Gordon Institute of Business Science
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The drivers of commitment to carbon neutrality: Impact on firm performance and supply chain management

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ABSTRACT

The global community is working to address climate change challenges by achieving carbon neutrality, a low-carbon, environmentally friendly model. Major companies worldwide have committed to achieving zero emissions targets, focusing on renewable energy sources like solar and wind farms and replacing fossil fuel-powered machinery and cars with more environmentally friendly models. This shift is seen as a driver to sustainability, contributing to the environment and society's wellbeing. Research aims to provide management and interested parties with actionable advice on navigating the transition to carbon neutrality. Companies must recognize external factors influencing the shift and take appropriate action to counter them. Companies must further recognize how the transitioning to carbon neutrality impacts their performance and supply chain management. They should also interact with the government to create legislation that facilitates the transition to carbon neutrality. This will help companies lead their teams through a smooth transition and contribute to a more sustainable future.

This qualitative study examined the motivations behind becoming carbon neutral as well as the possible effects on supply chain management and company performance. Thirteen semi-structured interviews with individuals who had gone through the process of becoming carbon neutral were used to collect data. Cross-sector comparisons were made possible by the fact that participants came from four distinct sectors in Namibia: mining, financial services, academic institutions, and industry associations. A thematic analysis approach was employed to systematically analyse the qualitative data.

A conceptual research framework outlining the process of transitioning to carbon neutrality was the study's final output. The study's similarities and differences with previous research on the factors influencing the shift to carbon neutrality, its effects on supply chain management and firm performance, and its implications for these areas were noted.

KEY WORDS

Carbon neutrality

Sustainability

Firm performance

Supply chain management

DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements of the degree of Master of Philosophy in Corporate Strategy at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination at any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

Rasta Kaeka **27 November 2023**

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS AND ACRONYMS

GDP	Gross Domestic Product
GHG	Greenhouse gasses
NCCI	Namibia Chamber of Commerce and Industry
NBC	Namibian Broadcasting Corporation
SDGs	Sustainable Development Goals
SMEs	Small and Medium Enterprises
UNDP	United Nation Deveopment Programme
UNFCCC	United Nations Framework Convention on Climate Change

CHAPTER 1: INTRODUCTION TO THE RESEARCH PROBLEM

1.1 Background: Business relevance of the research

The most tenacious challenge the world faces today is the change in climate primarily because of carbon dioxide and other greenhouse gases (GHG) being emitted (Ritchie et al., 2020). To address the tenacious challenge of climate change, most countries have pledged their commitment by joining the Paris Climate Agreement with the aim of assisting to increase the global average temperatures to within 1.5◦C pre-industrial levels (UNFCCC, 2015). In response, leading companies around the world have also joined a similar initiative called the Climate Pledge. The Climate Pledge aims to address the following three objectives: (1) “measuring and regular reporting on greenhouse gas emissions” (para. 01), (2) “implementation of the decarbonisation strategies as per Paris Agreement” (para. 02) and (3) “offsetting emissions to achieve net zero by 2040” (para. 03) (The Climate Pledge, n.d).

In 2021 the Government of the Republic of Namibia have revised and submitted its nationally determined contributions (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC) reaffirming their commitment towards the Paris Agreement and paving the road to net-zero emissions by 2050 (UNDP, 2022). The initiative by Namibia supports the United Nations efforts in addressing climate change and particularly responding to the Sustainable Development Goals (SDGs), goal 13 which emphasizes “the urgent action to combat climate change and its impacts” (United Nations, n.d).

The Namibia Chamber of Commerce and Industry (NCCI) have urged private sector in Namibia to join efforts with government in compacting climate change. NCCI called on companies to include procedures in their day-to-day operations that would address challenges of climate change (NBC, 2022). The call by NCCI is on companies in the major economic sectors to address climate change.

Mining sector is the leading economic sector in Namibia contributing 12.2% of Namibia’s GDP in 2022 (Chamber of Mines of Namibia, 2023). According to Mohsin et al. (2021) mining is a great contributor towards countries’ economic growth. The sentiments were share by Walser (2000) 23 years ago that mining is an important economic driver if done responsibly. The mining sector is one of the leading carbon emitters in Namibia

(UNFCCC,2020). Mining, as a leading economic sector and a leading carbon emitter makes a good choice in responding to the question of transitioning to carbon neutrality and in addressing the call by NCCI in addressing climate change challenges.

1.2 Research problem: Theoretical relevance for the research

The world has taken arms in addressing climate change challenges which is considered as the most pertinent issue in the world today, as countries are committed to achieving carbon neutrality (Zhang et al., 2022). Global warming has drawn the attention of the international community, which is working to address the core issues with the current model of economic development and create a low-carbon, environmentally friendly model (Zhao et al., 2022). Major companies in the world have shown their commitment towards carbon neutrality or zero emissions targets (Yuan et al., 2022). To contribute to the environment and societies wellbeing, carbon neutrality has been considered as a driver to sustainability (Zhang et al., 2022). The global green and low-carbon transformation has a general direction that has been established by the Paris Agreement, which also outlines the necessary course of action to preserve the environment and ensure human survival. In order to accomplish this, all nations should strive to reach their global emissions peak as soon as possible. If this is done, there is a chance that the world will be carbon neutral by the middle of the century (Zhao et al., 2022). Businesses have a major role to play in curbing global warming trends by effectively mitigating against carbon emissions which aide in achieving carbon neutrality (de Sousa Jabbour et al., 2019). Curbing climate change risks can only be achieved by joint contributions through global, national, firms and individuals' initiatives (Zhang et al., 2022). For accountability purposes the concept of carbon neutrality is considered more measurable than the low-carbon concept (Zhang et al., 2022).

The research on the concept of carbon neutrality have mainly focused on the macro perspective, looking at initiatives driven from global and national levels with emphasise on policies and technologies (Zhang et al., 2022). There is little literature on (1) what drives the business in achieving carbon neutrality (2) impact of carbon neutralities on firm performance and (3) impact of carbon neutrality on supply chain management (Zhang et al., 2022). Most researchers have focused on the factors that influences carbon emissions, but there is a need to do more research on drivers influencing the clean energy penetration (S. Liu et al., 2020). Even though there is a common goal which is achieving carbon neutrality globally, there is a need to review the socio-economic conditions for each country independently (Yang & Liu, 2023).

It is against this background that a research opportunity presented by Zhang et al. (2022) was welcomed in exploring and contributing to the body of literature by inviting more participants in different country to contribute and expand to (1) the key drivers of achieving carbon neutrality, (2) the impact of carbon neutrality on firm performance and (3) impact on supply chain management. The above will be achieved through the lens of stakeholder and institutional theory.

1.3 Research question

The primary research question for this study was derived from a study on the idea of carbon neutrality and an invitation for additional research issued by (Zhang et al., 2022). This was due to the idea of carbon neutrality is still relatively new, and more participants from more nations will be needed to provide a thorough and in-depth analysis of the major factors influencing the transition to carbon neutrality.

Primary research question:
What drives a firm's commitment to carbon neutrality and how does it impact firm perfromance and supply chain management? (Zhang et al., 2022).

After analysing the literature on carbon neutrality from the primary research question's main constructs, three research questions were developed. The three new research questions have been created in an attempt to better understand the potential impacts that a commitment to lowering carbon emissions may have on supply chain management and firm performance.

Research question 1: How do firms transition to carbon neutrality and what are the drivers? (Zhang et al., 2022).

Research question 2: How does commitment to carbon neutrality impact firm performance? (Zhang et al., 2022 & Yao et al., 2021).

Research question 3: How does commitment to carbon neutrality impact supply chain management? neutrality (Di Maggio & Powell, 1983; Zhang et al., 2022; Jia et al., 2019; Gong et al., 2018; Chan et al., 2018)

In Chapter 3, the research questions are covered in more detail.

1.4 Research aims

Gaining a deeper comprehension and insight into the idea of becoming carbon neutral was the primary aim of the study. This was accomplished by determining the factors that lead to carbon neutrality as well as the effects that shifting to carbon neutrality would have on supply chain management and firm performance. In summary, the research seeks to leverage these insights to provide management and interested parties with actionable advice and a deeper understanding of how to effectively navigate the transition to carbon neutrality.

The creation of a conceptual framework that outlines the key constructs and themes for a smooth transition to carbon neutrality is another aim of this research.

1.5 Research contribution

The study's theoretical relevance was in its identification of the factors that lead to carbon neutrality and the effects that such a transition has on supply chain management and company performance. By doing so, it may contribute to the body of existing literature by offering new perspectives and knowledge. The research also revealed nuances of differences in the literature on carbon neutrality, which could be potential contribution to the body of literature. The government's provision of primary infrastructure, the government's prioritisation of pertinent issues, the elimination of the abundance mindset, and the high-cost impact on SMEs resulting from the transition to carbon neutrality were the potential refinements that were identified.

1.6 Scope of the research

1.6.1 Theoretical scope

The theoretical scoping of the study has considered the following key constructs: the firm (or an organization), the study is situated in literature of carbon neutrality and not on the reduction of carbon emissions. Ample research exists on carbon emissions while the concept of carbon neutrality is relatively new (de Sousa Jabbour et al., 2019 & Zhang et al., 2022). The study focuses on gaining understanding and new insights on carbon neutrality from countries and industries that are not included in current literature. It

considers the transition to carbon neutrality and the impact on firm performance and supply chain management (Zhang et al., 2022). The study deliberately excluded internal dynamics such as how the firm manages its supply chain management but considered how the supply chain management is impacted by the transition to carbon neutrality. The study did not look solely at profitability but looked at firm performance more broadly and considered it from the perspective of how it can be impacted by the transition to carbon neutrality. Firm performance broadly includes social and environmental benefits extending to the traditional evaluation of profitability, return on investment and measuring of solvency of the firm (Yao et al., 2021).

1.6.2 Physical setting

The physical setting for the study is Namibia which is a suitable choice to answer the research question for the following reasons. It is practical because the researcher lives in Namibia and have access to people in Namibia to conduct the study. Namibia have been chosen due to its commitment to halt climate change and its objective of achieving net- zero emissions by 2050 (UNDP, 2022).

The mining industry have been chosen due to the sector being one of the biggest carbon emitters in Namibia. Figure 1 shows the top ten industry comparison of emissions. The biggest carbon emitters in Namibia are the energy sector and road transportation followed by far less but still very significant the fishing and the mining sector.

Year	1 - Energy	1.A.1.a.i - Electricity Generation	1.A.2.i - Mining (excluding fuels) and Quarrying	1.A.2.m - Non-specified Industry	1.A.3.a - Civil Aviation	1.A.3.b - Road Transportation	1.A.3.c - Railways	1.A.4.b - Residential	1.A.4.c.iii - Fishing (mobile combustion)	1.A.5.b.iii - Mobile (Other)
2011	2796.3	13.0	220.8	2.1	28.7	2041.8	52.4	130.8	261.5	45.3
2012	3003.3	97.0	189.7	2.4	25.3	2140.5	56.5	126.0	314.7	51.4
2013	2861.0	15.5	173.1	2.4	25.4	2187.4	52.1	126.3	226.0	52.8
2014	3234.2	5.4	173.7	2.3	25.5	2506.7	54.3	132.1	273.0	61.1
2015	3540.0	20.7	177.4	2.4	25.7	2742.2	54.3	138.0	270.5	108.8

Figure 1 GHG emissions (Gg CO2-eq) by Energy sub-category for period 2011 to 2015

Source: UNFCCC (2020).

The mining industry is chosen because of its significant emissions that comes from the industry and therefore a key sector that is appropriate for answering the research question on how the industry navigates the transition to carbon neutrality.

1.7 Research report overview

There are seven chapters in this research report. Chapter 1 introduces the business and theoretical problem. Chapter 2 covers the literature on carbon neutrality in detail, which concludes with the development of the conceptual framework that includes the key constructs that answer the research question. Chapter 3 coveres the three research questions that address the primary research question in detail. Chapter 4 describes the research methodology and designs used for the study. Chapter 5 presents the results of the data collection and analysis performed during the study. in Chapter 6 covers the comparison of the research results from Chapter 5 with the literature from Chapter 2. Chapter 7 covers the theoretical research conclusion that attempts to address the research questions, along with the research findings from the comparative analysis between the research findings and the existing literature as discussed in Chapter 6. It also includes recommendations for management and other interested parties, the final conceptual framework, research contribution, limitations of the research, and ideas for future research.

1.8 Chapter conclusion

The importance of transitioning to carbon neutrality, the impact of such transitioning to firm performance and supply chain management proves to be of business and theoretical relevance. The transitioning to carbon neutrality will be studied through the lens of instrumental stakeholder and institutional pressures theories. The chapter have indicated the need for the identified research questions to be addressed from a different setting. It further detailed that the chosen setting is appropriate to respond to the research questions. Chapter two would investigate the literature around the drivers of transitioning to carbon neutrality and its impact on firm performance and supply chain management. It would also highlight and explain the key constructs of the study.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

To address the research questions, a review of the literature was conducted. The literature was sourced from highly rated, peer-reviewed journal articles published in the previous five years.

Before reading what, the various scholars had to say about the chosen topic, the researcher first described the search criteria. In the literature review, the main ideas from every research question are examined and discussed. Following the description of the established criteria, the review delves into the idea of understanding carbon neutrality and analyses it. The articles about what motivates the shift to carbon neutrality are discussed and analysed, which used discussion and analysis of relationship between institutional theory and carbon neutrality, and the relationship between stakeholder theory and carbon neutrality. After that, the impact of carbon neutrality on supply chain management was examined and discussed, and finally, the enablers and barriers to carbon neutrality were discussed and examined. A summary of the literature and the development of the conceptual framework, which was derived from the literature reviewed, is the last section of the chapter. Below is an outlay of literature review in Figure 2.

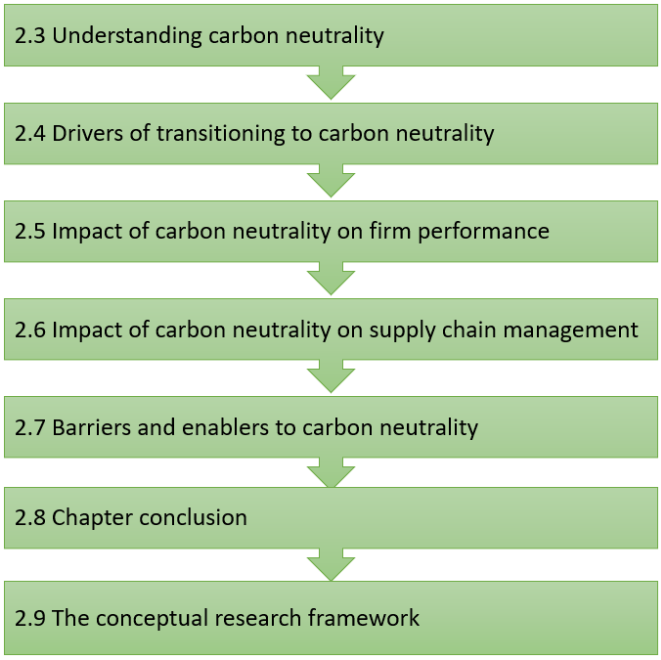

Figure 2 Outlay of the literature review

Source: Researcher's Own.

