar	2	Tongaat Hullet	2

Market

The market and reputation risks are closely related, placing emphasis on consumer demands and stakeholders in the disclosure of climate relation-information. Consumer awareness of climate and sustainability issues can place pressure on businesses to respond through relevant environmentally friendly products and services. Overall, companies performed well, disclosing various issues beyond climate change that included food security, water security, pollution, waste, sustainable sourcing, product labelling, recycling, biodiversity, and land use. All companies scored 2, except Tongaat Hulett, who recognised water only to be a significant material risk in the agro-food sector, rather than acknowledging climate change as a whole; whereas consumers expect businesses to be socially responsible when it comes to climate change.

Companies scoring 2/2 are consistent with the incentive of retaining their climate informed consumers and grow their customer base. Furthermore, RCL Foods reinforced this trend, by placing a premium on product integrity and quality as a high material risk. In line with global best practice, certain top performers additionally acknowledged the substantial climate impacts on the supply chain in terms of the availability, price, and quality of products.

Table 18: *Market scores*

SA food retailers		**SA agri-business**	
Company name	**Score**	**Company name**	**Score**
Pick ’n Pay	2	RCL Foods	2
Shoprite	2	Tiger Brands	2
Woolworths	2	Oceana Group	2
Spar	2	Tongaat Hulett	1

Reputation

Although market and reputation risks tend to be closely related, for this measurement area, it appeared that companies focused on stakeholders who expect issues of climate change and sustainability to be championed beyond the acknowledgment of crises to actions. Consequently, stakeholder engagement was highly regarded as being the responsibility of companies. Similarly, the overall performance was excellent across the board, with all SA agro-food companies scoring 2. Some initiatives included companies disclosing commitments to supporting their suppliers, farmers and small-scale producers and providing evidence of training and partnerships with stakeholders for market entry purposes. Some companies went further, with certain firms making specific reference to aiding stakeholders with climate adaptation actions.

Table 19: *Reputation scores*

SA food retailers		**SA agri-business**	
Company name	**Score**	**Company name**	**Score**
Pick 'n Pay	2	RCL Foods	2
Shoprite	2	Tiger Brands	2
Woolworths	2	Oceana Group	2
Spar	2	Tongaat Hulett	2

4.3.3 Physical Risks

The discussion of physical risks proves to be a focal point of the study, with the literature suggesting that physical climate risk reporting remains underestimated globally. For some South African companies, transition risk is extremely concentrated in reporting, rather than in physical risks. Furthermore, the results of the high-level analysis presented on 4.1.1, revealed an average score of 50% for physical risk scoring/reporting as opposed to 80% in transition risk. The next section considers why this may be the case.

According to the TCFD (2017), physical risks include changes in weather and climate that can cause the operational disruption or destruction of property if they are not prepared for. There are two measurement areas to be discussed in sections 3.5.1 and 3.5.2, these include acute and chronic risks. Overall, the impact on agro-food companies operation costs and revenue can be severe and may include disruptions

in their raw material supply and manufacturing sites, causing an increase in prices and decrease in production capacity because of pricing changes (WBCSD, 2020). A study conducted by the FAO, AQUASTAT Database and the World Bank investigating the relationship between the variability of rainfall and cereal production in the region revealed that reduced agricultural productivity of between 15 to 50% is likely to have adverse impacts on a number of staple crops namely, maize, wheat and sugarcane (Nhemachena et al., 2020). These projections have several implications for food security and livelihoods, negatively impacting progress on poverty reduction and multiple SDG goals (Nhemachena et al., 2020). South Africa is not unique in this regard, as physical climate risks remain a constraint to achieving developmental goals through the SADC region (Turton & Ashton, 2008).

Acute risks

Acute risks are event-driven, and can occur due to extreme weather conditions, such as hurricanes, floods, or heat waves. In the Southern African region, there has been an increase in both the severity and occurrence of extreme weather conditions over recent decades such as the tropical cyclones and heatwave events associated with El Niño-induced drought (Fitchett, 2021). Therefore, it is crucial that companies disclose information on acute climate-related risks and those impacted by acute climate-related risks so as to ensure their sustainability. In this measurement area, eight SA companies scored 2 apart from RCL foods and Woolworths, who respectively scored 1. The top-performing companies recognised the regional climatic trends of extreme weather events as acute climate risks and included these in risk assessments, acknowledging their potential for disrupting several aspects, including business operations, availability of raw materials; and causing a decreased supply of fresh produce and food security, while negatively impacting revenues and profitability. Examples that were cited included the Western Cape drought, Cyclone Idai's heavy rains and floods, and extreme El Niño weather that included significant damage to regional infrastructure.

In addition to their plans and actions to reduce such impact, companies also disclosed actions to support stakeholders' failure in to adapting to climate change by strengthening physical resilience to extreme weather events. Spar, for instance, has included extreme weather events in their SPAR Risk Register, in addition to

establishing time-horizon risk management strategies as part of their scenario planning. Pick ’n Pay has an integrated multi-disciplinary company-wide process to assess risk management in their operations. Woolworths and Pick ’n pay have programmes for establishing and supporting small agricultural projects. Encouragingly, companies also sought additional support and collaborations from academia and scientific specialists to better understand their knowledge gaps, and to develop robust action that falls in line with global best practice (WBCSD, 2020).

Regarding RCL foods and Woolworths HL, who both scored 1, there seemed to be limited granularity in the description of acute climate change risk. For RCL Foods, whilst there is a reference made to the uncertainties related to resource scarcity as result of climate change impacts, there is no evidence presented of how RCL foods is impacted by acute climate-related risks. In the case of Woolworths, there was no distinction in their approach to managing both their acute and physical climatic risks.

Table 20: *Acute risk scores*

SA Food Retailers		**SA Agribusiness**	
Company name	**Score**	**Company name**	**Score**
Pick n Pay	2	RCL Foods	1
Shoprite	2	Tiger Brands	2
Woolworths	1	Oceana Group	2
Spar	2	Tongaat Hullet	2

Chronic risks

Climate-related risks such as rising sea levels and extended heatwaves are likely to increase long-term due to climate change. Southern Africa is especially vulnerable to chronic risk, since it is a historically water scarce region, which has been projected to become generally warmer due to rising mean temperatures and reductions in precipitation (Scholes and Engelbrecht, 2021). The implications on water resources for South Africa are severe, due to insufficient and unreliable rainfall, which is likely to intensify. At the same time, this measurement area saw some mixed results across the board, where the SA food retailers and agri-businesses all scored 2 besides Woolworths and RCL Foods each with a score of 1. Companies disclosed information on chronic climate-related risk impacts, targets, plans, and ongoing action to respond

to long-term chronic climate-related risks. Their response the top performing companies included climate adaptation support for stakeholders in building resilience against droughts or floods. Water security was widely cited as a high-risk to operations, with companies referring to the severe impact of drought on farmers and communities throughout Southern Africa.

Woolworths HL, RCL Foods and Tiger Brands all scored 1 for different reasons. Woolworths HL scored 1 because they were generic in their approach to managing both their acute and physical climate risks in the same way. Whilst RCL Foods did not link their constraints in energy and water supply, as well as their energy efficiency and water conservation responses to chronic climate risks. Tiger Brands scored 0 because it did not disclose information on chronic climate-related risks, however, instead focusing on acute risks. The knowledge gap leaves SA agro-food companies' raw material exposed to amplified chronic climate risks.