2.2 Search criteria

Carbon neutrality is a relatively new concept that has gained a lot of attention recently (Zhang et al., 2022). Striking key words were utilised to search the literature reviewed using key constructs to determine relevance of the literature. Key words used are: “carbon neutrality”, “transition to carbon”, “net zero”, “decarbonization”, “emissions”, “climate change” “sustainability”, “stakeholders”, “institution”, “firm”, “performance”, “drivers”, “barriers”, “enablers” and “supply chain”. Literature reviewed was from peer reviewed journals. Literature was reviewed for quality using the Academy Journal Guide 2021, mainly only journals with a rating of three (3) or four (4) will be considered but journals of lower rankings that would provide quality to the research would be considered (Chidlow et al., 2015). Only publications from the previous five years were included, and the timeframe was predetermined. Articles older than five years were taken into consideration when appropriate and if doing so would add value. Google Scholar was mainly used for articles to be reviewed, Scopus and JSTOR were used when relevant literature could not be found on Google Scholar. Articles published in predatory and open access journals were avoided unless it has some valuable and relevant information that could not be found elsewhere. Predatory and open access journals were avoided when reviewing articles, unless they contained important, unique, and relevant information that could add value and could not be found anywhere else. The quality of the scholar was also considered when selecting articles.

2.3 Understanding carbon neutrality

Zhang et al. (2022) invites researchers to address the knowledge gap and provide new insights on the concept of carbon neutrality. The research opportunity is to determine the drivers of achieving carbon neutrality, its impact on firm performance and supply chain management in a different country in various industries. The researcher accepted to investigate and provide new insights: (1) how firms transition to carbon neutrality and what drives them, (2) the impact of the commitment to carbon neutrality on firm performance and (3) the impact of the commitment to carbon neutrality on supply chain management (Zhang et al. 2022). The above will be investigated through the lens of how instrumental stakeholders (Freeman & Reed, 1983) and institutional pressures (Di Maggio & Powell, 1983) impacts the transitioning to carbon neutrality.

Carbon neutrality is defined as the carbon dioxide ($CO_{2)}$ emitted by humans in the atmosphere must equate to the carbon dioxide that is being removed by humans from

the atmosphere, carbon neutrality is equated to net-zero emissions (IPCC, 2018). According to J. Chen (2021) carbon neutrality is to stop the increase of carbon dioxide in the atmosphere, which causes global warming and achieiving net-zero CO_2 emissions by balancing CO_2 emissions with its removal. Y. Wang et al. (2021) defined carbon neutrality as “at a given time to reach a state of global neutrality between CO_2 emissions by humans and the global CO_2 removal by humans” and net-zero emissions (greenhouse gas neutrality) was defined as “at a given time to reach a state of balance between the human-emitted greenhouse gases into the atmosphere and the greenhouse gases removed by humans from the atmosphere”. Both sentiments tackle the balance between the emissions and removal of CO_2 by humans that would result in carbon neutrality or net-zero emissions. The increase in damage is in line with the rise in global temperature, which is caused by the accumulation of carbon emissions in the atmosphere (H. Chen et al., 2022). F. Wang et al. (2021) argued that it may be possible to end our reliance on fossil fuels by using the potential of renewable and carbon-neutral resources to generate energy and other fossil-based substitutes. Carbon neutrality can also be achieved through carbon offsett and buying of carbon credits or earning carbon credits. Carbon offset also known as carbon credit is a reduction in greenhouse gas emissions used to offset emissions from other sources, or an increase in carbon storage (for example, by planting trees or restoring damaged land). When further effort is put into lowering greenhouse gas emissions, carbon credits are granted (T. Chen et al., 2019).

Organisation should develop an emissions inventory; the inventory helps businesses identify all the emissions they produce throughout their value chain and concentrate their efforts on the biggest potential for reduction which will assist with the transitioning to carbon neutrality. The inventory is classified in three scopes from scope 1 to scope 3. The emissions from sources inside the organisations are included in these inventories (Scope 1), as are emissions resulting from using grid-supplied heat, steam, electricity, and/or cooling (Scope 2), and all other greenhouse gas emissions that happen outside the organisation because of activities occurring within the organisation (Scope 3) (Wiedmann et al., 2020).

2.4 Drivers of transitioning to carbon neutrality

2.4.1 Stakeholder theory and carbon neutrality

2.4.1.1 Presenting key literature

Stakeholder refers to a “group or individual that can impact or be impacted by” their action in an organization, the impact can be positive or negative. Stakeholder theory intends to address the issues around value creation and trade or business (Freeman & Reed, 1983). Jones et al. (2018, p.371) argues that stakeholder theory refers to the “relationship between firms and their stakeholders, as well as some of the performance outcomes of these relationships”. It is against this background that the instrumental stakeholders are expected to influence firm’s decision including the transitioning to carbon neutrality.

Instrumental stakeholders, both internal and external, including those from regulatory bodies have a meaningful impact on the firm commitment to achieving carbon neutrality (Hong et al., 2021). Transitioning of a firm to carbon neutrality is influenced by the firm’s management and shareholders and so are other sustainability initiatives influenced (J. Wang et al., 2022). According to Dhanda et al. (2022) carbon mitigation strategies that addresses the goal of carbon neutrality are developed because of compression from stakeholders. Influence from stakeholders and institutions is considered a significant driver on applying pressure for firms to drive sustainability initiatives (Cadez et al., 2019). Top management and shareholders appetite towards environmental standards contributes significantly towards transitioning to carbon neutrality (Zhang et al., 2022). Developing a sustainable business value by top management and incorporating in the firm’s overall strategy plays a vital role achieving the set goal which is linked to the strategy (Burke et al., 2021).

The discussion will now proceed with an analysis and comparison of the key literature in terms of similarities and differences as argued by different scholars. The literature draws attention to how external or internal shareholders influence the transitioning to carbon neutrality. Hong et al. (2021) refers to the impact that can be exerted by regulatory bodies (external) to achieving carbon neutrality. Regulatory bodies remain a vital role player on the journey of transitioning to carbon neutrality as they can lay down laws that needs to be followed and if not followed it bears consequences. Implementation of laws are crucial

in the journey to carbon neutrality as they would require a certain level of compliance from relevant firms. Transitioning to firm's performance requires influence from management (internal) and shareholders (internal) (Dhanda et al., 2022). Appetite of top management (internal) and shareholders (internal) towards environmental standards can impact the transitioning to carbon neutrality (Zhang et., 2022). Top management (internal) must develop a sustainable business value which will assist in achieving the set objectives of carbon neutrality (Burke et al., 2021). The voice and appetite from top management and owners of the businesses have an impact of driving business objectives including the climate change agenda. Once top management and shareholders commits towards transitioning and included in the overall strategy, it would require the entity to report on such efforts requiring the tracking of successes and failures and amending the plan along the way to achieve the desired results. Sustainability initiatives can easily be implemented because of influence from stakeholders (internal and external) and institutions (Cadez et al., 2019).

2.4.1.2 Conclusion on stakeholder theory and carbon neutrality

The sub-section has looked at the drivers of transitioning to carbon neutrality integrating the stakeholder theory (Freeman & Reed, 1983; Zhang et al., 2022). The most crucial element in achieving carbon neutrality from a stakeholder perspective is the influence from internal stakeholders which includes top management and shareholders (Zhang et al., 2022; Burke et al., 2021). Carbon neutrality can be achieved once the internal stakeholder has shown interest and prioritize the agenda of climate change. Like any good project, once implemented there should be some level of reporting (Cadez et al., 2019).

2.4.2 Institutional theory and carbon neutrality

2.4.2.1 Presenting key literature

Institutional theories refer to pressures by influential stakeholders on the governance of organizations (Di Maggio & Powell, 1983). Pressures include coercive, normative and mimetic pressures. Coercive pressures refer to pressures that are forced for implementation through laws, regulations and policies, these are usually exerted by government authorities and big clients who are usually instrumental (Di Maggio & Powell, 1983). In achieving carbon neutrality coercive pressures is considered effective for firms

to follow as they are forced to follow regulations (Dhanda et al., 2022). Achieving carbon neutrality requires a great level of government involvement to ensure that laws and regulations are implemented that can positively impact the emissions reduction (Yuan et al., 2022). Normative pressures refer to pressures resulting from same views in business operations, entities that applies normative pressures are professional organization, academic institutions, suppliers, customers and activists amongst others (Di Maggio & Powell, 1983). Professional and academic institutions can exert normative pressures due to their stand in society and the credibility attached to them, thus driving agendas on emissions could assist in entities adopting strategies of achieving carbon neutrality (Zhang et al., 2022). Dhanda et al., (2022) considers normative pressure less effective than coercive pressures. Mimetic pressures refer to pressures resulting from imitations, it relates to taking an opportunity which can impact a firm's competitive advantage (Di Maggio & Powell, 1983). New initiatives like carbon reduction by early adopters can give a competitive advantage this would lead to intimidation to other entities should the competitive advantage prevail and would force firms to imitate competitors (Zhang et al., 2022). Institutional legitimacy and competitive advantages could be achieved in the firms invest in green technology. It enhances the firm's reputation which influence customers to do business with the firm. This could have a direct impact on the company's economic value (Camilleri et al., 2023). Focus on energy restructuring by influential institutions with a consideration of cleaner energy can lead to carbon reduction which enhances the chances of reaching carbon neutrality (Yang & Liu, 2023). Influential institutions can apply pressures in that regard in return to offering some incentives to participants. A deliberate focus should be placed on energy consumption and energy structure by influential institutions, as an increasing energy consumption should be countered with an increasing supply of clean energy (Yang & Liu, 2023). A drive of renewable energy by influential institutions has a direct impact on the reduced usage of greenhouse gases which results in the advancement of the goal to carbon neutrality (Yuan et al., 2022). Organizations committed to climate change should place emphasis on the development and growth of renewable energy as an alternative to other sources of energy which have detrimental effect on global warming (Lin & Zhu, 2019).

The discussion will now proceed with an analysis and comparison of the key literature in terms of similarities and differences as argued by different scholars. Institutional theory is guided by the various pressures which includes coercive, normative and mimetic pressures (Di Maggio & Powell, 1983). These pressures are mostly exerted from external stakeholders. The one that is considered more effective is the coercive pressure as it refers to laws and regulations being implemented by government (Dhanda et al., 2022).

When developing policies for environmental protection, policymakers should prioritize supporting green energy projects. This kind of active globalization will greatly enhance the environment (Su et al., 2021). Yuan et al. (2022) supports the arguments of government proactiveness in developing laws and regulations that would expedite the transitioning to carbon neutrality as it would force role players to abide to the set rules to avoid various penalties if they breach. Early adoption by competitors to commit towards carbon neutrality and those firms gaining competitive advantage could assist other firms to transition to carbon neutrality as they would be indimidated by the performance of those early adopters and competitive advantage gained through early adoption (Zhang et al., 2022). If carbon neutrality proofs to provide a competitive advantage, it would force a lot of firms to transition to carbon neutrality and as a result assist with the climate change agenda.

2.4.2.2 Conclusion on institutional theory and carbon neutrality

The sub-section looked at the potential drivers of transitioning to carbon neutrality integrating the institutional theory (Di Maggio & Powell, 1983; Zhang et al., 2022). The section place emphasis on external stakeholders with government being central as policy maker. Policy should be focused on promoting reduction of carbon emission and energy consumption with renewable energy being prioritized as primary source of energy. Governments that support the carbon neutrality initiatives, should implement laws that supports the initiative of achieving carbon neutrality (Dhanda et al., 2022; Yuan et al., 2022).

2.5 Impact of carbon neutrality on firm performance

2.5.1 Presenting of key literature

Improvements to the environment and economic development are encouraged and coordinated together. To a certain degree, economic growth will support the advancement of pertinent technologies, and once advanced technologies are applied, they will be better able to support the achievement of environmental goals. Conversely, pursuing a reduction in carbon emissions without considering socio-economic costs is irrational and ineffective (H. Chen et al., 2022). The size and rate of infrastructure development, coupled with the land demands of a low-carbon transition, suggest that social, environmental, and economic priorities are in competition with one another

(Williams et al., 2021). Yao et al. (2021) expanded to the traditional evaluation of firm performance to include social and environmental benefits in extension to profitability, return on investment and measuring of solvency of the firm. While new jobs are created by policies, the distributional effects of such a shift could be lessened by supporting communities and industries that depend on the extraction of fossil fuels (Williams et al., 2021). Tight carbon emission reduction targets will raise the costs of reducing emissions, which will have a negative impact on the economy. From the standpoint of social welfare, however, the general level of social welfare will rise in the future due to the limitations imposed by more stringent carbon emission reduction targets (H. Chen et al., 2022). The relationship between energy consumption and economic growth is that an economy can move from one based on agriculture to one based on industry, which will increase pollution in the environment (Su et al., 2021). According to Chan et al. (2018) having a coordinated and collaborative approach towards carbon neutrality assists the firm with minimizing its own costs on the investment in achieving carbon neutrality. It might be necessary to implement different policies to sway customers who are merely cost-sensitive up front (Williams et al., 2021). Transitioning to carbon neutrality requires a huge upfront investment which can have an impact on the firm performance, but most entities foresee a long-term financial and environmental benefits. To reduce initial capital cost firms should exhaust finance options from entities who offer terms that are favorable to sustainability initiatives (Blum et al., 2021). The urgency of achieving carbon neutrality within a short period may drive development that puts a strain on manufacturing capabilities and encourages significant investment in renewable energy units before the full benefit of their cost decline is realized. Numerous factors influence these costs associated with the shift to carbon neutrality, and it is yet unknown how much of an impact they will have (Zhuo et al., 2022). Achieving carbon neutrality through energy conservation is also crucial because it can reduce operating costs and regulate the amount of coal consumed (Wu et al., 2022). The shift from fuel-using to electric technologies is typically driven by final energy costs as decarbonization advances. This is because it is generally less expensive to provide decarbonized electricity than it is to provide fuels (Williams et al., 2021). Sustainability initiatives can also be achieved through collaborations with firms with the same drive towards sustainability or even competitors can collaborate in addressing a certain sustainable initiative, this has a direct impact on the cost involved. In terms of carbon neutrality, entities who operates in the same sector or segment could collaborate in coming up with a common standard, policy or emission reports (Camilleri et al., 2023). In order to address the high cost and financing challenges in the early stages of transitioning, boosting government financial investment and policy support, enhancing bank financing, and looking for foreign investment could

all help support the transition to carbon neutrality (Wu et al., 2022). To effectively assess the investment cost on decarbonization it is essential to acquire advanced technologies which are vital in assessing and measuring the firms targets and producing timely reports on aspects of carbon neutrality (Bai & Sarkis, 2020). There could be requirements in future to report on the firm's emissions throughout its business, this would require short-term investments with long-term benefits both economic and environmental. With the global agenda on climate change, customers of the future would prefer doing business with firms who are environmentally friendly thus impacting the firm's revenue (Zhang et al., 2022). The negative effects of air pollution extend beyond health problems to include impaired visibility, which disrupts traffic flow. Undoubtedly, excessive and consistent energy use will exacerbate environmental problems and increase the carbon footprint. When compared to conventional petroleum-fueled vehicles, electric vehicle technology has demonstrated strong performance and a bright future in addressing the issues of energy scarcity and air pollution (Su et al., 2021). The concentration is predicted to significantly decrease between 2020 and 2060 as a result of the implementation of stronger energy industry restructuring driven by low-carbon policies and end-of-pipe controls driven by environmental policies. This will have a positive impact on human health through improved air quality (X. Shi et al., 2021).