Table 21: *Chronic risks scores*

SA food retailers		**SA agri-business**	
Company name	**Score**	**Company name**	**Score**
Pick n Pay	2	RCL Foods	1
Shoprite	2	Tiger Brands	0
Woolworths	1	Oceana Group	2
Spar	2	Tongaat Hulett	2

4.4 Overall SA climate risk disclosure framework results

According to the climate risk disclosure framework results summarised in Table 22 below, the food retailers and argi-business jointly scored an average of **1.6/2** in overall climate risk disclosure. Overall, the food retailers were the best performers, with an above average score of **1.7/2** compared to the agri-business with a below average score of **1.4/2**. The analysis illustrates that South African companies in the agro-food sector are publicly disclosing climate risk on a par with good environmental management practices in CDP terms. As shown in Figure 2 and 3, RCL Foods, the Spar Group, Woolworths and Pick 'n Pay were jointly the top-performing companies, with **1.8/2**, Oceana Group and Shoprite were joint second, with **1.7/2**. Ranking third,

was Tiger Brands with **1.4/2**, and ranking fourth and last place was Tongaat Hulett with **1.**

Table 22: *SA climate risk and disclosure framework results*

Climate risk disclosure blended framework scores: SA agri-business											
Company											
RCL Foods	2	1	2	2	2	2	2	2	1	1	1,7
Tiger Brands	2	1	1	2	2	1	2	2	2	2	1,7
Oceana Group	2	1	0	1	1	2	2	2	2	1	1,4
Tongat Hullet	0	0	0	1	1	1	1	2	2	2	1
	Governance	Strategy	Risk Assessment	Metrics and Targets	Policy and legal	Technology	Market	Reputation	Acute Risks	Chronic Risks	Average

Climate risk disclosure blended framework scores: SA food retailers											
Company											
Pick n Pay	2	2	2	1	2	1	2	2	2	2	1.8
Shoprite	2	2	2	1	1	2	2	2	2	2	1.7
Woolorths	2	2	2	2	2	2	2	2	2	1	1.9
Spar	2	2	2	1	2	2	2	2	2	2	1.9
	Governance	Strategy	Risk Assessment	Metrics and Targets	Policy and legal	Technology	Market	Reputation	Acute Risks	Chronic Risks	Average

In the different measurement areas of the TCFD, transition risks and physical risks, the results for the food retailers were consistent with an average of 80% across all the 3 measurement areas. In contrast, the agri-businesses results were mixed, showing 70% for TFCD, 90% for transition risks, and 50% for physical risk. These results indicate the level of priority areas in climate risk disclosure for companies and for the agri-business, their underreporting of physical climate change risks were consistent with international trends. The high prioritisation of climate-risk governance in both sectors speaks to the strong integration of climate change into their governance process, as data from the NBI suggests (NBI, 2019).

5. Conclusion and Recommendations

The overall aim of the research was to investigate the extent to which South African companies in the agro-food sector have incorporated climate change risks into their strategies and planning. The approach of this study was to go beyond the conventional high carbon-intensive sectors and bring to the fore sectors that are less carbon intensive, but arguably more prone to physical climate risk.

The research introduced a blended climate risk disclosure framework, which drew from international climate disclosure frameworks such as the Carbon Disclosure Project and the Task Force on Climate-Related Financial Disclosures (TCFD). Additionally, the dissertation analysed the role of climate change risk in the agro-food sector and described how climate risk is conceptualised and reported across different international contexts, generating a set of best practice against which to assess South African agro-food companies.

5.1 Key Findings

Overall, the results of the SA companies indicate that ESG topics and climate risk reporting remain nascent in South Africa. There was no single clear front-runner in the scores, as no company scored a perfect 2/2 in the climate risk disclosure blended framework. Spar and Woolworths emerged in a first-place tied ranking by scoring 1.9/2 each, performing in line with international standards. Furthermore, the results indicated that the performance of the South African agri-businesses were not far off from that of their international counterparts in CDP climate change disclosure, with the majority performing on par with global best practice, despite not being on the ‘A list’ of top performers leading the way in environmental transparency and performance on climate change disclosure. Despite this, it is important to note that, although some the international industry leaders were formidable performers in their own industries, overall, some did not achieve an ‘A list’ rating. These findings are consistent with an NBI South African Climate Report indicating that no other global sample surpasses South African corporates in identifying their climate risks and opportunities.

Consequently, despite South African companies illustrating strong risk recognition in reporting, the disclosures on action and engagement are not as strong, and so these

risks do not translate into progressive action. Therefore, whilst there is evidence of good reporting on climate change risk present within the South African agro-food sector, greater detail on actions and implementation are needed. In terms of TCFD recommendations that outline climate change governance, the SA food retailers performed better than did the agri-businesses. The same pattern followed for both transition risks and physical risks. More specifically, South African companies understand and take seriously the importance of transitioning towards a low carbon economy in line with local legislation in their disclosures where they reference the Greenhouse Gas Protocol, the South African Carbon tax and the Draft Climate Change Bill since the signing of the Paris Agreement.

Under the GHG emissions reductions targets that align with a 1.5°C Paris Agreement warming trajectory, SBTi and have GHG emissions reduction targets under scope 1, 2 and 3, South African companies are not meeting all the targets. Overall, most companies only disclosed information on Scope 1 and 2 emissions, describing targets ‘under 2°C or well-below 1.5°C scenario’ in line with South Africa's 2030 NDC mitigation target, but not in line with the global goal. The research adds to the literature, which notes that, whilst the South African private sector prominently supports the Paris Agreement as signatory by effectively endorsing the call for reduction of GHGs, there needs to be substantial improvements to be consistent with limiting warming to 1.5°C. This finding reinforces calls for greater ambition and more concrete climate action from the South Africa government, with South Africa’s newly updated NDC in 2023 is still rated as “insufficient” (previously highly inefficient) when compared to its fair share contribution to climate action (CAT, 2023).

South African companies performed admirably in the category of physical risk, which is notable, given that physical climate risk reporting is underestimated globally. The finding indicates a high degree of prioritisation of climate-risk governance in both sectors, which speaks to the strong integration of climate change into their governance process, as data from the NBI suggests. In addition to their plans and actions to reduce impact, companies also disclosed actions to support stakeholders’ failure to adapt to climate change and build physical resilience to climate-related risks. Nevertheless, areas of improvement include companies making the distinction between chronic and

physical risk, which would allow them to respond effectively; the knowledge gap leaves some SA agro-food companies' raw material exposed to amplified climate risk.

5.2 Implications of the Research

The following section discusses some of the theoretical and practical implications of this research.