The discussion will now proceed with an analysis and comparison of the key literature in terms of similarities and differences as argued by different scholars. Apart from profits, shareholders value and solvency firm performance can also measure the environmental and social impact by the firm (Yao et al., 2021). Although carbon neutrality has a negative impact on the profitability of the business it's the sustainable gains that holds high regards. The cost of committing to carbon neutrality can be massive but this can be controlled if a coordinated and collaborative approach is taken and favourable finance options exhausted (Blum et al., 2021; Chan et al., 2018). The ultimate prize is the long-term incentives of transitioning to carbon neutrality with customers of the future preferring to do business with those that preserves the environment resulting in increase in revenues (Zhang et al., 2022). The majority of the generation capacity in power systems is usually owned by large producers. Because they can influence prices to their advantage, generators may have more market power as a result of the ownership concentration. The equilibrium prices and supply are different from the ideal of perfect competition as a result of such imperfect competition (Ekholm and Virasjoki, 2020). The pricing of traditional electricity has become more competitive due to the rising renewable energy technology, which will surely facilitate the shift to a low-carbon economy (Kuik et al., 2019). Although market competitiveness is monitored by energy authorities, market

power at decentralized power markets has been demonstrated in a number of nations, even though a large market share does not always indicate market power. Making the switch to renewable energy sources might create a new demand source with competitive pricing (Ekholm and Virasjoki, 2020).

2.5.2 Conclusion

The sub-section has looked at the impact of transitioning to carbon neutrality on firm performance. It has expanded the traditional definition of firm performance, including environment and social benefits (Yao et al., 2021). Even though transitioning to carbon neutrality has huge investment costs, entities who have committed to the initiative should see the long-term financial and economic benefits (Blum et al., 2021).

2.6 Impact of carbon neutrality on supply chain management

2.6.1 Literature review

Supply chain management refers to the effective management of the flow of goods and services from the supplier to the end user (Mentzer et al., 2001). Supply chain management provides an opportunity for engagement with customers and suppliers, it provides an opportunity through mimetic pressures to influence its customers and suppliers to transition to carbon neutrality, once enforced it results in the reduction of carbon emissions (Di Maggio & Powell, 1983; Zhang et al., 2022). Firms who are leaders in various industries could play a leading role in advancing and advocating for carbon neutrality transitioning and influencing stakeholders involved in their supply chain (Jia et al., 2019). Leading firms who have made a commitment to achieving carbon neutrality could transfer their learnings to customers and suppliers this would result in an increase in the efforts of decarbonisation while enjoying the benefits of “supply chain learning” (Gong et al., 2018). Investments in decarbonisation could be shared through supply chain collaboration and cost could be shared (Chan et al., 2018). According to Dong et al. (2021) (as cited in W. Liu et al., 2023, p. 7), the adoption of carbon neutrality may necessitate suppliers with established key upstream supplier relationships to seek alternative suppliers. This could lead to higher switching costs when it comes to changing suppliers. Supply chain management provides an ideal opportunity of data collection, data collected from supply chain reports can assist in identifying areas that needs further improvements in curbing of the emissions and developing robust emissions governance

structure (Saberi et al., 2019). Achieving carbon neutrality can be expensive for a number of reasons, including the cost of replacing equipment, the cost of clean energy, the depreciation of old fixed assets, and other related economic costs related to emission control laws (Anda *et al.*, 2009; Kolstad and Toman, 2005, as cited in W. Liu et al., 2023, p.5). The increase in short-term operating costs associated with transitioning has a detrimental effect on operations because it necessitates low-carbon operations, technology investment, and equipment replacement (W. Liu and Wang, 2017). According to Broberg et al. (2013) and Rubashkina et al. (2015) (as cited in W. Liu et al., 2023, p. 5), the possible benefits of environmental regulations for businesses' innovative endeavors do not outweigh the additional costs associated with compliance. Making the switch to carbon neutrality could be expensive and have an effect on relationships with important clients (Zhong et al., 2020). Goal restrictions brought about by the shift to carbon neutrality are taken into account when making decisions and organizing supply chains (De and Giri, 2020). In order to accomplish the established sustainability goals, an organization should coordinate relationships with supply chain participants in order to manage dependencies, uncertainties, and build resilience (Schnittfeld and Busch, 2016 and J. Shi et al., 2023). Despite supply chain disruptions, smart supply chains help organizations manage resilience building and uncertainty mitigation. This entity performs well, particularly when goods are supplied by several suppliers, which lowers the risk associated with depending solely on one or more new suppliers. Having a smart supply chain in place helps an organization transition to a carbon neutrality future with resilience and provides a chance to balance dependencies and uncertainty (W. Liu et al., 2023).

The discussion will now proceed with an analysis and comparison of the key literature in terms of similarities and differences as argued by different scholars. Supply chain management provides an opportunity for collaboration in the effort of achieving carbon neutrality. Collaborations could in the form of sharing costs and learnings. Supply chain due to its extensiveness could be used for advancing and advocating for the transitioning to carbon neutrality (Di Maggio & Powell, 1983; Zhang et al., 2022; Jia et al., 2019; Gong et al., 2018; Chan et al., 2018). To achieve carbon neutrality there is a great need to collect data and report, data can be collected using supply chain management and such information can be used to produce reports that would assist in curbing of emissions (Saberi et al., 2019).

2.6.2 Conclusion

The key impact of transitioning to carbon neutrality on supply chain management as per extant literature are: 1) Potential to improve relationships with stakeholders (Zhong et al., 2020) and also benefit from supply chain learning (Gong et al., 2018), 2) Opportunity to optimise on data collected to solve problems (Saberi et al., 2019), 3) Manage uncertainties, single dependency or reliance on suppliers through resilience (Schnittfeld and Busch, 2016 and J. Shi et al., 2023), 4) Incurring potential cost due to transitioning (H. Chen et al., 2022), 5) negatively affecting established relationships with suppliers (Zhong et al., 2020) and 6) customers and potential collaboration and cost sharing (Chan et al., 2018).

Prominent companies can promote carbon neutrality by interacting with suppliers and customers, leading to decarbonization efforts and "supply chain learning" (Gong et al., 2018). However, adopting carbon neutrality may increase switching costs (H. Chen et al., 2022). Supply chain management aids in data collection, identifying problem areas, and creating strong emissions governance frameworks (Saberi et al., 2019). Smart supply chains manage resilience, dependability, and uncertainty, enabling a transition to a carbon neutral future (W. Liu et al., 2023).

Obtaining carbon neutrality can be costly due to equipment replacement, clean energy demand, and depreciation of assets. This can negatively impact operations, necessitating low-carbon operations, technology investment, and equipment replacement (Anda *et al.*, 2009; Kolstad and Toman, 2005, as cited in W. Liu et al., 2023, p.5). Compliance with environmental regulations may be costly, but the benefits outweigh the costs. According to Dong et al. (2021) (as cited in W. Liu et al., 2023, p. 7) transitioning to carbon neutrality may also affect client relationships.

In conclusion, the transition to carbon neutrality has had both positive and negative effects on supply chain management, according to the literature. The goal of the research was to better understand how supply chain management would be impacted by the move to carbon neutrality.

2.7 Barriers and enablers to carbon neutrality

2.7.1 Literature review

The carbon neutrality target is hindered by the emission of carbon dioxide by human beings (IPPC, 2018). Human beings remain the biggest threat to climate change through the utilization of fossil fuel resulting in emissions of carbon dioxide which ultimately results in the rise of global temperature (Yuan et al., 2022; Ritchie et al., 2020). Urbanization have been identified as a key barrier in achieving carbon neutrality, with more people moving to urban areas for economic reasons. Urbanization requires an increase in infrastructure which transforms in increased carbon emissions due to increased consumption (S. Liu et al., 2020). Governments have a task of controlling urbanization to curb emissions in cities. Population has a direct effect on emissions as greater number of people translates in greater emissions (Yang & Liu, 2023). Reporting plays a vital role in the journey of transition towards carbon neutrality, thus reliance on a single or linear approach of measuring emissions should be avoided as it provides drawbacks in achieving carbon neutrality. Various approaches of collecting emission data should be used and assist in assessing the reliability and validity of data (Yang & Liu, 2023).

The discussion will now proceed with an analysis and comparison of the key literature in terms of similarities and differences as argued by different scholars. Literature puts emphasis that human beings are the biggest hinderance of carbon neutrality. This emanates from the definition as well as supported by various scholars that the emissions of carbon dioxide are influenced by human beings (IPCC, 2018). The successful transitioning to carbon neutrality is dependent on human beings which includes the control of urbanization (S. Liu et al., 2020).

2.7.2 Conclusion

Government should take the forefront of controlling and educating people. They should implement policies that are pro achieving carbon neutrality (Yang & Liu, 2023). They should embark on initiative that would reduce carbon neutrality (Yang & Liu, 2023). Part of policy development should be compulsory reporting on the milestones of carbon neutrality.

2.8 Chapter conclusion

The chapter presents findings on the literature review of achieving carbon neutrality looking at the drivers and barriers, and the impact of carbon neutrality on the firm performance and supply chain management. The results are intended for internal and external stakeholders who are instrumental in policy and decision making. There is a great chance of achieving carbon neutrality with the right support, innovation and collaboration amongst stakeholders and particularly through supply chain management. Major institutions have a crucial role in influencing the drive towards carbon neutrality by exerting certain pressures. The findings in this chapter should be used for developing plans, policy amendments and actions to creating the pathway to carbon neutrality. Top management, shareholders and various instrumental institutions (banks, etc.) should take the lead in driving the agenda of carbon neutrality and cascading it within their organisations. Carbon neutrality should be embedded in firms' strategies and should be included in reports. Lending institutions should look at providing favourable terms and conditions to firms that have embedded carbon neutrality as well as other environmental goals. Renewable energy has been identified as a great contributor towards a cleaner energy and stakeholders should be encouraged to invest in renewable energy infrastructure. Various governments should focus on the impact of urbanisation and opportunities should be created in remote areas to reduce urbanisation. It's vital to consider the recommendations based on local needs.

2.9 The conceptual research framework

The conceptual research framework as adapted from Zhang et al., (2022) conceptualizes the instrumental stakeholders (Freeman & Reed, 1983) and institutional pressures theories (Di Maggio & Powell, 1983). The theories are used to determine the external and internal drivers of transitioning to carbon neutrality. As depicted by Figure 3 the research framework classifies the stakeholders as internal or external, the external stakeholders identify the drivers to carbon neutrality using the institutional pressures (Zhang et al., 2022; Di Maggio and Powell, 1983). Internal stakeholders base their decisions on how the firm performance (Jones et al., 2018), and the idea of transitioning to carbon neutrality may be driven "due to intrinsic sustainable business value or a belief in potential benefits" (Zhang et al., 2022, p.4) or sustainable competitive advantage (Jones et al., 2018). Included in institutional pressures are coercive, normative and mimetic pressures as defined by Di Maggio & Powell (1983). The research framework further depicts the understanding of carbon neutrality (J. Chen, 2021 & Y. Wang et al.,

2021) and how the transitioning to carbon neutrality impacts “firm performance and supply chain management” (Zhang et al., 2022).

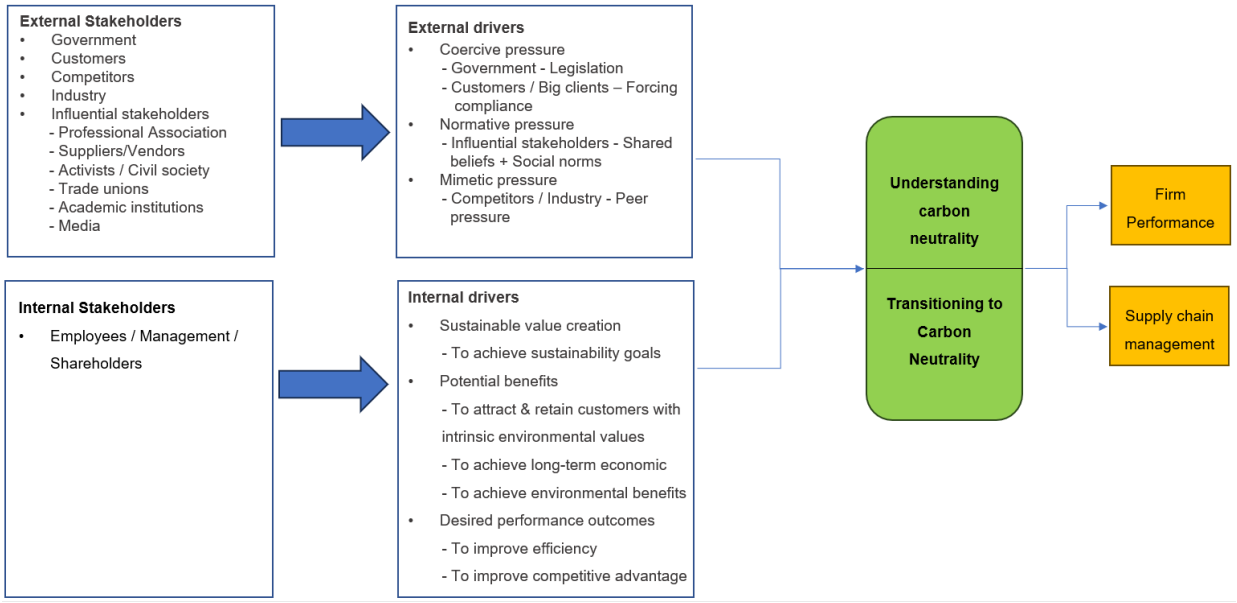

Figure 3 Research framework

Source: Adapted from Zhang et al. (2022); J. Chen (2021), Y. Wang et al. (2021), Freeman & Reed (1983) & Di Maggio & Powell (1983)

CHAPTER 3: RESEARCH QUESTIONS

The chapter defines the academic focus of the study and outlines the research question, in accordance with the research problems and research questions presented in Chapter 1.

3.1 Primary reseach question

The research questions are derived from the literature reviewed in Chapter 2 and took into consideration key constructs: supply chain management, firm performance, external and internal drivers of transitioning to carbon neutrality, and the fundamental concepts of understanding carbon neutrality.

Zhang et al. (2022) acknowledged that research on the concept of carbon neutrality was still in its infancy, so they extended an invitation to scholars from various countries and sectors to contribute to a deeper comprehension of the factors that influence the shift to carbon neutrality. In response to the call for additional study, potential addition to the body of literature, and filling the knowledge gap, this study will gather more thorough data for a more thorough examination of the identified primary drivers of the shift to carbon neutrality to answer the primary research question:

What drives a firm's commitment to carbon neutrality and how does it impact firm perfromance and supply chain management? (Zhang et al., 2022).

3.1.1 Research question 1

How do firms transition to carbon neutrality and what are the drivers? (Zhang et al., 2022).

The research question examines the steps businesses must take to become carbon neutral as well as the factors that would motivate them to do so. Through a review of literature and participant interviews, the study seeks to answer the research question.The question was adapted from Zhang et al. (2022) as per their invitation and the question was developed to respond to the drivers of transitioing to carbon neutrality element of the primary question, by determining how the stakeholder theory and the institutional theory exert or influence the transitioning to carbon neutrality (Freeman &

Reed, 1983, Di Maggio & Powell,1983 & Zhang et al.,2022).

3.1.2 Research question 2

How does commitment to carbon neutrality impact firm performance? (Zhang et al., 2022 & Yao et al., 2021).

The research question aims to shed light on the potential effects on company performance of a commitment to carbon neutrality. It would investigate the potential benefits of such a commitment. The goal of the research question is to extend the firm's performance on environmental and social gains, going beyond the traditional performance of the firm, which focuses on financial performance. The question will gain an understanding on how the theory has expanded the traditional definition of firm performance, including environment and social benefits and how that can be impacted by carbon neutrality (Yao et al., 2021).

3.1.3 Research question 3

How does commitment to carbon neutrality impact supply chain management? neutrality (Zhang et al., 2022; Jia et al., 2019; Gong et al., 2018; Chan et al., 2018)

Similarly, this research questions would focus on how a company can achieve carbon neutrality through efficient supply chain management (Zhang et al., 2022). It will examine how supply chain data can help advance the goal of carbon neutrality. The impact would be evaluated by consulting literature and conducting interviews with experts in Namibia's mining industry.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 Introduction

This chapter outlines the research methodology and designs adopted for the study. It contains the research paradigm, the choice of methodology, defines the population/setting, the level and unit of analysis used, the data sets, approach and strategy taken to gather and analyse data. It further detailed the approach taken to ensure the validity of data and finally looked at the limitations of the research design and methodology adopted.

The choices made below are in response to the main research question of how firms transition to carbon neutrality which is an exploratory question in nature. Exploratory question seeks understanding and new insights and favors different perspectives.

The rationale for selection for each of the methodology choices are detailed below, the choices are made to address the exploratory questions above.

4.2 Research paradigm

The interpretive paradigm looks at a variety of actors and different perspectives, it includes looking for new learnings, new things and new insights (Bell et al., 2019; Darby et al., 2019; Alharahsheh & Pius, 2020). Given this definition it fits the exploratory nature of the research question. Interpretivism is often adopted by social scientist as opposed to positivism adopted by natural scientist whereas interpretivist focuses on exploring and understanding human behavior, positivist focus on the explanation of human behavior. The interpretivist has a view that human action has an influence on institutions and outcomes (Bell et al., 2019). The question is not asking to explain but asking to explore and thus the interpretivism choice is the favoured approach to address to address the research question. Even though the process is informed by thematic analysis, the study was not able to claim their entire design (Braun & Clarke, 2021).

4.3 Choice of methodology

The study adopted a phenomenological approach because it fits with the interpretive paradigm which favors multiple perspective and matches the exploratory nature of the

questions. A phenomenological approach analyses the world out there without being conceived by own understanding of the subject (Bell et al., 2019). Phenomenological approach deals with how humans understand and interpret the world, it deals with research questions that looks at personal encounters and understanding while using purposeful sampling and using interviews to obtain empirical data from those personal encounters (Braun & Clarke, 2021).

The case study approach as used by Zhang et al. (2022) was considered but it was not followed due to ample time required for case studies. Case study approach was therefore not selected due to strict time limitation required for master's studies. Furthermore, the study is not intended to be a replication study but an expansion to the body of knowledge in a different country and industry.

4.3.1 Research design

The qualitative method requires an understanding of how people think and for the researcher to interpret the data from their own viewpoint (Bell et al., 2019). As opposed to quantitative research which focuses on the testing or measuring of existing concepts, qualitative research focuses on building new concepts (Allwood, 2012; Morgan, 2018). As carbon neutrality is an emerging concept the qualitative research design is adopted to explore this new concept and address our exploratory research questions (Zhang et al., 2022).

4.4 Population/Setting

The setting of the research refers to the organisation, agency or community where the study will be done (Kumar, 2011). The study will be conducted in the Namibian mining sector. The sector is considered a suitable choice to respond to the research question due to the sector being a leading economic contributor to the Gross Domestic Product (Chamber of Mines of Namibia, 2023). The mining sector is the chosen setting due mining sector being one of the significant carbon emitters in Namibia UNFCCC (2020). The research question envisaged to understand how stakeholders in the sector plans to achieve carbon neutrality and their planned contributions, if any, towards achieving net-zero by 2050 (UNDP, 2022).

4.5 Level and Unit of analysis

The level of analysis of the study is derived from the primary research question and the question is asking about the transition of organisations to carbon neutrality (Zhang et al., 2022) and thus the level of analysis is at an organisation level. The study was not done at global or national levels.

A unit of analysis is how the research design answers the research question (Bell et al., 2019). The research question would be answered through interviewing individual people and thus the unit of analysis is the individual people that have been interviewed.

4.6 Sampling, frame and/or criteria

4.6.1 Sampling

Purposive sampling seeks participants who can best respond to the research question and who have the essential information (Kumar, 2011). The sampling of participants was not done at random but focused on the aims of the research being conducted (Bell et al., 2019). A purposive sampling approach was deemed to be appropriate in responding to the research question which enabled appropriate data collection through interviews from people with expertise in carbon neutrality, net-zero, carbon emissions and sustainability. It accorded meaningful exploration of existing literature and emerging theories from experienced scholars (Gehman et al., 2018).

4.6.2 Sampling frame and/or criteria

A non-probability sampling method was used to identify the sample size. The intended sample size was eighteen (18) interviews, but the final sample size was thirteen (13) from 4 different sectors, namely, mining with seven (7) participants, financial services with four (4) participants and academic institution and industry association each with one (participant). Saturation point was achieved at interview thirteen with no new code generated. Saturation refers to when no new data is coming through from the interviews (Bell et al., 2019). The interviewees were divided in the following three categories of individuals possessing some level of knowledge and experience in carbon neutrality, net-zero, carbon emissions, firm performance, supply chain management and sustainability: professional executives, activists and policy makers. The criteria used for inclusion was as follows:

4.6.2.1 Professional executives sourced from my professional network working in the (12):

a) In Namibia
b) Mining sector in Namibia
c) Organisation in the mining sector
d) Professional that works in these organisations that have the knowledge and experience of transition to carbon neutrality.

4.6.2.2 Other stakeholders sourced from my professional network in energy sector (3):

a) In Namibia
b) Active in the Energy Sector
c) Knowledge and experience of transitioning to carbon neutrality.

4.6.2.3 Policy Makers sourced from my professional network (3):

a) In Namibia
b) Active in the Energy Sector
c) Knowledge and experience of transitioning to carbon neutrality

4.7 Data gathering process and research instrument

Semi-structured interviews were used to gather information from professional executives in exploring their experience and knowledge on carbon neutrality (Bell et al., 2019). Semi-structured interviews favored multiple perspective and matched the exploratory nature of the questions. Although it started with structured questions it allowed for follow-up questions that provided more in-depth information on what is being enquired (Ahlin, 2019). Where possible the interviews were conducted through Microsoft teams. The interview questions were not provided prior to the interview and thus interviewees did not have amble opportunity for understanding and interpretation to study the question but used their professional experiences and insights (Krosnick & Presser, 2010). All interviews were recorded using Teams meetings. Notes were taken during interviews. No further information was obtained from secondary sources. Parameters were set to determine the reliability, validity, and quality of the data. Personal diaries, newspapers and magazines were deliberately avoided as they usually present a problem of personal biasness. Literature review from peer reviewed journals was used. Literature was

reviewed for quality using the Academy Journal Guide 2021, mainly only journals with a rating of three (3) or four (4) was considered but journals of lower rankings that would provide quality to the research were also considered (Chidlow et al., 2015).

For research studies human subjects should be guarded by applying appropriate ethics philosophies (Arifin, 2018). During the data gathering and distribution thereof I protectED the identity of the individuals and their organisation by anonymising the information gathered. Informed consent was obtained from each participant, which informed the participant about the research being conducted, that the interview will be recorded and the recording might be transcribed by a third party who is subject to a non-disclosure agreement. The data shared with the transcriber would be through an encrypted device which is password protected. The participant was informed that the participation in the research is voluntarily, and that the participant could withdraw at any moment with no repercussions. The data collected was disseminated publicly without any identifiers.

No permission was required from any organisation due to the set criteria under section 4.6 of the research methodology as any organisation that meets the criteria was suitable for the research and therefore no specific organisation was required for the study.

Data collected was stored with protective passwords on encrypted devices. The password was changed on a regular basis to avoid any access to the data other than by the researcher. The password was not shared with any other person and only known by the researcher. Any other physical data was kept in a lockable cabinet with no other person than me having access. All data will be safely stored for a minimum period of 10 years as per the academic requirements and guidelines in a format that is accessible.

4.8 Data analysis approach

Data analysis is defined as the process of reducing the data collected to a more meaningful and understandable size (Bell et al., 2019). Data analysis was helpful in answering the research question. The purpose of data analysis was to identify similarities, differences in answers from participants and summarized the data. A four-step approach was used to analyze data. The four steps approach included coding, categorizing, development of themes and building constructs (Braun & Clarke, 2021). As opposed to Braun & Clarke (2021), Qureshi & Ünlü (2020) also advocates for a four steps approach of data analysis that includes the code, concept, category and theme. The approaches are similar as they both starts with coding and end with a theme which is

used to build constructs. An inductive analytical process as informed by thematic analysis was followed for coding and categorizing, working with data as per the participants (what they said), using the descriptive analysis which is commonly not done by one researcher (Braun & Clarke, 2021). For the themes and constructs a deductive analytical process was followed using the adapted lens of the Zhang framework, which conceptualized the stakeholder and institutional theories (Braun & Clarke, 2021; Zhang et al., 2022). For all recorded interviews a verbatim transcribed was done from voice to words. Data was then coded and categorized. The researcher then developed themes from the categorized data. Once the themes have been developed the researcher developed constructs from the collected data that was measured and validated (Gioia et al.,2013). Where there were uncertainties transcribed data was compared to the notes.

4.9 Research quality and rigour

A rigorous approach was used that ensured that the procedures used in answering the research questions were valid, relevant and have been vindicated. A systematic approach was applied, ensuring that a logical order was used during the research process and before analysing the data, the validity and reliability of the data was tested. The participants included in the study were knowledgeable in the constructs examined and it preserved the quality of the study (Gioia et al.,2013). The quality of the research was measured for reliability, replicability and validity. Reliability was achieved when the study produced the same results if a similar process was followed that ensured that the results represented what they alleged. Whereas replicability was achieved when researcher provided great details on the processes followed to conduct the study and these processes could be followed by another researcher to achieve the same results. Lastly, validity was tested through the integrity of data collected and that the conclusion the researcher makes could be verified by others (Bell et al., 2019). Gioia et al. (2013) argues that the quality (reliable, replicable & valid) of the study at organizational level can be achieved on the assumption that the practitioners have appropriate knowledge and experience in the chosen field without being influenced by constructs and theories of the study.

4.10 Ethical considerations

For research studies human subjects should be guarded by applying appropriate ethics philosophies (Arifin, 2018). During the data gathering and distribution thereof I protected

the identity of the individuals and their organisation by anonymising the information gathered. Informed consent was obtained from each participant, which will inform the participant about the research being conducted, that the interview will be recorded, and the recording might be transcribed by a third party who is subject to a non-disclosure agreement. The data shared with the transcriber would be through an encrypted device which is password protected. The participant was informed that the participation in the research was voluntarily, and that the participant could withdraw at any moment with no repercussions. The data collected was disseminated publicly without any identifiers.

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4.11 Limitation of the research design and method

- As a novice researcher with limited knowledge of conducting research this impacted the research design.
- The physical setting of the study which was the Namibian mining sector. Due to the limited nature of the study not all stakeholders in the mining sector were included in the study and the study cannot fully represent the entire mining sector in Namibia.

4.12 Chapter conclusion

This chapter outlines the research methodology and designs that was adopted for the study. It contains the processes and approaches that the study followed in collecting and analyzing the data. It further provides the setting from where the data was collected. It details the processes that was taken to preserve the integrity of the data and the quality of the study. It also highlights ethical clearance issues, how the human subject and the data was protected. The chapter explains the methodological choices for the study and

the rationale for the selection. The chapter finally looked at the presumed limitations of the research design and methodology to be adopted.

CHAPTER 5: FINDINGS

5.1 Presentation of Findings

This chapter outlines the findings from the data gathering and analysis of data gathered during the research in answering the three research questions as outlined in Chapter 3.

The organizing and summarizing of the data gathered from the thirteen (13) semi-structured interviews produced the main findings. Interviews were conducted across four different industry sectors: mining (7 participants) financial services (4 participants), academic institutions (1 participant), and industry associations (1 participant). This allowed for triangulation and cross-tabulation of the results by sector. Table 1 below shows which industry sectors these interviews were conducted in.

Table 1 Number of interview participants by sector

Sector	Final number of participants
Mining	7
Financial Services	4
Academic Insitution	1
Industry Association	1
Total	**13**

Source: Researcher's Own.

The deductive mapping process explained in Chapter 4 identified ten (10) themes were mapped of which six (6) were existing from the conceptual framework in Chapter 2 and three were new. The subthemes mapped were eighteen (18) of which nine (8) were new and ten (10) were existing. The subthemes were mapped against themes, of which the themes were mapped against constructs as depicted in the Revised Conceptual Framework below. The constructs as per the Revised Conceptual Framework responds to each of the research questions. Given that the research's goal was to produce fresh insights and understanding, and not comprehensive study, not all the subthemes that emerged from the data analysis were dealt with during this chapter. To give the fullest possible insight and new understanding of the research questions, the researcher has chosen eleven subthemes in total, including all seven new subthemes selected by means of data analysis. The degree of significance of a topic or theme is not indicated by how

frequently it is mentioned in a qualitative study. Using the deductive analytical process, a revised conceptual framework has been developed as depicted in Figure 4 below.

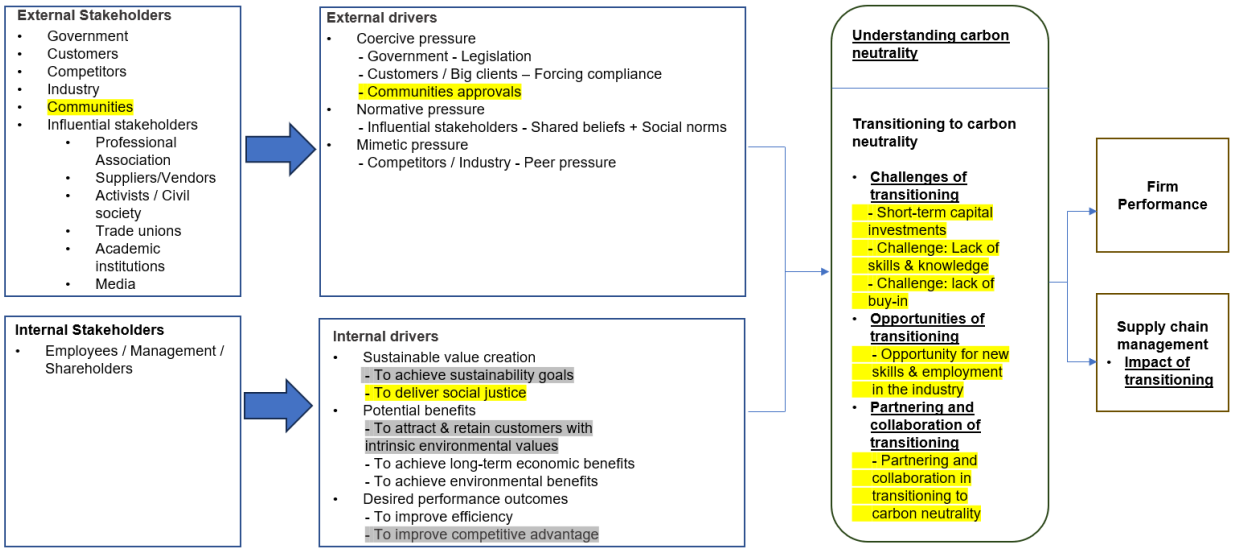

Figure 4 Revised Conceptual Framework from the Data Analysis

Source: Researcher's Own.