- By virtue of operating in one of the most climate vulnerable projected agricultural regions in the world, companies are very much prone to climatic risk. The thesis echoes the sentiments made by Goldstein et al. (2018) that proactively adapting to climatic change is in the best interest of companies.
- The results of the study suggest, as indicated by Ziervogel and Ericksen (2010), that the research gap between climate change and food security needs to be closed. For instance, in 2024, scientists from southern Africa and Europe collaborated to assess how climate change has altered the severity of El Niño events with some leading to droughts while others did not (Kimutai et al., 2024). This research can provide the foundation for agro-food companies and famers to build as well strengthen climate resilient systems during extreme weather events.
- The results from the South Africa companies were mixed across the spectrum of climate risk reporting. On one hand, companies performed well by not only reporting physical climate risks and taking actions to address extreme weather events posing severe financial risk – but also preparing for long term risks and brining their value chain with them. One the other, some companies did not fully address the impact of chronic risks, either by having no long-term plans at all or no actions across their supply chain risks. The latter results are also consistent with studies of food companies underestimating the magnitude of physical climate by underreporting on chronic physical risks (Goldstein et al, 2018).
- Whilst ESG related regulatory processes on disclosure or reporting such as the JSE's sustainability and climate disclosure guidance are voluntary, the literature acknowledges that there is at least a direction of travel (Soni, 2024). However, the thesis indicates that more action is needed in the alignment of corporate reporting with the scale of the climate challenge.

- To meet the global target of 1.5°C warming trajectory, South African private sector companies, with the support of policy makers, ought to be encouraged to be more ambitious and go beyond compliance of the local legislations if they are to become industry leaders themselves.
- Policy makers, researchers, and industry could draw more attention to the agro-food sector, which remains highly vulnerable to climate risk due to projections of Southern Africa's water scarcity in the region, the deficit in water availability, the dependency on rain-fed agriculture, and the impact of extreme weather, such as floods and drought. The magnitude of damage by 2022 KwaZulu Natal floods and the 2023/24 El Niño Southern Oscillation (ENSO) droughts are examples of the urgent to action to address climate risks in Southern Africa (Kimutai et al., 2024).
- An important approach to managing climate risk from global best practice was industry teamwork through collaborative climate risk identification and responses, which served to increased awareness of sustainability practices and optimise partner networks to increase response efficiency.
- The SA agro-food sector could benefit from this approach, by learning from one another, sharing synergies, and experiences of climate risk responses.
- The climate risk disclosure blended framework used in this study found that climate related reporting across governance, transition risks, and physical risks allows for a more holistic understanding of sustainability, ESG topics, and climate risk reporting in South Africa.

5.3 Areas for future research

The research analysed a sample of eight South African companies from the agro-food sector. Future research could extend this sample and analyse all SA agro-food companies listed on the JSE. This enlarged scope will help researchers and policy makers to understand the industry as a whole. In addition to benchmarking from international industry leaders, future research could also compare similar companies in the same industries that operate in a similar typography to South Africa, thereby comparing responses and actions to similar climate risks. Since this research commenced in 2020 at the peak of Covid 19 pandemic, in-person interviews were not possible. To overcome this, interviews could also be conducted online to complement

the methodology. Furthermore, future research should complement company reports with interview questions to explore companies' short- and longer-term climate action plans, the challenges and motivations behind climate-related reporting, as well as responses and actions. The outcomes from these addition, will be crucial in gaining a deeper understanding of the situation that SA companies face in their sustainability and climate risk reporting practices.

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7. Appendices

Appendix A: JSE Consumer Goods C

There are 22 companies in the Consumer Goods sector listed on the Johannesburg Stock Exchange (JSE). These are the companies that were looked at as potential SA candidates; the companies that are highlighted in grey are the ones that were chosen for the research.

	Code	Company	Market Cap (USD)
1.	JSE:ANH	Anheuser-Busch Inbev	1.81T
2.	JSE:CFR	Compagnie Fin Richemont	1.48T
3.	JSE:BTI	British American Tobacco	1.48T
4.	JSE:TBS	Tiger Brands Limited	29B
5.	JSE:AVI	AVI Limited	24.18B
6.	JSE:RCL	RCL Foods Limited	9.34B
7.	JSE:OCE	Oceana Group Limited	8.97B
8.	JSE:PMR	Premier Group Limited	7.73B
9.	JSE:ARL	Astral Foods Limited	7B
10.	JSE:MTA	Metair Investments Limited	3.78B
11.	JSE:SHG	Sea Harvest Group Limited	3.06B
12.	JSE:LBR	Libstar Holdings Limited	2.71B
13.	JSE:RFG	RFG Holdings Limited	2.69B
14.	JSE:ZZD	Zeda Limited	1.9B
15.	JSE:QFH	Quantum Foods Holdings	960.12M
16.	JSE:NWL	Nu-World Holdings Limited	588.81M
17.	JSE:TON	Tongaat Hulett Limited	545.86M
18.	JSE:CKS	Crookes Brothers Limited	442.67M
19.	JSE:PFB	Premier Fishing and Brands	408.2M
20.	JSE:ILE	Imbalie Beauty Limited	27.68M
21.	JSE:AHL	AH-Vest Limited	16.33M
22.	JSE:DGH	Distell Group Holdings	N/A

Source: https://www.listcorp.com/jse/sectors/consumer-goods

APPENDIX B: JSE Consumer Services Companies

There are 47 companies in the Consumer Services sector listed on the Johannesburg Stock Exchange (JSE). These are the companies that were looked at as potential SA candidates; the companies that are highlighted in grey are the ones that were chosen for the research.

	Code	Company	Market Cap (USD)		Code	Company	Market Cap
1.	JSE:SHP	Shoprite Holdings Limited	151.57B	25.	JSE:LEW	Lewis Group Limited	2.18B
2.	JSE:BID	Bid Corporation Limited	140.9B	26.	JSE:SUR	Spur Corporation Limited	2.15B
3.	JSE:WHL	Woolworths Holdings Limited	77.41B	27.	JSE:HIL	Homechoice International plc	2.08B
4.	JSE:CLS	Clicks Group Limited	68.53B	28.	JSE:CMH	Combined Motor Holdings Limited	2.01B
5.	JSE:PPH	Pepkor Holdings Limited	63.15B	29.	JSE:EMN	E Media Holdings Limited - N Shares	1.24B
6.	JSE:MRP	Mr Price Group	41.18B	30.	JSE:CHP	Choppies Enterprises Limited	1.17B
7.	JSE:MCG	MultiChoice Group	38.83B	31.	JSE:HPR	Hosken Passenger Logistics and Rail Limited	1.16B
8.	JSE:TFG	The Foschini Group	35.65B	32.	JSE:RTN	Rex Trueform Group - N Shares	269.09M
9.	JSE:TRU	Truworths International Limited	28.89B	33.	JSE:EMH	E Media Holdings Limited	255.24M
10.	JSE:DCP	Dis-Chem Pharmacies Limited	22.1B	34.	JSE:SNH	Steinhoff International Holdings NV	213.48M
11.	JSE:SPP	Spar Group Limited	20.8B	35.	JSE:AME	African Media Entertainment	210.67M
12.	JSE:PIK	Pick n Pay Stores Limited	18.87B	36.	JSE:AON	African and Overseas Enterprises - N Shares	163.55M
13.	JSE:MTH	Motus Holdings Limited	18.64B	37.	JSE:RTO	Rex Trueform Group	41.81M
14.	JSE:ITE	Italtile Limited	16.47B	38.	JSE:NCS	Nictus Limited	34.2M
15.	JSE:TSG	Tsogo Sun Gaming	13.26B	39.	JSE:AOO	African and Overseas Enterprises Limited	26.3M
16.	JSE:ADH	ADvTECH Limited	10.33B	40.	JSE:TAS	Taste Holdings Limited	23.97M
17.	JSE:SUI	Sun International Limited	9.3B	41.	JSE:COM	Comair Limited	N/A
18.	JSE:FBR	Famous Brands Limited	5.94B	42.	JSE:MSM	Massmart Holdings Limited	N/A
19.	JSE:COH	Curro Holdings Limited	5.16B	43.	JSE:PEM	Pembury Lifestyle Group	N/A
20.	JSE:CSB	Cashbuild Limited	3.88B	44.	JSE:PHM	Phumelela Gaming And Leisure Limited	N/A
21.	JSE:SDO	STADIO Holdings Limited	3.84B	45.	JSE:TBG	Tiso Blackstar Group SE	N/A
22.	JSE:CAT	Caxton & CTP Publishers & Printers Limited	3.56B	46.	JSE:TGO	Tsogo Sun Hotels	N/A
23.	JSE:CLH	City Lodge Hotels Limited	3.02B	47.	JSE:VVO	Vivo Energy plc	N/A
24.	JSE:KAL	Kaap Agri Limited	2.76B				

25.	JSE:LEW	Lewis Group Limited	2.18B

Source: https://www.listcorp.com/jse/sectors/consumer-services

APPENDIX C: 2021 World Food and Agricultural Benchmark Top 100 companies

Assessing the world's 350 most influential food and agriculture companies (worldbenchmarkingalliance.org). These are the companies that were looked at as potential industry leaders; the food and agricultural companies that are highlighted in grey are the ones that were chosen for the research.

Rank	Company	Headquarters	Rank	Company	Headquarters
1	Unilever	UK	26	Bayer	Germany
2	Nestlé	Switzerland	27	Woolworths Group	Australia
3	Danone	France	28	Syngenta Group	Switzerland
4	OCP	Morocco	29	Wilmar International	Singapore
5	Anheuser-Busch InBev	Belgium	30	General Mills	USA
6	PepsiCo	USA	31	Sodexo	France
7	Tesco	UK	32	Kirin Holdings	Japan
8	Fonterra	New Zealand	33	BASF	Germany
9	Diageo	United Kingdom	34	Keurig Dr Pepper	USA
10	Firmenich	Switzerland	35	Mondelez International	USA
11	Kellogg's	USA	36	Yara	Norway
12	Coles Group	Australia	37	Archer Daniels Midland (ADM)	USA
13	The Coca-Cola Company	USA	38	Campbell's	USA
14	Arla Foods	Denmark	39	Grupo Bimbo	Mexico
15	UPL	India	40	Nueva Pescanova	Spain
16	Kerry Group	Ireland	41	Walmart	USA
17	Sainsbury's	UK	42	Molson Coors	USA
18	Heineken	Netherlands	43	Ferrero	Luxembourg
19	Orkla	Norway	44	Mars	USA
20	Carrefour	France	45	CNH Industrial	Netherlands
21	DSM	Netherlands	46	Kroger	USA
22	FrieslandCampina	Netherlands	47	Wm Morrison Supermarkets	UK
23	Olam International	Singapore	48	Jeronimo Martins	Portugal
24	Ahold Delhaize	Netherlands	49	Pernod Ricard	France

Rank	Company	Headquarters	Rank	Company	Headquarters
25	The Hershey Company	United States of America	50	Tate & Lyle	United Kingdom
51	Aldi South Group	Germany	76	Rewe Group	Germany
52	Aldi Nord	Germany	77	Carlsberg	Denmark
53	Givaudan	Switzerland	78	Compass Group	UK
54	Meiji	Japan	79	Symrise	Germany
55	McCain Foods	Canada	80	PhosAgro	Russia
56	Thai Union Group	Thailand	81	Bonduelle	France
57	Mowi	Norway	82	Thai Beverage	Thailand
58	Kraft Heinz	USA	83	BayWa	Germany
59	Charoen Pokphand Group	Thailand	84	Suntory	Japan
60	Sumitomo Chemical	Japan	85	Sime Darby Plantation	Malaysia
61	Asahi Group	Japan	86	Mosaic	USA
62	Hormel Foods	USA	87	Nordzucker	Germany
63	Novozymes	Denmark	88	Tyson Foods	USA
64	Metro AG	Germany	89	Associated British Foods	UK
65	Fuji Oil Holdings	Japan	90	ForFarmers	Netherlands
66	Nutrien	Canada	91	Ajinomoto Group	Japan
67	Corteva Agriscience	United States of America	92	Danish Crown	Denmark
68	McDonald's	United States of America	93	Musim Mas	Singapore
69	Zespri	New Zealand	94	Mahindra and Mahindra	India
70	Groupe Casino	France	95	Barilla	Italy
71	Deere & Co	United States of America	96	Ingredion	USA
72	Schwarz Gruppe (Kaufland, Lidl)	Germany	97	Starbucks	USA
73	ICL	Israel	98	Greenyard	Belgium
74	Cargill	United States of America	99	Jacobs Douwe Egberts	Netherlands
75	Tiger Brands	South Africa	100	International Flavors & Fragrances (IFF)	USA

Source: https://www.worldbenchmarkingalliance.org/publication/food-agriculture/rankings/