Figure 4 above depicts all the 10 themes and 18 subthemes. New subthemes suggest possible distinctions as well as fresh perspectives and understanding, all new subthemes that could not be mapped into existing themes in the conceptual framework would be explored and discussed below. Sub-themes lacking data from the empeical study are highlighted in grey, while existing themes are not highlighted at all. Potential new themes from the empirical study are **underlined**, while potential new subthemes are highlighted in yellow. Highlighted also in yellow is a new key stakeholder that emerged from data collection and did not form part of the existing conceptual framework depicted in Chapter 2. The researcher did not delve deeper into the sub-themes that lacked research data.

5.2 Research Question 1: Transitioning to carbon neutrality

5.2.1 Understanding carbon neutrality

To present the findings on the main research question, it is important to first provide an overview of the various interpretations of the concept of carbon neutrality.

5.2.1.1 Evidence of understanding carbon neutrality

By comparing mentions of carbon neutrality, decarbonization, and net-zero emissions, the evidence was chosen because of the diversity of experiences within the case as well as cross-case, where a 'case' is each sector group. Table 2 is a table of evidence that demonstrated the diverse experiences of the participants who provided rich insights into the research question and contributed to a better understanding of the phenomenon.

Table 2 Evidence of understanding the concept of carbon neutrality

Evidence of understanding carbon neutrality	
Quotation	**Sector**
MIN2: "Not emitting any more emissions than currently being emitted."	Mining
MIN3: "Reduction of scope 1 and scope 2 emissions by at least 90%."	Mining
MIN5: "Reducing the amount of carbon released into the atmosphere to zero."	Mining
FIN3: Decrease greenhouse gas emissions and balance any remaining emissions thorugh offsetting measures."	Financial services
FIN1: "Implementing these renewable sources of energy to ensure that we reach a point where we are carbon neutral."	Financial services
FIN2: Trying to get industries to minimize carbon emissions as much as possible till we achive net-zero."	Financial services
IND1: "Reduce the reliance on fossil fuels and substitute fossil fuel with green fuel."	Industry association
ACA1: Carbon neutrality is about the reduction of carbon to a point whereby you do not emit carbon anymore, where it is impractical to buy carbon credits to offest the surplus carbon."	Academic institution

Source: Researcher's Own.

5.2.1.2 Cross-case and In-case analysis of understanding carbon neutrality

To present the analysis, the researcher used the participants' mentions of the major themes found in the emperical data, along with the researcher's own understanding of those themes, as a guide to possible similarities and differences between the various

sectors. It should be noted that the number of mentions by sector do not indicate the theme's relevance, significance, or importance, but rather the comparison to other sectors was useful as an indicator of similarities and differences. The mentions are therefore reported as ‘many’, ‘some’, ‘few’ or ‘none’ for the purposes of this analysis.

Table 2a, which expands on Table 2, shows the number of times the theme of understanding carbon neutrality has been mentioned per sector.

Table 2a Theme relating to research question 1: Understanding the concept of carbon neutrality

Themes from the dataset	**Mining**	**Financial Services**	**Industry Association**	**Academic Institution**
Transitioning to carbon neutrality	**Mentions by sector**			
Understanding carbon neutrality	Many	Many	Few	Few

Source: Researcher’s Own.

All four sectors have drawn similarities to the understanding of carbon neutrality. From the Academic Institution sector, an understanding which draws to all the factors in the definition of carbon neutrality have been addressed. There is an understanding that carbon neutrality is the doing away with the emission of carbon dioxide to a point where there is no more emission being emitted, in the absence of that goal not being achieved the emitter must commit to covering the gap by offsetting the residual emission through buying carbon credits.

One participant from the mining sector made a distinction when they stated that the targets would be to reduce scope 1 and scope 2 emissions by a minimum of 90%. While scope 3 emissions relate to external emissions from suppliers and customers, scope 1 and scope 2 explicitly refer to internal emissions that are under the company's control.

The financial services sector concentrated on putting renewable energy sources into place to guarantee the achievement of the shift to carbon neutrality. An additional stance was taken regarding the mitigation of greenhouse gas emissions, which aligned with the academic institution's stance on compensatory measures.

The Industry Association made it abundantly evident that substituting alternative green fuels for fossil fuels and reducing dependency on them is the best way to achieve the goal of Namibia's mining sector becoming carbon neutral.

5.2.1.3 Conclusion on the theme of understanding carbon neutrality

The evidence of participants understanding of carbon neutrality revealed a lot of similarities and with minimal differences on the approach to achieving carbon neutrality.

The four sectors have similar understandings of carbon neutrality. Academic Institution sector focuses on eliminating carbon dioxide emissions to zero, while mining sector targets reducing scope 1 and scope 2 emissions by at least 90%. Scope 1 and scope 2 emissions are internal company-controlled emissions, while scope 3 emissions are external from vendors and customers. Financial services sector focuses on implementing renewable energy sources to transition to carbon neutrality. Academic Institution sector supports offsetting measures and reducing greenhouse gas emissions. The Industry Association suggested reducing reliance on fossil fuels and replacing them with alternative green fuels to achieve carbon neutrality. The Industry Association also emphasized the importance of renewable energy sources in achieving carbon neutrality. The mining sector's transition to carbon neutrality is a key tool for achieving this goal.

5.2.2 RQ1: Subtheme1 – External drivers: Coercive pressure – Communities' approvals

To present the findings on the main research question of establishing how companies transition to carbon neutrality and what drives the transitioning, the subtheme of communities' approvals is presented which stems from the theme of coercive pressure.

5.2.2.1 Evidence of communities' approvals

By comparing mentions of communities' approvals, the evidence was chosen because of the diversity of experiences within the case as well as cross-case, where a 'case' is each sector group. Table 3 is a table of evidence that demonstrated the diverse experiences of the participants who provided rich insights into the research question and contributed to a better understanding of the phenomenon.

Table 3 Evidence of communities' approvals

Evidence of communities' approval	
Quotation	**Sector**
IND1: "Are you giving back to the communities in a manner that they will continue to survive and be economically viable after the life of mine?"	Industry association
ACA1: Mining operations should fund new sustainable projects that can sustain the communities in the long run."	Academic institution
FIN1: "You create resilience in your communities, as communities in the mining area face a greater health risk."	Mining
FIN4: "Traditional leaders have influence in their respective regions."	Financial services
MIN6: "Communities need to be consulted in all the large scale projects that need to be undertaken."	Mining
MIN6: "Obviously the general community buy-in on mining activities."	Mining
MIN1: "Our country does not emit a lot of carbon emissions, but the impact of climate change is being felt through droughts and it mostly affects vulnerable communities."	Mining

Source: Researcher's Own.

5.2.2.2 Cross-case and In-case analysis of communities' approvals

To present the analysis, the researcher used the participants' mentions of the subtheme found in the data, along with the researcher's own understanding of the subtheme, as a guide to possible similarities and differences between the various sectors. It should be noted that the number of mentions by sector do not indicate the theme's relevance, significance, or importance, but rather the comparison to other sectors was useful as an indicator of similarities and differences. The mentions are therefore reported as 'many', 'some', 'few' or 'none' for the purposes of this analysis.

Table 3a, which expands on Table 3, shows the number of times, the subtheme of communities' approval has been mentioned per sector.

Table 3a Subtheme relating to research question 1: Communities' approvals

Themes from the dataset	**Mining**	**Financial Services**	**Industry Association**	**Academic Institution**
Coercive pressure	**Mentions by sector**			
Communities' approval	Many	Few	Few	Few

Source: Researcher's Own.

Regarding the support that local communities have shown for the projects being carried out in their respective areas, all four sectors have found common ground. All sectors agree that any project should take into account the needs of people (social), plants (environmental), and profits (economic).

Participants in the mining sector expressed opinions that vulnerable communities—those that are progressively impacted by climate change effects like drought—should always be protected. Communities living next to mining companies face increased health risks due to direct exposure to harmful substances released from the mines, including greenhouse gas emissions from mining operations. Therefore, before beginning any mining operations, communities' consent and buy-in should be obtained. The preservation of biodiversity, the natural environment, and community livelihoods from potentially fatal activities like greenhouse gas emissions that contribute to climate change are just a few examples of the types of approvals that fall under this category. The mining sector also pointed out that even though Namibian mining companies emit very little greenhouse gas, one should nevertheless develop resilience to make sure that any emissions do not have a significant negative influence on the environment and its people. Therefore, there is some pressure from the community for mining companies to choose environmentally friendly practices, such as reducing carbon emissions and moving toward carbon neutrality.

The industry association cared about communities that extended beyond my lifetime. They stated that communities should only give their consent if mining companies take sustainability into account in their operations and that mining should be conducted in a sustainable manner.

The academic institution agreed with the industry association that mining operations

ought to take into account long-term sustainable projects that will improve communities. These initiatives focus on protecting the environment, which also include cutting back on greenhouse gas emissions that directly affect public health and safety. In order to gain support from the communities where they operate, mining companies should take into account becoming carbon neutral.

On the other hand, the financial services sector observed that traditional leaders and communities have a say in the granting and extending of mining licenses. In the unlikely event that mining operations negatively affect the local population and environment, they may object to the granting or renewal of such licenses. Thus, they could put pressure on mining companies to adhere to environmental standards that would guarantee there is little harm done to the environment and its biodiversity. This pressure translates into helping the mining industry make the transition to carbon neutrality by forcing them to look into alternatives that have negligible to no environmental impact, such as lowering greenhouse gas emissions, which directly contribute to climate change. In an effort to further both the government's decarbonization or net-zero agenda and the global agenda, traditional leaders also push for the transition to carbon neutrality.

5.2.2.3 Conclusion on the subtheme of communities' approval

The evidence of participants on communities' approval revealed a lot of similarities and differences on the approach to achieving carbon neutrality.

Mining operations must make the shift to sustainable mining, which will undoubtedly guarantee their continued economic success while taking care of the environment and the planet's inhabitants. Only if sustainable mining is included in the mining operations strategy will these initiatives be successful. The communities in which traditional mining operations operate stand to lose out if mining operations continue in this manner. Traditional mining, in particular, relies heavily on fossil fuels for its vehicles and equipment, as well as coal-aided electricity for its operations.

Even though it was mentioned that Namibia as a nation emits relatively little greenhouse gas emissions, especially in the mining industry, Namibia cannot be left out of the global effort to become carbon neutral. Relentless droughts are one way that communities experience the effects of climate change, so policies that would mitigate these effects are favored. People who live close to the mines therefore put pressure on the industry to make sure that mining operations are carried out in a way that is safe, ethical, and

environmentally responsible. Communities have the authority and clout to restrict business licenses to those that give the environment and their citizens first priority. Communities prefer to work with mining companies that guarantee their economic well-being long after the mine closes and have sustainable plans beyond that time. It is essential that mining companies choose to become carbon neutral in order to gain community support for their operations.

5.2.3 RQ1: Subtheme2 – External drivers: Coercive pressure – Government / Legislation

To present the findings on the main research question of establishing how companies transition to carbon neutrality and what drives the transitioning, the subtheme of government / legislation is presented which stems from the theme of coercive pressure.

5.2.3.1 Evidence of government / legislation pressure

By comparing mentions of government, laws, regulations & policies, the evidence was chosen because of the diversity of experiences within the case as well as cross-case, where a 'case' is each sector group. Table 4 is a table of evidence that demonstrated the diverse experiences of the participants who provided rich insights into the research question and contributed to a better understanding of the phenomenon.

Table 4 Evidence of government / legislation

Evidence of government / legislation	
Quotation	**Sector**
ACA1: "And then the last one is conceived pressure, which is conceived is like forcing change by regulation. So this is from government."	Academic institution
ACA1: "It has to come from government regulation on some of these things. We need to demand for sustainability reports."	Academic institution
IND1: "Yeah, according to environmental best practice and within the laws of the country in terms of the environmental legislation"	Industry association

IND1: "A more resilient and sustainable economy, I think there are lots of opportunities because we, Namibia has a lot of I mean never mind the push from government."	Industry association
IND1: "The pressure to do so is coming from outside, so in terms of where our government, yes, our government wants to be seen."	Industry association
IND1: "Umm yeah, I think our government is definitely far more proactive than other governments have been and especially with its plans to develop a green hydrogen industry and it is very forward looking in terms of its environmental policies and its ambitions actually for Namibia to play a role in supporting the world in its global transition."	Industry association
MIN3: "It should work for you guys at taking accountability on terms of investing in the necessary infrastructure that will ensure that, for example, if you have to invest in alternative fuels, there is support infrastructure that will make it much more easier from from the end user point of view and create the necessary corridors for example. But that promotes that that, that whole development. I think in short, that's what the government should do."	Mining
MIN4: "Yeah, you need government to be to be on board and to be supportive and you need laws and regulations just to be clear."	Mining

Source: Researcher's Own.

5.2.3.2 Cross-case and In-case analysis of government / legislation

To present the analysis, the researcher used the participants' mentions of the subtheme found in the data, along with the researcher's own understanding of the subtheme, as a guide to possible similarities and differences between the various sectors. It should be noted that the number of mentions by sector do not indicate the theme's relevance, significance, or importance, but rather the comparison to other sectors was useful as an indicator of similarities and differences. The mentions are therefore reported as 'many', 'some', 'few' or 'none' for the purposes of this analysis.

Table 4a, which expands on Table 4, shows the number of times, the subtheme of

communities' approval has been mentioned per sector.

Table 4a Subtheme relating to research question 1: Government / legislation

Themes from the dataset	**Mining**	**Financial Services**	**Industry Association**	**Academic Institution**
Coercive pressure	**Mentions by sector**			
Government / legislation	Some	None	Many	Some

Source: Researcher's Own.

Regarding government and legislative pressure, no meaningful indicator of similarities and differences was found in the financial services sector. The other three sectors have shown a similar response to legislative pressure from the government to facilitate the shift to carbon neutrality. There were a few minor variations between the mining and industry association sector.

Academic sector observed that legislation should be used by the government to impose coercive pressure in order to facilitate the transition to carbon neutrality. The sector also pointed out that the acceleration of the shift to carbon neutrality could be achieved by exerting pressure on the government through the use of instruments like laws, regulations, and acts. The sector also pointed out that industry participants' sustainability reporting can help with the transition.