APPENDIX D: SA agri-business joint analysis

Measurement Area	RCL Foods	Tiger Brands	Oceana Group	Tongaat Hulett
Governance	RCL Foods discloses that the overall responsibility for its sustainable development is its Board, who are assisted by their Risk Committee and the Social & Ethics Committee.	Tiger Brands' board is tasked with the ultimate oversight of its sustainability strategy and performance.	Oceana Group's Board approves strategic direction and oversees implementation of the sustainability strategy, with assistance from the Social, Ethics and Transformation Committee (SETCOM).	Tongaat Hulett demonstrates it has assigned ultimate responsibility for its sustainability strategy to the board of directors.
Strategy	RCL Foods recognises climate change as one of the material risks affecting its business.	Tiger Brands prioritizes the following sustainability focus areas: health and nutrition, enhanced livelihoods, and environmental stewardship.	Ocean Group's sustainability strategy focuses on promoting responsible stewardship of the marine environment.	Tongaat Hulett has identified sustainability objectives covering topics related to nutrition, social inclusion and the environment dimensions.
Risk management	RCL Foods uses an Enterprise Risk Management (ERM) in their identification and evaluation of key risks and opportunities.	The Tiger Brands' board has ultimate responsibility for overseeing the group's risk management processes.	Ocean Group uses internal integrated risk management practices for internal decision-making and for its external reports.	N/A
Metrics and targets	RCL Foods reports on Scope 1, Scope 2 and 3 GHG emissions but have no clear GHG emissions/ climate change-related target.	Tiger Brands reports on reductions of scope 1 GHG emissions and has set a 2030 target for a 15% decrease in emissions. The company does not report on reductions in its scope 2 GHG emissions nor disclose a relevant target.	Oceana Group reports on Scope 1, Scope 2 and 3 GHG emissions and has set a 50% reduction in greenhouse gas emissions by 2030.	Tongaat Hulett reports on Scope 1, Scope 2 GHG emissions and has set a 50% reduction in greenhouse gas emissions by 2030.
Policy and legal	RCL Foods RCL Foods has an investor relations policy to ensure compliance with all legislation, regulation and voluntary codes in relation to the Disclosure.	Tiger Brands recognizes the carbon tax as a transition risk and uses an internal carbon price to track its potential impact of business whilst exploring closer TCFD recommendations alignment.	Oceana Group acknowledges the Carbon tax on certain liquid fuels and as a response have commissioned carbon consultants to assist in carbon tax measurements annually.	Tongaat Hulett has made internal changes to aligns their carbon emission calculation methodology with South Africa's, Department of Environment, Forestry and Fisheries' reporting methodology.
Technology	RCL Foods has 3 types of renewable energy generation. Sugar Co-Generation of Electricity, Waste-to-Value and Solar (rooftop solar) generation across their operations.	Tiger Brands have implemented energy management system (EnMS) and energy system optimisation (ESO) projects on several of their sites to manage their energy use.	Oceana Group continues to focus on improving our energy efficiency and seek to reduce our consumption of non-renewable energy.	Several Tongaat Hulett sugar mills operations have been reregistered for Renewable Energy Certificates for exported renewable electricity and increasing the actual export capacity from 7.5 MW to an average of 12.5 MW.
Market	RCL Foods reports on Scope 1, Scope 2 and 3 GHG emissions and aligned their emission reductions with the 1.5°C Paris Agreement target.	Tiger Brands has set a target for 100% of its packaging to be recyclable by 2030.	Oceana Group has an SDG commitment to harvesting marine resources responsibly and recognizes the impact of climate change on food security.	Tongaat Hulett has a water stewardship strategy throughout their operations such as water conservation, water re-use and soil management.
Reputation	RCL Foods has an investor relations policy to limit reputational risk for management and the group.	Tiger Brands provides a list of key stakeholder groups and details how it engages with these groups, their material interests as well as its response to the material interests of each group.	Oceana Group engages regularly various stakeholders in civil society, government, associations, private sector and academia to support small-scale fishers an ecosystem approach to fishing	Tongaat Hulett has a stakeholder engagement process that regularly how it has responded to stakeholder concerns and integrated these into its actions.
Acute risks	RCL Foods recognizes climate adaptation impacting energy and water supply as key risks. Their sustainability team is tasked with responding to the related issues of climate change.	Tiger Brands has highlighted the climatic challenges such as droughts which has exasperated the water crisis in parts of South Africa as a key risk to the performance of their most water-intensive operations.	Oceana Group recognizes changing weather patterns and climate change are as a risk seen through significant impacts on their operations such as extreme weather events causing climate-induced shifts in fishing sources.	Tongaat Hulett recognizes the extreme weather events caused by climate change through namely flooding and have responded through a water stewardship strategy and integrating small-scale farmers as well.
Chronic risks	RCL Foods recognizes climate adaptation impacting energy and water supply as key risks. Their sustainability team is tasked with responding to the related issues of climate change.	N/A	Oceana Group responds to the long-term impacts of climate through diversification of farmed fish. In addition, Oceana regularly engages partners that support small-scale fishers and an ecosystem approach to fishing.	Tongaat Hulett has a commitment to support the resilience, productivity and access to small-scale farmers as part of its inclusive growth objective.

APPENDIX E: SA food retailers' analysis

Measurement Area	Pick n Pay	Shoprite	Woolworths	Spar
Governance	Pick n Pay's sustainability performance is overseen by the Sustainability Steering Committee and the Social and Ethics Committee.	Shoprite's Social and Ethics Committee oversee its environmental and social sustainability activities.	Woolworths sustainability performance is overseen by the Sustainability Steering Committee and the Social and Ethics Committee.	The Social and Ethics Committee of the Board has overall accountability for the sustainability and climate change agenda for Spar.
Strategy	The accountability for and oversight of the Pick n Pay's sustainability strategy lies with the highest governance body and discloses its process for identifying and prioritizing its most relevant topics.	Shoprite discloses its process for identifying and prioritizing its most relevant sustainability topics, as well the outcome of this process in relation to its sustainability strategy.	Woolworths has a Sustainability Committee that main purpose of the committee is to ensure that the sustainability strategy and objectives are effectively integrated into the business.	Spar describes how its processes for identifying, assessing, and managing climate-related issues through a multi-disciplinary company-wide risk identification, assessment, and management process.
Risk management	Pick n Pay are addressed their risks through in their Climate Change strategy and incorporate climate-related scenario models to build resilience.	Shoprite uses an Enterprise Risk Management (ERM) policy and framework to embed sustainability principles and practices into the Group's operations.	Woolworths uses an Enterprise Risk Management (ERM) which implements and monitors risks to ensure that a consistent approach to risk management is applied across its operations.	Spar's risk management and materiality is guided by both their Integrated Reporting (IR) framework and an Enterprise Risk Management (ERM) process.
Metrics and targets	Pick n Pay has a time-bound target to reduce its scope 1 and 2 GHG emissions by a '25% reduction in its CO2 emissions by 2020. Their targets are not aligned with a 1.5-degree trajectory, SBTi approved or include a Scope 3 emissions target.	Shoprite reports on reductions of scope 1 GHG emissions and have not set a reduction target for its GHG emissions. In addition, Shoprite's targets are not aligned with a 1.5-degree trajectory, SBTi approved or include a Scope 3 emissions target.	Woolworths have an approved SBTi target which is in line with the 1.5 °C trajectory despite disclosing Scope 1 and Scope 2 emissions but not Scope 3.	Spar developed science-based targets which set out Scope 1 and 2 emissions reduction targets by 2050. But the targets have not been approved by the SBTi and are not aligned with a 1.5-degree trajectory or include a Scope 3 emissions target.
Policy and legal	Pick n Pay noted regulatory risks regarding water management, the South African Carbon tax, the Draft Climate Change Bill imposing a carbon budgeting system.	Shoprite have noted regulatory risks regarding water management in drought risk operations areas mainly the Western Cape, the South African Carbon tax, the Draft Climate Change Bill imposing a carbon budgeting system.	Woolworths have noted the 2015 Paris Agreement and the IPCC 1.5 C warming threshold as important instruments to drive climate-related action. In SA, they note the Carbon tax, the Draft Climate Change and national GHG reporting regulations.	SPAR has noted the Carbon tax as an impact on its direct operations and suppliers across the supply chain, increasing the cost of operations such as diesel and liquified petroleum gas used in its operations.
Technology	Pick n Pay's has made some progress in implementing energy efficiency technologies and renewable energy generation in their operations. They have set a renewable energy target to be 50% renewable by 2030 and 70% by 2040.	Shoprite sites renewable energy, increased demand for energy efficient equipment to reduce GHG emissions and continues to accelerate the roll-out of its energy efficiency lighting.	Woolworths has set a goal to source 100% renewable energy by 2030 and have invested in in solar PV and generations capacity.	Spar utilizes technological innovations that support transition to a low-carbon economy such as solar PV roll outs, alternative fuel sources and piloting semi-rigid hybrid vehicles.
Market	Pick any pay reports on climate change, food security, water security, pollution, waste, biodiversity and land use.	Shoprite addresses social and environmental issues with a focus on food security, packaging, water and climate change.	In recognition of consumer demand for more sustainable and environmentally friendly products, Woolworths engage in product labelling around the origin of the product, setting targets around organic products and other community and environmental initiatives intended to broaden their supply base.	Spar recognizes that changing customers or community perceptions around their climate change actions is important by identifying shifting consumer perceptions as one of its climate-related risks.
Reputation	Pick n Pay emphasizes creating long-term sustainable value with their stakeholders by disclosing information to stakeholders to meet 'stakeholder' specific information requirements in the form of several reports.	Shoprite maintains a strong reputation among its stakeholders by addressing food security through the development of long-term relationships with suppliers, resulting in cost savings and increased food security which mitigates the associated upstream climate-related risk.	Woolworths are exploring opportunities to transition their business to cleaner energy through initiatives in their operations – they are 5-star rated certified by the Green Building Council South Africa (GBCSA), across 190 stores.	Spar is actively involved in pursuing carbon and waste management programmes, water saving initiatives and product labelling.
Acute risks	Pick n pay recognizes extreme weather events posing severe financial risk to the company and notes acute physical risks are noted as becoming more prevalent and examples include severe storm events and flooding impacting infrastructure, upstream value chain and agricultural goods	Shoprite recognizes extreme weather events posing severe financial risk to the company and notes acute physical risks are noted as becoming more prevalent noting the Western Cape drought as a risk and the floods in Mozambique damaging infrastructure.	Woolworths recognizes the extreme weather events caused by climate change and engages Provincial and National Government Departments by assisting in climate change resilience within the agricultural sphere. In addition, they work with suppliers and broader network for upstream famers to improve to improve soil health, protect water supply, restore biodiversity, support rural livelihoods and help communities adapt to climate change.	Spar recognizes increased severity and frequency of extreme weather events as acute climate risks and are always included in risk assessments as they could disrupt business operations and negatively impact revenues and profitability. Extreme weather events are included in SPAR's Risk Register.