Although Namibia has environmental laws that adhere to best practices, the industry association sector pointed out that there is no proof that the laws include provisions for becoming carbon neutral. Through a variety of initiatives and actions, such as green hydrogen, the government is consciously working toward a sustainable economy. The government made it clear that it was prepared to push for the switch to green energy. While the government has demonstrated a proactive approach towards transition, the sector maintains that external factors, rather than government initiatives, are the driving force behind the drive.

The mining sector feels that laws and regulations are the best way for the government to set the agenda. They also think that the government should play an enabling role by offering incentives to those who want to be early adopters of the transition to carbon neutrality and by setting up infrastructure such as electric charging stations.

5.2.3.3 Conclusion on the subtheme of government / legislation

The evidence of participants on government / legislation revealed a lot of similarities and minor differences were noted in the industry association and mining sectors.

The three sectors namely, academic institution, indusry association, and mining, noted that government can exert some coercive pressure to transitioning to carbon neutrality through implemention of laws and regulations. They noted that government is key stakeholder for the transitioning. Government can implement environmental laws and regulations that would drive companies to transitioin to carbon neutrality.

The mining and industry association sectors noted some differences that even though the government should implement enforceable laws and regulations for the transitioning to carbon neutrality, the government should also be able to provide the primary infrastrucure to aide the transitioning. The other difference pertains to that although the government is proactive in establishing green hydrogen sector which addresses climate change problems, they believe that the efforts of transitioning are more in compliance with external forces who are driving the climate change agenda, rather than their own initiatives, they believe that the government faces more pertinent issues such as addressing proverty, unemployment, etc., as opposed to the transitioning to carbon neutrablity which is more an issue in developed countries.

5.2.4 RQ1: Subtheme3 – Transitioning to carbon neutrality: Opportunities of transitioning – Opportunity for new skills and employment in the industry

To present the findings on the main research question of establishing how companies transition to carbon neutrality and what drives the transitioning, the subtheme of opportunity of new skills and employmnet in the industry is presented which stems from the theme of transitioning to carbon neutrality.

5.2.4.1 Evidence of opportunity for new skills and employment in the industry

By comparing mentions of new skills and employment in the industry because of transitioning to carbon neutrality, the evidence was chosen because of the diversity of experiences within the case as well as cross-case, where a ‘case’ is each sector group.

Table 5 is a table of evidence that demonstrated the diverse experiences of the participants who provided rich insights into the research question and contributed to a better understanding of the phenomenon.

Table 5 Evidence of opportunity for new skills and employment in the industry

Evidence of opportunity for new skills and employment in the industry	
Quotation	**Sector**
IND1: However, they've started to supplement current electricity supply, for example, Org3. has built a solar plant which they are utilizing from, and Org4 is also building a solar plant, Org4 are building a wind farm and all of these will also feedback into into the National Grid. So that's one way another way, what they've also the mining companies have also started to invest heavily and is also into research in terms of their actual.	Industry association
MIN1: "This new technology coming in, we recognize with the new technology, we will also need a new skill set that will be in support or complement this type of technology."	Mining
MIN1: "But I think for Namibia, for us it's about people, it's about job creation, it's about skills and education."	Mining
MIN1: "There's there's carbon capturing abilities of the cop, but importantly, like I said, you developing skills, you developing education, you expose people to that, and you're creating jobs".	Mining
MIN2: "And yeah, it definitely will give you negotiating skills."	Mining
MIN2: "So you it gives you an opportunity to also give your suppliers the chance to develop and innovate new products and research new products that they may have not thought of."	Mining
MIN4: "So that's universities, but I think also to formational schools and technical schools etcetera, to really make sure that you have the people that can do the work instead of having to import them from them from somewhere else."	Mining

Source: Researcher's Own.

5.2.4.2 Cross-case and In-case analysis of opportunity for new skills and employment in the industry

To present the analysis, the researcher used the participants' mentions of the subtheme found in the data, along with the researcher's own understanding of the subtheme, as a guide to possible similarities and differences between the various sectors. It should be noted that the number of mentions by sector do not indicate the theme's relevance, significance, or importance, but rather the comparison to other sectors was useful as an indicator of similarities and differences. The mentions are therefore reported as 'many', 'some', 'few' or 'none' for the purposes of this analysis.

Table 5a, which expands on Table 5, shows the number of times, the subtheme of opportunity for new skills and employment in the industry due to transitioning to carbon neutrality has been mentioned per sector.

Table 5a Subtheme relating to research question 1: Opportunity for new skills and employment in the industry

Themes from the dataset	**Mining**	**Financial Services**	**Industry Association**	**Academic Institution**
Opportunities of transitioning	**Mentions by sector**			
Opportunity for new skills & employment in the industry	Many	None	Few	None

Source: Researcher's Own.

When it came to the opportunity for new skills and employment in the industry as a result of the transition to carbon neutrality, there was no meaningful indicator of similarities and differences found in the financial services and academic institution sectors. The mining and industry association sectors observed that the shift towards carbon neutrality offers prospects for new technology, new competencies, and job creation within the industry. There were no differences found between the two sectors.

A representative from the industry association mentioned that some organizations have begun to construct their own solar and wind power plants, and that the mining industry has begun the process of switching to renewable energy as a source of electricity. The renewable energy plants' goal is to supply their operations with electricity, with any excess being fed into the national grid. People can learn new skills through the construction and maintenance of these plants, and it also gives them the chance to work in the industry.

The mining sector has also observed that the introduction of new technology will require the acquisition of new skills, which will create jobs in the sector. Additional opinions expressed were that the move toward carbon neutrality includes the idea of carbon capturing, which would also result in the creation of new jobs, education, and skill sets. As a result of having to conduct research and innovate, suppliers would have the chance to create and innovate new products as well as acquire new skills as a result of the shift to carbon neutrality. The sector also pointed out that rather than importing skills from abroad, the necessary skill set should be developed in the nation of operations to generate jobs.

5.2.4.3 Conclusion on the subtheme of opportunity for new skills and employment

The evidence of participants on opportunity for new skills and employment in the industry due to transitioning to carbon neutrality provided a lot of similarities from the quotations of the participants in the industry association and mining sectors, with no differences were noted.

The mining sector is transitioning to renewable energy sources, such as solar and wind power plants, to power their operations and feed excess into the national grid. This shift is fostering the development of new skills and job opportunities in the sector. The sector also acknowledges the need for new technology and skills, which will be required for the introduction of new technology and job creation. The shift towards carbon neutrality, which includes carbon capturing, will also lead to new jobs, education, and skill sets. Suppliers will have the opportunity to create and innovate new products and acquire new skills through research and innovation. The sector advocates for developing necessary skill sets in the country of operations rather than importing them from abroad.

5.2.5 RQ1: Subtheme4 – Transitioning to carbon neutrality: Challenges of transitioning – Lack of buy-in

To present the findings on the main research question of establishing how companies transition to carbon neutrality and what drives the transitioning, the subtheme of lack of buy-in pertaining to the transitioning to carbon neutrality is presented which stems from the theme of transitioning to carbon neutrality.

5.2.5.1 Evidence of lack of buy-in needed for the transitioning to carbon neutrality

By comparing mentions of lack of buy-in for the transitioning to carbon neutrality, the evidence was chosen because of the diversity of experiences within the case as well as cross-case, where a 'case' is each sector group. Table 6 is a table of evidence that demonstrated the diverse experiences of the participants who provided rich insights into the research question and contributed to a better understanding of the phenomenon.

Table 6 Evidence of lack of buy-in for the transitioning to carbon neutrality

Evidence of challenges pertaining to lack of buy-in	
Quotation	**Sector**
ACA1: "And also, especially when people cannot see the impact of climate change right now in Namibia, we have the cleanest air. Why would somebody think that they are polluting right now?"	Academic institution
ACA1: "Then the drive and the buy-in is not happening because people are not enthusiastic about these topics."	Academic institution
FIN1: "I've not really want to advocate for electric vehicles as it relates to long distance, particularly as it relates to the infrastructure that we have now. As a country and it's not sustainable, it doesn't make sense."	Financial services
FIN4: "We understand that we didn't contribute to partly contributed 0.1% to these carbon emission."	Financial services
IND1: "I think in some cases, honestly, in the biggest scheme of	Industry

things, their emissions are insignificant, right?"	association
MIN1: "Like I said, we our countries not emitting a lot of carbon emissions, but because of the because of the climate change worldwide."	Mining
MIN2: "They tell us that human activities are the cause of climate change and that we should reduce umm and where we should reduce our missions in which industries."	Mining

Source: Researcher's Own.

5.2.5.2 Cross-case and In-case analysis of lack of buy-in for transitioning to carbon neutrality

To present the analysis, the researcher used the participants' mentions of the subtheme found in the data, along with the researcher's own understanding of the subtheme, as a guide to possible similarities and differences between the various sectors. It should be noted that the number of mentions by sector do not indicate the theme's relevance, significance, or importance, but rather the comparison to other sectors was useful as an indicator of similarities and differences. The mentions are therefore reported as 'many', 'some', 'few' or 'none' for the purposes of this analysis.

Table 6a, which expands on Table 6, shows the number of times, the subtheme of lack of buy-in for transitioning to carbon neutrality has been mentioned per sector.

Table 6a Subtheme relating to research question 1: Lack of buy-in for transitioning to carbon neutrality

Themes from the dataset	**Mining**	**Financial Services**	**Industry Association**	**Academic Institution**
Challenges of transitioning	**Mentions by sector**			
Lack of buy-in	Some	Some	Few	Some

Source: Researcher's Own.

Regarding the topic of becoming carbon neutral, all four sectors observed that there are common challenges regarding buy-in. The mining and academic sectors made different observations. The former questioned which industry needed to cut emissions to combat climate change, while the latter pointed out that role players' lack of enthusiasm for the issue resulted in a lack of motivation and buy-in to transition. The financial services sector also noticed a difference, pointing out that although the transition is a good thing, Namibia is not prepared for it because it does not have the required infrastructure. As a result, the topic of transitioning to carbon neutrality should come up once the infrastructure is established.

A participant from the academic sector pointed out that because Namibia has some of the cleanest air in the world, people there are unable to see the effects of climate change at this time. They questioned why people should believe that Namibians should be the ones to address this issue. All four sectors expressed agreement that there is no reason for the nation or any one industry to be concerned about Namibia's emissions. The financial services sector contended that Namibia's emissions have very little effect on global warming. The mining sector pointed out that although emissions from Namibia are negligible, the issue of climate change is one that affects the entire world. The industry association acknowledged this.

5.2.5.3 Conclusion on the subtheme of lack of buy-in for transitioning to carbon neutrality

The evidence of participants on lack of buy-in for transitioning to carbon neutrality provided similarities and differences.

The research findings emphasized the importance of transitioning to carbon neutrality, but identified challenges due to lack of buy-in. The findings emphasized the need to contribute to the global agenda and build resilience to climate change changes. However, research findings noted differences in the lack of infrastructure, people's aversion to carbon neutrality, and industry targeting for emissions reduction. From a country perspective, the emissions currently released do not justify prioritizing transitioning to carbon neutrality. They believe that even achieving zero emissions would not be significant enough to curb global warming challenges. The findings emphasized the need for role players to be educated about the importance of addressing climate change challenges, and that small steps or contributions can contribute to reducing the impacts of climate change and reducing the rate at which the world increases global

average temperatures to within 1.5°C pre-industrial levels.

5.2.6 RQ1: Subtheme5 – Transitioning to carbon neutrality: Challenges of transitioning – Lack of skills and knowledge

To present the findings on the main research question of establishing how companies transition to carbon neutrality and what drives the transitioning, the subtheme of lack of skills and knowledge pertaining to the transitioning to carbon neutrality is presented which stems from the theme of transitioning to carbon neutrality.

5.2.6.1 Evidence of lack of skills and knowledge needed for the transitioning to carbon neutrality

By comparing mentions of lack of skills and knowledge needed for the transitioning to carbon neutrality, the evidence was chosen because of the diversity of experiences within the case as well as cross-case, where a 'case' is each sector group. Table 6 is a table of evidence that demonstrated the diverse experiences of the participants who provided rich insights into the research question and contributed to a better understanding of the phenomenon.

Table 7 Evidence of lack of skills and knowledge needed for the transitioning to carbon neutrality

Evidence of challenges pertaining to lack of skills and knowledge	
Quotation	**Sector**
MIN4: "I think you need your and educational institutes because again, this is all new stuff. You need people that have the right skills."	Mining
ACA1: "There's a lack of research on this topic and I think that's where we need to start because at the end of the day, it's a very valuable topic."	Academic institution

Source: Researcher's Own.

5.2.6.2 Cross-case and In-case analysis of lack of skills and knowledge needed for transitioning to carbon neutrality

To present the analysis, the researcher used the participants' mentions of the subtheme found in the data, along with the researcher's own understanding of the subtheme, as a guide to possible similarities and differences between the various sectors. It should be noted that the number of mentions by sector do not indicate the theme's relevance, significance, or importance, but rather the comparison to other sectors was useful as an indicator of similarities and differences. The mentions are therefore reported as 'many', 'some', 'few' or 'none' for the purposes of this analysis.

Table 7a, which expands on Table 7, shows the number of times, the subtheme of lack of skills and knowldege needed for transitioning to carbon neutrality has been mentioned per sector.

Table 7a Subtheme relating to research question 1: Lack of skills and knowledge need for the transitioning to carbon neutrality

Themes from the dataset	**Mining**	**Financial Services**	**Industry Association**	**Academic Institution**
Challenges of transitioning	**Mentions by sector**			
Lack of skills and knowledge	Few	None	None	Few

Source: Researcher's Own.

In terms of the lack of expertise required for the shift to carbon neutrality, no meaningful comparison or contrast between the financial services and industry association sectors could be found. The academic institution and mining sectors observed parallels in the current transitional challenge brought about by a lack of skills and knowledge. There were no differences found between the two sectors.

Participants from the mining and academic institutions sectors pointed out that Namibia lacks knowledge on the subject of carbon neutrality, which is still in its infancy. The sector

also pointed out that there isn't much research being done in Namibia on the subject and that there isn't much enthusiasm for it. A nation that is well-informed is necessary for the transition to carbon neutrality; ignorance and incompetence will impede this process. To achieve the transition, individuals possessing the necessary skills and knowledge of carbon neutrality are required.

5.2.6.3 Conclusion on the subtheme of lack of skills and knowledge

The evidence of participants on lack of skills and knowledge needed for transitioning to carbon neutrality provided similarities, with no differences were noted.

Namibia's mining and academic institutions sectors have highlighted the country's lack of knowledge and enthusiasm for carbon neutrality, a topic in its infancy. They also noted a lack of research and enthusiasm for the subject. To successfully transition to carbon neutrality, a well-informed nation is needed, and individuals with the necessary skills and knowledge are essential for this transition.

5.3 Research Question 2: How does commitment to carbon neutrality impact firm performance?

5.3.1 RQ2: Subtheme6 – Internals driver: Sustainable value creation – Social justice

To present the findings on the research question of establishing how commitment to carbon neutrality impact firm performance, the subtheme of social justice is presented which stems from the theme of sustainable value creation.