Measurement Area	Pick n Pay	Shoprite	Woolworths	Spar
Chronic risks	Pick n Pay monitors evaluates and includes longer term risks on an ongoing basis. They have cited water security and referring to the severe impact of drought on farmers and communities throughout South Africa as well their operational water use.	Shoprite has cited water security and referring to the severe impact of drought on farmers and communities throughout South Africa as well their operational water use. Shoprite has started to diversify the sourcing of products and discloses a commitment to supporting farmers and small-scale producers.	How WHL manage their acute climate-related risk is the same as how they address their chronic climate-change risk which is a cause for concern as the impact of the risk posed by the two physical risks vary, depending on the geographic location and regions in South Africa.	Spar recognizes longer-term shifts in climate patterns (including temperature increases, reduced precipitation or sea level rise) having longer term impacts on their operations and are always included in risk assessments of their operations and across the value chain.

APPENDIX F: The SA agri-business Individual scores:

RCL Foods – 1.7/2

RCL Foods demonstrates a commitment to climate risk disclosure through a good score of 1.7/2. They performed well in the TCFD and transition risk reporting segment scoring 2/2 except for strategy. Although RCL Foods recognizes climate change as one of their material risks, the company does not disclose the impact of climate related risks on their operations or affected areas. Nerveless, RCL were exemplary in their Metrics and targets section in line with international standards. Their emission reductions targets are aligned with the 1.5°C Paris Agreement target and reported on Scope 3 emission reductions. Regarding the physical risks section, RCL foods scored 1 for both acute and chronic risk. The reason for these scores is that RCL Foods does not provide enough detail as to how both acute and chronic climate-related risks impact their operations recognizing climate adaption is too broad.

Measurement Area	RCL Foods	Scores
Governance	RCL Foods discloses that the overall responsibility for its sustainable development is its Board, who are assisted by their Risk Committee and the Social & Ethics Committee.	2
Strategy	RCL Foods recognises climate change as one of the material risks affecting its business.	1
Risk management	RCL Foods uses an Enterprise Risk Management (ERM) in their identification and evaluation of key risks and opportunities.	2
Metrics and targets	RCL Foods reports on Scope 1, Scope 2 and 3 GHG emissions and aligned their emission reductions with the 1.5°C Paris Agreement target.	2
Policy and legal	RCL Foods RCL Foods has an investor relations policy to ensure compliance with all legislation, regulation and voluntary codes in relation to the Disclosure.	2
Technology	RCL Foods has 3 types of renewable energy generation. Sugar Co-Generation of Electricity, Waste-to-Value and Solar (rooftop solar) generation across their operations.	2
Market	RCL Foods places product packaging at the highest standard to ensure product quality and safety and customer satisfaction.	2
Reputation	RCL Foods has an investor relations policy to limit reputational risk for management and the group.	2
Acute risks	RCL Foods recognizes climate adaptation impacting energy and water supply as key risks. Their sustainability team is tasked with responding to the related issues of climate change.	1
Chronic risks	RCL Foods recognizes climate adaptation impacting energy and water supply as key risks. Their sustainability team is tasked with responding to the related issues of climate change.	1

Tiger Brands – 1.7/2

Tiger Brands performed relatively well, scoring 1.7/2 overall in the climate risk disclosure blended framework. They scored 1/2 in the physical risk segment of the framework, this was because focusing despite producing information on acute risks, they did not disclose information for chronic climate- related risks. The knowledge gap leaves SA agro-food companies' raw material exposed to amplified chronic climate risks. In the TCFD and transition risk reporting segment, they struggled. Tiger Brands scored 1/ 2 for strategy – whilst they outline their sustainability focus areas, they do not disclose the climate-related risks and impact on their operations. Regarding risk management, they scored 1/ 2 for not disclosing their processes to prioritize or manage climate-related risk.

Measurement Area	Tiger Brands	Scores
Governance	Tiger Brands demonstrates that its board of directors is tasked with the ultimate oversight of its sustainability strategy and performance.	2
Strategy	Tiger Brands prioritizes sustainability focus areas: health and nutrition, enhanced livelihoods and environmental stewardship.	1
Risk management	The Tiger Brands' board has ultimate responsibility for overseeing the group's risk management processes.	1
Metrics and targets	Tiger Brands reports on reductions of scope 1 GHG emissions and has set a 2030 target for a 15% decrease in emissions. The company does not report on reductions in its scope 2 GHG emissions nor disclose a relevant target.	2
Policy and legal	Tiger Brands recognizes the carbon tax as a transition risk and uses an internal carbon price to track its potential impact of business whilst exploring closer TCFD recommendations alignment.	2
Technology	Tiger Brands have implemented energy management system (EnMS) and energy system optimisation (ESO) projects on several of their sites to manage their energy use.	2
Market	Tiger Brands has set a target for 100% of its packaging to be recyclable by 2030. They also have a	2
Reputation	Tiger Brands provides a list of key stakeholder groups and details how it engages with these groups, their material interests as well as its response to the material interests of each group.	2
Acute risks	Tiger Brands has highlighted the climatic challenges such as droughts which has exasperated the water crisis in parts of Sou Africa as a key risk to the performance of their most water-intensive operations.	1
Chronic risks	N/A	1

Oceana Group – 1.8/2

Oceana Group showcases an exemplary climate risk and sustainability performance scoring 1.8/2. They scored 2/2 across the board with two areas they need to improve on due to scoring 1/2 which is strategy and metrics and targets. Regarding strategy, Oceana Group do not disclose the focus areas impacted by climate related risks on their operations. On metrics and targets, whilst Oceana Group reports on Scope 1, Scope 2 and 3 GHG emissions and has set a 50% reduction in GHG emissions by 2030. Their emission reduction targets are still not aligned with the SBTi or the 1.5°C Paris Agreement target.