5.3.1.1 Evidence of social justice

By comparing mentions of social justice elements, the evidence was chosen because of the diversity of experiences within the case as well as cross-case, where a ‘case’ is each sector group. Table 8 is a table of evidence that demonstrated the diverse experiences of the participants who provided rich insights into the research question and contributed to a better understanding of the phenomenon.

Table 8 Evidence of social justice

Evidence of social justice	
Quotation	**Sector**
ACA1: "A need to understand that the mines will not be there forever and that financial sustainability component is going to be achieved in the long run when the mine is closing down. Sustainability is not only about environment and carbon footprint, but its also about social aspects and most importantly fincial sustainability. Sustainability should be about efforts of creating employment, while eradicating carbon footprint there should be efforts to create employment."	Academic institution
ACA1: "You have targets, monthly targets, and you cannot exceed the targets or below. So that means you don't really need to mine too much when you have already reached your target, let's say half a month earlier. You just have to stop or do it low. And then at the end of the day, what that means is you add to the lifecycle of the mine. That also helps with the sustainability of the people's employment conditions continue for a few more years, you don't need to make more money than you need."	Academic institution
FIN1: "Shifting to carbon neutrality should not only be viewed from a cost perspective, but opportunities should also be weight. Offering green bonds like financing solar projects would generate money for the funder, but in the same vein create employment while sustaining the environment as well."	Financial services
FIN1: "Every individual is a global citizen, thus efforts to avert climate change should be everyone's responsibilit, it will contribute to making the shift."	Financial services
FIN3: "Committed to responsible business and the recognition and environmental and societal risks associated with climate change. We also see the financial opportunities."	Financial services
FIN3: "To attract investments in clean energy and sustainable development, ultimately improving the well-being of its citizens."	Financial services

FIN4: "Commitment to transitioning is not for the sake of a company ticking boxes, but it's also for the well being of the employees."	Financial services
IND1: "Are you giving back to the communities in a manner that they will continue to survive and be economically viable after the life of mine?"	Industry association
MIN1: "Shifting to carbon neutrality is about the benefits tothe people of this country. So it's bringing the planetary side with the social side to conect the two."	Mining
MIN2: "It's irresponsible, the manner in which we use resourves today is based on a mindset of abundance."	Mining
MIN2: "Deploying technologies that have fewer emmissions that have 0 emissions or clean emissions. It is speaks to your health and safety, which is a key metric for any mining company, because the air is clean. Now if you deploy different technologies, you can prevent that suppression. If you redesign your mind for electric, you can actually reduce dust. Umm you can reduce oil spills. Uh, you know the toxicity of having diesel spills and diesel fumes all over the mindset. So it's definitely improves health and safety and then they they for the quality of life of your employees on site and UM, yes."	Mining
MIN4: "It's the right thing to do, as consumers have started to as question such as as what your carbon footprint is? Pressure is also coming from alternative products who claims they emit zero carbon."	Mining
MIN4: "People should be able to relate with how the product you selling was ethically sourced and manufactured."	Mining
MIN4: "Shifting to carbon neutrality is the right thing to do from a scoial and environmental perspective."	Mining
MIN5: "Shifting to carbon neutral is the right thing to do, in terms of protecting the environment. We need to care for the environment, we need to care for each other and reducing the carbon footprint just makes sense."	Mining
MIN7: "Our organisation provides training with regards to the impact of	Mining

climate change."	

Source: Researcher's Own.

5.3.1.2 Cross-case and In-case analysis of social justice

To present the analysis, the researcher used the participants' mentions of the subtheme found in the data, along with the researcher's own understanding of the subtheme, as a guide to possible similarities and differences between the various sectors. It should be noted that the number of mentions by sector do not indicate the theme's relevance, significance, or importance, but rather the comparison to other sectors was useful as an indicator of similarities and differences. The mentions are therefore reported as 'many', 'some', 'few' or 'none' for the purposes of this analysis.

Table 8a, which expands on Table 8, shows the number of times, the subtheme of social justice has been mentioned per sector.

Table 8a Subtheme relating to research question 2: Social justice

Themes from the dataset	**Mining**	**Financial Services**	**Industry Association**	**Academic Institution**
Sustainable value creation	**Mentions by sector**			
Social justice	Many	Some	Few	Few

Source: Researcher's Own.

The four sectors have demonstrated a commonality in advocating for social justice as a means of generating sustainable value. The academic institution was focused on the creation of jobs and, more accurately, the sustainability of jobs. The sector pointed out that part of their strategy should include creating jobs in addition to eliminating carbon footprints. The sector went on to say that the strategy should focus on sustainable mining, meaning that no more material should be taken out than is necessary to maintain the mine's longer lifespan and, consequently, the long-term preservation of jobs.

Like the academic community, the financial services sector stated that while the

transition to carbon neutrality has costs, it also presents an opportunity to create additional jobs and support the environment. The acknowledgement of the risks that climate change poses to society and the environment was also mentioned. In the same way, there are financial benefits to the shift. The financeial services sector went on to say that luring investments into sustainable development and clean energy will eventually raise people's standard of living. They concluded, however, that making the commitment to transition shouldn't just be a box to be checked; rather, it should also take into account the welfare of the workforce.

The industry association sector has demonstrated parallels with the academic institution and financial services sectors in that it is imperative to prioritize the welfare of people in its operations and as it moves toward becoming carbon neutral. The sector pointed out that organizations ought to support the local communities so they can continue to exist once the mines are closed when their useful lives are over.

The mining sector also stated that the goal of the transition to carbon neutrality is to improve people's lives by bringing about positive social and environmental effects and linking it to people's well-being. The mining sector also stated that resource conservation and careful mining with an eye toward the future should be the mindset of mining operations rather than one of abundance. The mining sector also stated that the core of the transitioning is people's well-being. The goal of the technology being developed is to reduce emissions, which in turn addresses worker and community health and safety. The mining sector observed that consumers are increasingly turning into environmental activists and making sure the goods they purchase are sourced ethically and have low carbon emissions. The mining sector also understands that, from a social and environmental standpoint, becoming carbon neutral is the right course of action. The environment must be preserved, and where appropriate, education about how carbon emissions contribute to climate change must be given.

5.3.1.3 Conclusion on the subtheme of social justice

The evidence of participants on social justice provided similarities, with no differences noted amongst the sectors.

The four sectors of academia, financial services, industry association, and mining have all emphasized the importance of social justice in generating sustainable value. Academic institutions focus on job creation and sustainability, while financial services

acknowledge the potential for increased jobs and environmental benefits from transitioning to carbon neutrality. The two ssectors emphasize the need to prioritize the welfare of the workforce and support local communities post-mine closure.

The industry association sector emphasized the importance of prioritizing people's welfare in operations and transitioning to carbon neutrality. It emphasized the need for resource conservation and careful mining with a future mindset. The mining sector aims to improve people's lives by bringing about positive social and environmental effects and linking it to their well-being.

The technology being developed aims to reduce emissions, addressing worker and community health and safety. The mining sector also recognizes the growing trend of consumers becoming environmental activists and purchasing ethically sourced goods with low carbon emissions. From a social and environmental standpoint, becoming carbon neutral is the right course of action, and education about how carbon emissions contribute to climate change should be given where appropriate. By focusing on these sectors, the transition to a more sustainable future can lead to improved social and environmental outcomes.

5.3.2 RQ2: Subtheme7 – External drivers: Mimetic pressure – Competitors / Industry

To present the findings on the research question of establishing how commitment to carbon neutrality impact firm performance, the subtheme of competitors and industry pressure is presented which stems from the theme of mimetic pressure.

5.3.2.1 Evidence of competitors and industry pressure

By comparing mentions of competitors and industry pressure, the evidence was chosen because of the diversity of experiences within the case as well as cross-case, where a ‘case’ is each sector group. Table 9 is a table of evidence that demonstrated the diverse experiences of the participants who provided rich insights into the research question and contributed to a better understanding of the phenomenon.

Table 9 Evidence of competitor and industry pressure

Evidence of competitor and industry pressure	
Quotation	**Sector**
ACA1: "A lot of companies have commitments that are based on carbon neutrality or reducing carbon footprint because they are hearing it around like it's a mimetic pressure."	Academic institution
MIN4: "Natural minerals started to claim they were the no carbon or 0 carbon alternative to natural minerals."	Mining
MIN5: "Obviously it's very important for us to show that we are doing lots of things to to also support the environment because our competitors in the microwave time and sector is is claiming one of the market standard. This is not the quality of the minerals because that manufactured in a lab is to say that I achieved that type of document with other thing the environment. So besides from the fact that it's right thing to do and we need to care, we also achieve the benefit to proof that what we are we are also putting back into the environment."	Mining
MIN6: "There's also in the industrial minerlas they they put in claims on the table that they are producing minerals that that, that, that there is less carbon impact on the environment. And so that's now becoming a bit of a cell speech. So if if Org2 has to compete against that, you know, obviously then Org2 has to put the it's it's money where where it has to go and that is to to ensure that you know we we we emit a lot less carbon than than what do we then then what our competitors competitors would would do."	Mining

Source: Researcher's Own.

5.3.2.2 Cross-case and In-case analysis of competitors and industry pressure

To present the analysis, the researcher used the participants' mentions of the subtheme found in the data, along with the researcher's own understanding of the subtheme, as a guide to possible similarities and differences between the various sectors. It should be noted that the number of mentions by sector do not indicate the theme's relevance,

significance, or importance, but rather the comparison to other sectors was useful as an indicator of similarities and differences. The mentions are therefore reported as ‘many’, ‘some’, ‘few’ or ‘none’ for the purposes of this analysis.

Table 9a, which expands on Table 9, shows the number of times, the subtheme of competitor and industry pressure has been mentioned per sector.

Table 9a Subtheme relating to research question 2: Competitor and industry pressure

Themes from the dataset	**Mining**	**Financial Services**	**Industry Association**	**Academic Institution**
Mimetic Pressure	**Mentions by sector**			
Competitor and industry pressure	Many	None	None	Few

Source: Researcher’s Own.

Regarding competition and industry pressure, no meaningful indicator of similarities or differences was found between the financial services and industry association sectors. The mining and industry association sectors observed commonalities as a result of rivals' pressure to reduce carbon footprints or achieve carbon neutrality. There were no differences found between the two sectors.

A participant from the academic institution sector mentioned that businesses are starting the process of becoming carbon neutral or lowering their carbon footprint due to market pressure. The mining sector are taking this action to ensure that they stay ahead of their rivals and to benefit from the competitive edge that comes from switching to a lower carbon footprint. Lab-grown minerals, which assert that they are manufacturing minerals with little to no carbon as an alternative to natural minerals, putting pressure on the natural minerals mining industry. As a result, it compels the natural minerals mining companies to reduce carbon emissions or move toward carbon neutrality in order to show their positive environmental impact. The mining sector also observed that, in order to compete from an environmentally conscious standpoint, natural minerals mining companies are forced to invest in the transition to carbon neutrality as a result of rivals' claims that they are producing zero or low carbon alternatives.

5.3.2.3 Conclusion on the subtheme of competitor and industry pressure

The evidence of participants on competitor and industry pressure provided similarities, with no differences noted amongst the sectors.

The research findings by the academic sector noted that businesses are starting the process of becoming carbon neutral or lowering their carbon footprint as a result of market pressure. Findings also noted that businesses are taking this action to ensure that they stay ahead of their rivals and benefit from the competitive edge that comes from switching to a lower carbon footprint. Lab-grown minerals sector asserts that they are manufacturing minerals with little to no carbon as an alternative to natural minerals, putting pressure on the natural minerals mining industry. As a result, it compels the natural mineral mining companies to reduce carbon emissions or move toward carbon neutrality to show their positive environmental impact. The mining sector also observed that, to compete from an environmentally conscious standpoint, natural mineral mining companies are forced to invest in the transition to carbon neutrality as a result of rivals' claims that they are producing zero or low carbon alternatives.

5.3.3 RQ2: Subtheme8 – Transitioning to carbon neutrality: Challenges of transitioning – Short-term capital investments

To present the findings on the research question of establishing how commitment to carbon neutrality impact firm performance, the subtheme of short-term capital investments is presented which stems from the theme of challenges to transitioning.

5.3.3.1 Evidence of short-term capital investments

By comparing mentions of short-term capital investments, the evidence was chosen because of the diversity of experiences within the case as well as cross-case, where a ‘case’ is each sector group. Table 10 is a table of evidence that demonstrated the diverse experiences of the participants who provided rich insights into the research question and contributed to a better understanding of the phenomenon.

Table 10 Evidence of short-term capital investments

Evidence of short-term capital investments	
Quotation	**Sector**
FIN2: "So we the world is still at the point where the costs have not allowed accessibility or affinity towards going green. Going green is not quite cost effective it it's it's not there yet."	Financial services
IND1: "Because, well, the problem is I think most measures that that we wanna introduce for carbon neutrality, I have our MP positive in the long term, but they do require sometimes significant capital capital injections that the short term and yeah, if you're not able to provide those then that means you're going to have to postpone certain projects."	Industry association
IND1: "Mining is a is a very low margin business, so they need to ensure that their costs are kept low and all of these alternative and green fuel sources at the moment are highly costly as it is."	Industry association
MIN1: "The big one is where Org1 remember, it's difficult if you've got a vessel and now you've gotta take that vessel and you've gotta replace that vessel. Replace fossil fuels on those vessels. How do you do that? Currently I know that the team is looking and and and and not alternative drop in fuel solution. Little steps financial impacts are going to be big in the short-term."	Mining
MIN6: "So look, uh, I think that that's generally sometimes the the first reaction of a lot of people is is to say listen if if you expect us to to now start looking at carbon neutrality and and implement solution it's gonna cost us money."	Mining

Source: Researcher's Own.

5.3.3.2 Cross-case and In-case analysis of short-term capital investments

To present the analysis, the researcher used the participants' mentions of the subtheme found in the data, along with the researcher's own understanding of the subtheme, as a guide to possible similarities and differences between the various sectors. It should be

noted that the number of mentions by sector do not indicate the theme's relevance, significance, or importance, but rather the comparison to other sectors was useful as an indicator of similarities and differences. The mentions are therefore reported as ‘many’, ‘some’, ‘few’ or ‘none’ for the purposes of this analysis.

Table 10a, which expands on Table 10, shows the number of times, the subtheme of short-term capital investments has been mentioned per sector.

Table 10a Subtheme relating to research question 2: Short-term capital investments

Themes from the dataset	**Mining**	**Financial Services**	**Industry Association**	**Academic Institution**
Challenges of transitioning	**Mentions by sector**			
Short-term capital investments	Some	Few	Some	None

Source: Researcher’s Own.

In the academic institution sector, no significant indicator of similarities or differences was discovered with regard to short-term capital investments. The financial services, mining, and industry associations claim that the move toward carbon neutrality spurred short-term capital investments. Between the three sectors, there were no differences.

A financial services industry participant brought up the point that becoming environmentally conscious or moving toward carbon neutrality comes at a high cost. Similarities were seen in the industry association sector, where it was mentioned that while measures to become carbon neutral have long-term financial benefits, they necessitate large capital infusions in the short term. The industry association futher mentioned that due to mining being a low margin business, the transitioning cost should be kept low, but the current alternatives of transitioining to carbon neutrality are highly priced. Similarly, the mining sector noted that for example a mining company that operates vessels would have to find alternative to fossil fuels, this would require short-term investment in equipment on the vessel which have short-term financial implications. The mining sector further noted that for the transitioning to be achieved it would cost money and excessive investments on the short-term.