Measurement Area	Oceana Group	Scores
Governance	Oceana Group's Board approves strategic direction and oversees implementation of the sustainability strategy, with assistance from the Social, Ethics and Transformation Committee (SETCOM).	2
Strategy	Ocean Group's sustainability strategy focuses on promoting responsible stewardship of the marine environment.	1
Risk management	Ocean Group uses internal integrated risk management practices for internal decision-making and for its external reports.	2
Metrics and targets	Oceana Group reports on Scope 1, Scope 2 and 3 GHG emissions and has set a 50% reduction in greenhouse gas emissions by 2030.	1
Policy and legal	Oceana Group acknowledges the Carbon tax on certain liquid fuels and as a response have commissioned carbon consultants to assist in carbon tax measurements annually.	2
Technology	Oceana Group continues to focus on improving our energy efficiency and seek to reduce our consumption of non-renewable energy.	2
Market	Oceana Group has an SDG commitment to harvesting marine resources responsibly and recognizes the impact of climate change on food security.	2
Reputation	Oceana Group engages regularly various stakeholders in civil society, government, associations, private sector and academia to support small-scale fishers an ecosystem approach to fishing.	2
Acute risks	Oceana Group recognizes changing weather patterns and climate change are as a risk seen through significant impacts on their operations such as extreme weather events causing climate-induced shifts in fishing sources.	2
Chronic risks	Oceana Group responds to the long-term impacts of climate through diversification of farmed fish. In addition, Oceana regularly engages partners that support small-scale fishers and an ecosystem approach to fishing.	2

Tongaat Hulett – 1.3/2

Tongaat Hulett was the lowest ranked company overall scoring a 1.3/2. The only areas they scored 2/2 was in the following areas: policy and legal, technology, reputation, acute risks. The other areas Tongaat scored 1/2 are discussed below. On governance, they do not disclose personnel who are equipped for the implementation of its climate-related risk i.e. a Board supported by Risk Committee and the Social & Ethics Committee. For strategy, they do not disclose the impact of climate related risks. Regarding metrics and targets, despite report across all scope 1, 2 and 3 GHG emissions, their reduction targets are still not aligned with the SBTi or the 1.5°C Paris Agreement target. Regarding the market, Tongaat Hullet recognizes only water as the as a significant material risk in the agro-food sector not climate change. The worst performing measurement area was risk management (scored 0) – Tongaat Hulett do not disclose how prioritizes, measures and manages climate-related risk and impacts. This undermines the potential to directly impact the 2/2 areas, particularly on physical risk. By not identifying the main climate threats and starting to develop a strategic direction for the adaptation planning, they are more reactive than proactive.

Measurement Area	Tongaat Hulett	Scores
Governance	Tongaat Hulett demonstrates it has assigned ultimate responsibility for its sustainability strategy to the board of directors.	1
Strategy	Tongaat Hulett has identified sustainability objectives covering topics related to nutrition, social inclusion and the environment dimensions.	1
Risk management	N/A	0
Metrics and targets	Tongaat Hulett reports on Scope 1, 2 and 3 GHG emissions and has set a 50% reduction in greenhouse gas emissions by 2030.	1
Policy and legal	Tongaat Hulett has made internal changes to align their carbon emission calculation methodology with South Africa's, Department of Environment, Forestry and Fisheries' reporting methodology.	2
Technology	Several Tongaat Hulett sugar mills operations have been reregistered for Renewable Energy Certificates for exported renewable electricity and increased the actual export capacity from 7.5 MW to an average of 12.5 MW.	2
Market	Tongaat Hulett has a water stewardship strategy throughout their operations such as water conservation, water re-use and soil management.	1
Reputation	Tongaat Hulett has a stakeholder engagement process that regularly shows how it has responded to stakeholder concerns and integrated these into its actions.	2
Acute risks	Tongaat Hulett recognizes the extreme weather events caused by climate change through flooding and has responded through a water stewardship strategy and integrating small-scale farmers as well.	2
Chronic risks	Tongaat Hulett has a commitment to support the resilience, productivity and access to small-scale farmers as part of its inclusive growth objective.	1

APPENDIX G: The SA food retailers Individual scores

Pick n Pay – 1.8/2

Pick n Pay performed exemplary in in the climate risk disclosure blended framework and is one of the top performers, scoring 1.8/2. They scored 2/2 across board except for strategy, metrics, and targets, where they scored 1/2. Regarding strategy, the reason for this score was that whilst Pick n Pay discloses its process for discovering and prioritizing its most relevant sustainability topics, they do not disclose the impact of climate related risks on their operations. For metrics and targets, Pick n Pay's GHG emissions reduction targets fall short, whilst they have set a time-bound target to reduce their scope 1 and 2 GHG emissions by a '25% reduction in its CO2 emissions by 2020, they are not aligned with the international 1.5°C Paris Agreement target, SBTi approved or include a Scope 3 emissions target.

Measurement Area	Pick n Pay	Scores
Governance	Pick n Pay's sustainability performance is overseen by the Sustainability Steering Committee and the Social and Ethics Committee.	2
Strategy	The accountability for and oversight of the Pick n Pay's sustainability strategy lies with the highest governance body and discloses its process for identifying and prioritizing its most relevant topics.	1
Risk management	Pick n Pay are addressed their risks through in their Climate Change strategy and incorporate climate-related scenario models to build resilience.	2
Metrics and targets	Pick n Pay has a time-bound target to reduce its scope 1 and 2 GHG emissions by a '25% reduction in its CO2 emissions by 2020. Their targets are not aligned with a 1.5-degree trajectory, SBTi approved or include a Scope 3 emissions target.	1
Policy and legal	Pick n Pay noted regulatory risks regarding water management, the South African Carbon tax, the Draft Climate Change Bill imposing a carbon budgeting system.	2
Technology	Pick n Pay's has made some progress in implementing energy efficiency technologies and renewable energy generation in their operations. They have set a renewable energy target to be 50% renewable by 2030 and 70% by 2040.	2
Market	Pick any pay reports on climate change, food security, water security, pollution, waste, biodiversity and land use.	2
Reputation	Pick n Pay emphasizes creating long-term sustainable value with their stakeholders by disclosing information to stakeholders to meet 'stakeholder' specific information requirements in the form of several reports.	2
Acute risks	Pick n pay recognizes extreme weather events posing severe financial risk to the company and notes acute physical risks are noted as becoming more prevalent and examples include severe storm events and flooding impacting infrastructure, upstream value chain and agricultural goods.	2
Chronic risks	Pick n Pay monitors evaluates and includes longer term risks on an ongoing basis. They have cited water security and referring to the severe impact of drought on farmers and communities throughout South Africa as well their operational water use.	2

Shoprite – 1.7/2

Shoprite Tiger Brands performed relatively well, scoring 1.7/2 overall in the climate risk disclosure blended framework. They scored 2/2 across the framework but struggled with scores of 1/2 in the TCDF recommendations segment. Regarding strategy, the reason for this score was that whilst Shoprite discloses its process for identifying and prioritizing its most relevant sustainability topics, but they do not disclose the impact of climate related risks on their operations. For risk management, despite using an ERM framework, they do not disclose the relative significance of climate-related risks to their operations. For metrics and targets relation to other risks perform poorly, they have no time-bound target to reduce their scope 1 and 2 GHG emissions and they are not aligned with a 1.5°C Paris Agreement target, SBTi approved or include a Scope 3 emissions target.

Measurement Area	Shoprite	Scores
Governance	Shoprite's Social and Ethics Committee oversee its environmental and social sustainability activities.	2
Strategy	Shoprite discloses its process for identifying and prioritizing its most relevant sustainability topics, as well the outcome of this process in relation to its sustainability strategy.	1
Risk management	Shoprite uses an Enterprise Risk Management (ERM) policy and framework to embed sustainability principles and practices into the Group's operations.	1
Metrics and targets	Shoprite reports on reductions of scope 1 GHG emissions and have not set a reduction target for its GHG emissions. In addition, Shoprite's targets are not aligned with a 1.5-degree trajectory, SBTi approved or include a Scope 3 emissions target.	1
Policy and legal	Shoprite have noted regulatory risks regarding water management in drought risk operations areas mainly the Western Cape, the South African Carbon tax, the Draft Climate Change Bill imposing a carbon budgeting system.	2
Technology	Shoprite sites renewable energy, increased demand for energy efficient equipment to reduce GHG emissions and continues to accelerate the roll-out of its energy efficiency lighting.	2
Market	Shoprite addresses social and environmental issues with a focus on food security, packaging, water and climate change.	2
Reputation	Shoprite maintains a strong reputation among its stakeholders by addressing food security through the development of long-term relationships with suppliers, resulting in cost savings and increased food security which mitigates the associated upstream climate-related risk.	2
Acute risks	Shoprite recognizes extreme weather events posing severe financial risk to the company and notes acute physical risks are noted as becoming more prevalent noting the Western Cape drought	2

	as a risk and the floods in Mozambique damaging infrastructure.	
Chronic risks	Shoprite has cited water security and referring to the severe impact of drought on farmers and communities throughout South Africa as well their operational water use. Shoprite has started to diversify the sourcing of products and discloses a commitment to supporting farmers and small-scale producers.	2

Woolworths – 1.9/2

Worthworths demonstrates an exemplary commitment to climate change risk disclosure, tied for 1st overall by scoring 1.9/2. They scored 2/2 across the climate risk disclosure blended framework. The only 1/2 score was in the chronic risk measurement area. Worthworths do not distinguish between acute and physical risk in their approaches. The lack in consideration of the longer-term impact of climate change on their operations and society poses a severe risk for Woolworths. The persistence of chronic climatic impacts is likely to change precipitation patterns, increase water stress, land degradation directly affecting resources and increasing food prices for consumers.

Measurement Area	Woolworths	Scores
Governance	Woolworths sustainability performance is overseen by the Sustainability Steering Committee and the Social and Ethics Committee.	2
Strategy	Woolworths has a Sustainability Committee that main purpose of the committee is to ensure that the sustainability strategy and objectives are effectively integrated into the business.	2
Risk management	Woolworths uses an Enterprise Risk Management (ERM) which implements and monitors risks to ensure that a consistent approach to risk management is applied across its operations.	2
Metrics and targets	Woolworths have an approved SBTi target which is in line with the 1.5 °C trajectory despite disclosing Scope 1 and Scope 2 emissions but not Scope 3.	2
Policy and legal	Woolworths have noted the 2015 Paris Agreement and the IPCC 1.5 C warming threshold as important instruments to drive climate-related action. In SA, they note the Carbon tax, the Draft Climate Change and national GHG reporting regulations.	2
Technology	Woolworths has set a goal to source 100% renewable energy by 2030 and have invested in in solar PV and generations capacity.	2
Market	In recognition of consumer demand for more sustainable and environmentally friendly products, Woolworths engage in product labelling around the origin of the product, setting targets around organic products and other community and environmental initiatives intended to broaden their supply base.	2
Reputation	Woolworths are exploring opportunities to transition their business to cleaner energy through initiatives in their operations – they are 5-star rated certified by the Green Building Council South Africa (GBCSA), across 190 stores.	2
Acute risks	Woolworths recognizes the extreme weather events caused by climate change and engages Provincial and National Government Departments by assisting in climate change resilience within the agricultural sphere. In addition, they work with suppliers and broader network for upstream famers to improve to improve soil health, protect water supply, restore biodiversity, support rural livelihoods and help communities adapt to climate change.	2
Chronic risks	How WHL manage their acute climate-related risk is the same as how they address their chronic climate-change risk which is a cause for concern as the impact of the risk posed by the two physical risks vary, depending on the geographic location and regions in South Africa.	1

Spar – 1.9/2

Spar demonstrates an excellent commitment to sustainability and climate risk management, tied for 1st overall by scoring 1.9/2. They scored 2/2 across the climate risk disclosure blended framework. The only 1/2 score was in the metrics and targets measurement area. Although, Spar developed a science-based targets which set out Scope 1 and 2 emissions reduction targets by 2050, their GHG emission reduction targets fall short and have not been approved by the SBTi, are not aligned with 1.5°C Paris Agreement target or include a Scope 3 emissions target.

Measurement Area	Spar	Scores
Governance	The Social and Ethics Committee of the Board has overall accountability for the sustainability and climate change agenda for Spar.	2
Strategy	Spar describes how its processes for identifying, assessing, and managing climate-related issues through a multi-disciplinary company-wide risk identification, assessment, and management process.	2
Risk management	Spar's risk management and materiality is guided by both their Integrated Reporting (IR) framework and an Enterprise Risk Management (ERM) process.	2
Metrics and targets	Spar developed science-based targets which set out Scope 1 and 2 emissions reduction targets by 2050. But the targets have not been approved by the SBTi and are not aligned with a 1.5-degree trajectory or include a Scope 3 emissions target.	1
Policy and legal	SPAR has noted the Carbon tax as an impact on its direct operations and suppliers across the supply chain, increasing the cost of operations such as diesel and liquified petroleum gas used in its operations.	2
Technology	Spar utilizes technological innovations that support transition to a low-carbon economy such as solar PV roll outs, alternative fuel sources and piloting semi-rigid hybrid vehicles.	2
Market	Spar recognizes that changing customers or community perceptions around their climate change actions is important by identifying shifting consumer perceptions as one of its climate-related risks.	2
Reputation	Spar is actively involved in pursuing carbon and waste management programmes, water saving initiatives and product labelling.	2

Acute risks	Spar recognizes increased severity and frequency of extreme weather events as acute climate risks and are always included in risk assessments as they could disrupt business operations and negatively impact revenues and profitability. Extreme weather events are included in SPAR's Risk Register.	2

Chronic risks	Spar recognizes longer-term shifts in climate patterns (including temperature increases, reduced precipitation or sea level rise) having longer term impacts on their operations and are always included in risk assessments of their operations and across the value chain.	2