5.3.3.3 Conclusion on the subtheme of short-term capital investments

The evidence of participants on short-term capital investments provided similarities, with no differences noted amongst the sectors.

The three sectors acknowledged that short-term capital investments will be necessary to cover the costs associated with the shift to carbon neutrality. It costs money to transition because you must convert your current assets into ones that are carbon neutrality compliant. Organizations are faced with a challenge because they would need to secure funding right away to make the switch to carbon neutrality. Businesses would have to redirect funds meant for other projects to make the switch to carbon neutrality. The financial performance of the company is negatively impacted by this because transitioning has higher short-term costs.

5.3.4 RQ2: Subtheme9 – Internal drivers: Potential benefits – To achieve long-term economic benefits

To present the findings on the research question of establishing how commitment to carbon neutrality impact firm performance, the subtheme to achieve long-term economic benefits is presented which stems from the theme of potential benefits.

5.3.4.1 Evidence of achieving long-term economic benefits

By comparing mentions of achieving long-term economic benefits, the evidence was chosen because of the diversity of experiences within the case as well as cross-case, where a 'case' is each sector group. Table 11 is a table of evidence that demonstrated the diverse experiences of the participants who provided rich insights into the research question and contributed to a better understanding of the phenomenon.

Table 11 Evidence of long-term economic benefits

Evidence of achieving long-term economic benefits	
Quotation	**Sector**

ACA1: I'm saving money by being a little bit on the low carbon side. There's a lot of carbon tax that are placed on mining also. The amount of water you use, the amount of energy you use. There's a lot of tax on that. And you can save by investing into a culture where you are not using a lot of that or you are using some efficient processes or renewable energy or just living in a much more better way.	Academic institution
FIN1: And thirdly, once you think about it from a bigger picture and commenting sustainable uh methodologies, techniques, processes into your business is more likely to save you. I'm in terms of operational costs and so forth in the long term, so so the three that I would mention at this point. And then the other benefit is that the operation will cost will go down as well depending on what you do now and what are the interventions that you implement.	Financial services
IND1: "I think a third one for us is said and then cases, it's just a cost saving exercise like renewable electricity is a lot cheaper."	Industry association
IND1: "So it's really the burning of diesel and the and the and the using of electricity though all the efficient measures, efficiency measures that we can put in place that means we use less energy are cost savings, energy savings and thus emission savings then replace is about replacing fossil based electricity with renewables."	Industry association
MIN2: "It gives you an opportunity to negotiate on price because why would you pay more for a product that is dirtier or that has more emissions then you would for something that is cleaner and more environmentally responsible and that can be recycled."	Mining
MIN2: "Our operational costs keep on increasing, so it it forces us to to think about what cheaper alternatives we can deploy as opposed to, for example, if you think of South Africa, we are completely reliant on a single entity for electricity. So if you reliant on a single entity you reliant and you have no protection against what that entity does with its price and its price points. So what you do is you end up, umm, looking at where these dependencies are and then you start taking accountability and you own those dependencies so you don't have a single supplier	Mining

dependency. So those are some of the the internal motivations."	
MIN2: Multiple lenses you can look look at it and it's definitely one of at the onset for a mining company, it starts off operational efficiency. How can I save cost? Because because it is technology now, like renewable energy, battery electric is being built at scale. It comes in and it's much cheaper than your traditional fossil fuel technologies and electricity, and a lot of our fossil fuel, for example oil comes from abroad. So therefore, if we decarbonize and we build solutions locally, umm, and we win ourselves of oil, we can actually protect ourselves from from the fluctuations.	Mining
MIN6: "You actually make savings. The making money part is has been held on by the fact that our energy suppliers, as as kept on increasing their prices. Way above inflation rate. So what has happened now is that you're electricity, for instance, that you that you get from your suppliers, from your grid suppliers become so expensive that it is financially more attractive to put rooftop solar on your on your roof."	Mining

Source: Researcher's Own.

5.3.4.2 Cross-case and In-case analysis of achieving long-term economic benefits

To present the analysis, the researcher used the participants' mentions of the subtheme found in the data, along with the researcher's own understanding of the subtheme, as a guide to possible similarities and differences between the various sectors. It should be noted that the number of mentions by sector do not indicate the theme's relevance, significance, or importance, but rather the comparison to other sectors was useful as an indicator of similarities and differences. The mentions are therefore reported as 'many', 'some', 'few' or 'none' for the purposes of this analysis.

Table 11a, which expands on Table 11, shows the number of times, the subtheme of achieving long-term economic data has been mentioned per sector.

Table 11a Subtheme relating to research question 2: To achieve long-term economic benefits

Themes from the dataset	**Mining**	**Financial Services**	**Industry Association**	**Academic Institution**
Potential benefits	**Mentions by sector**			
To achieve long-term economic benefits	Many	Few	Some	Few

Source: Researcher's Own.

The subtheme of achieving long-term economic benefits as a result of the shift to carbon neutrality has drawn similarities from all four sectors. There were no differences found between the four sectors.

Participant from the academic institution sector noted that organisation can save cost if their carbon emission is low, this is due to carbon emission attracting high taxes. The academic institution sector therefore advised organisation to deploy processes that are efficient to reduce their carbon emissions and further use renewables as a source of energy.

The financial services sector noted similarities with academic institution sector with regards to reduction in operating costs. The sector noted that organisations that transition to carbon neutrality would have to implement methodologies, techiques and processes within their organisation focusing on the reduction of emissions and as a result that would lead to a decrease of their operating costs in the long run depending on their interventions.

Simalirities were also noted in the industry association sector that the operating costs would decrease. They noted that implementation of renewable energy would lead to the reduction in electricity costs as renewable electricity is cheaper. The industry association sector further noted that the transitioning to carbon neutrality requires efficiency in operations, efficiency in the consumption of energy resulting in reduced electricity cost.

The mining sector did not differ with findings above, they also noted the transitioning to carbon neutrality would result in new suppliers of renewables emerging and this gives an opportunity to the organisation to negotiate for cheaper prices resulting in reduced

operational costs. The sector further noted currently organisations relies on fossil fuel-based electricity that is supplied by a single supplier, which is often expensive, renewable energy provides the necessary competition to the single supplier resulting in the reduction of electricity cost. The sector mention that other energy suppliers have kept on increasing their prices above inflation rate, by investing in their own solar or wind plants as a source of electricity would result in decrased operational cost.

5.3.4.3 Conclusion on the subtheme of achieving long-term economic benefits

The evidence of participants on achieving long-term economic benefits provided similarities, with no differences noted amongst the sectors.

All four sectors agreed that companies that starts early the process of becoming carbon neutral will eventually reap financial rewards. Since alternative energy sources are thought to be less expensive in the long run than the conventional energy sources currently in use, the operational costs would go down. Research finding also mentioned that since they only have one supplier of electricity, there is no competition and an unabatedly high price for electricity. The energy sector would experience competition from renewable energy sources, which would be advantageous since it would prevent unwarranted price increases. There could be long-term economic benefits from the shift to carbon neutrality, according to all four sectors.

5.3.5 RQ2: Subtheme10 – Internal drivers: Potential benefits – To achieve environmental benefits

To present the findings on the research question of establishing how commitment to carbon neutrality impact firm performance, the subtheme to achieve environmental benefits is presented which stems from the theme of potential benefits.

5.3.5.1 Evidence of achieving environmental benefits

By comparing mentions of achieving environmental benefits, the evidence was chosen because of the diversity of experiences within the case as well as cross-case, where a ‘case’ is each sector group. Table 12 is a table of evidence that demonstrated the diverse experiences of the participants who provided rich insights into the research question and contributed to a better understanding of the phenomenon.

Table 12 Evidence of environmental benefits

Evidence of achieving environmental benefits	
Quotation	**Sector**
FIN1: "Shifting to carbon neutrality should not only be viewed from a cost perspective, but opportunities should also be weight. Offering green bonds like financing solar projects would generate money for the funder, but in the same vein create employment while sustaining the environment as well."	Financial services
MIN2: "It's irresponsible, the manner in which we use resourves today is based on a mindset of abundance."	Mining
MIN4: "People should be able to relate with how the product you selling was ethically sourced and manufactured."	Mining
MIN7: "Our organisation provides training with regards to the impact of climate change."	Mining

Source: Researcher's Own.

5.3.5.2 Cross-case and In-case analysis of achieving environmental benefits

To present the analysis, the researcher used the participants' mentions of the subtheme found in the data, along with the researcher's own understanding of the subtheme, as a guide to possible similarities and differences between the various sectors. It should be noted that the number of mentions by sector do not indicate the theme's relevance, significance, or importance, but rather the comparison to other sectors was useful as an indicator of similarities and differences. The mentions are therefore reported as 'many', 'some', 'few' or 'none' for the purposes of this analysis.

Table 12a, which expands on Table 12, shows the number of times, the subtheme of achieving environmental benefits has been mentioned per sector.

Table 12a Subtheme relating to research question 2: To achieve environmental benefits

Themes from the dataset	**Mining**	**Financial Services**	**Industry Association**	**Academic Institution**
Potential benefits	**Mentions by sector**			
To achieve environmental benefits	Many	Few	None	None

Source: Researcher's Own.

Regarding the obtaining environmental benefits subtheme, no meaningful indication of similarities and differences was found between the sectors of industry associations and academic institutions. Similarities between the mining and financial services sectors were observed, leading to environmental benefits from the shift to carbon neutrality. There were no differences found between the two sectors.

Participant from the financial services sector noted that shifting to carbon neutrality should not only be viewed from a cost perspective, but other opportunities should be considered. The transitioning to carbon neutrality provides an opportunity for employment creation, but most importantly sustaining the environment should be embraced.

Simalirities were also noted in the mining sector which entails the preservation of the environment by shifting the mindset of abundance and embracing responsible and ethical mining. The mining sector also noted that the environment would preservered if key stakeholders provide training with regards to considerate uage of the environment.

5.3.5.3 Conclusion on the subtheme of achieving environmental benefits

The evidence of participants on achieving environmental benefits provided similarities, with no differences noted amongst the sectors.

The research findinds noted that transitioning to carbon neutrality would results in the reduction of carbon emissions into the atmosphere which is a positive environmental benefit. The reductions of the impact to climate changes because of emissions of

greenhouse gases is also a potential benefit for the environment. This would result in improved water and air quality which ahave a ripple effect on the health and well being of people. The shifting of mindset that resource supplies are in abundance would assist in ensuring that resources are preservered for future use and the environemnt would not be deteriorated at an expidited rate. The life cycle would be expanded due to preserving the environment. The transitioning to carbon neutrality would achieve the benefit of reducing the impact of climate change. The two sectors agreed that transitioning to carbon neutrality have a potential for achieving environmental benefits.

5.3.6 RQ2: Subtheme11 – Transitioning to carbon neutrality: Partnering and collaboration – Partnering and collaboration in transitioning to carbon neutrality

To present the findings on the research question of establishing how commitment to carbon neutrality impact firm performance, the subtheme of partnering and collaboration in transitioning to carbon neutrality is presented which stems from the theme of partnering and collaboration.

5.3.6.1 Evidence of partnering and collaboration in transitioning to carbon neutrality

By comparing mentions of partnering and collaboration in transitioning to carbon neutrality, the evidence was chosen because of the diversity of experiences within the case as well as cross-case, where a 'case' is each sector group. Table 13 is a table of evidence that demonstrated the diverse experiences of the participants who provided rich insights into the research question and contributed to a better understanding of the phenomenon.

Table 13 Evidence of partnering and collaboration in transitioning to carbon neutrality

Evidence of partnering and collaboration in transitioning to carbon neutrality	
Quotation	**Sector**
ACA1: "Even industry standards can be normative pressure or having partnerships with institutions, professional institutions that understand these things."	Academic institution

FIN4: "Sort of show and I I'm huge and inclusivity and collaboration because you need to understand that it affects everyone, not only people who seems to know what the carbonizing and using this really, really nice, beautiful terms or you need to go to the chorus of a person or pool to understand because it's a behavioral setup. You need to influence from there, so you need and they need to be heard and they need to feel like they're part of the solution, not to be told what to do because there's no one person who likes to be told what to do. Even a doormat doesn't like to be told what to do, so it's a thing of like you need to collaborate and we need to appreciate that expertise cannot be hoarded and shouldn't be hoarded and should not be coming from one angle or one side."	Financial services
MIN1: "Even bringing our suppliers up to that standard to understand that if you really wanna partner with us, they specific values and principles that we are gearing ourselves towards and and then we need to take you also on this journey."	Mining
MIN2: "So those are some of the the, the internal motivations and then external motivations, user forces you to collaborate with people or departments or other companies or even your competitors that you may have not thought about collaborating and that can open doors for you going forward. So for example, if you think about ORG2 and having blockchain and tracer, if we started using it off as a tool for provenance, but then a lot of companies are coming and saying, well, you have something already, can we use it to trace emissions in the value chain so you know, it opens up opportunities to collaborate and innovate."	Mining
MIN2: "You can also, you know, change and influence policy, because now you can actively collaborate. The I disagree with this kind of tax policy or this climate national climate change. Well, and umm and you and you can influence that in the direction and then you can attract funding."	Mining

Source: Researcher's Own.

5.3.6.2 Cross-case and In-case analysis of partnering and collaboration in transitioning to carbon neutrality

To present the analysis, the researcher used the participants' mentions of the subtheme found in the data, along with the researcher's own understanding of the subtheme, as a guide to possible similarities and differences between the various sectors. It should be noted that the number of mentions by sector do not indicate the theme's relevance, significance, or importance, but rather the comparison to other sectors was useful as an indicator of similarities and differences. The mentions are therefore reported as 'many', 'some', 'few' or 'none' for the purposes of this analysis.

Table 13a, which expands on Table 13, shows the number of times, the subtheme of partnering and collaboration in transitioning to carbon neutrality has been mentioned per sector.

Table 13a Subtheme relating to research question 2: Partnering and collaboration in transitioning to carbon neutrality

Themes from the dataset	**Mining**	**Financial Services**	**Industry Association**	**Academic Institution**
Partnering and collaboration	**Mentions by sector**			
Partnering and collaboration in transitioning to carbon neutrality	Some	Few	None	Few

Source: Researcher's Own.

In the industry association sector, there was no discernible similarity or difference in terms of cooperation and partnership during the shift to the carbon neutrality subtheme. Similarities between the mining, financial services, and academic sectors led to cooperation and partnership in the shift to carbon neutrality. There were observed distinctions between the three sectors.

Participant from the academic institution sector mentioned that various institutions

should be included in the transitioning to carbon neutrality, particularly considering institution with knowledge and understanding of carbon neutrality. This will assist in ensuring that the transitioning in achieved as these entities would be sharing their knowledge with those with little or no knowledge on the carbon neutrality topic.

The financial services sector noted that everyone should be included on the journey of transitioning as the impact of climate change affects everyone. The transitioning should only be left to those with the knowledge.

The mining sector noted that transitiong to carbon neutrality provides an opportunity to partner with suppliers. The sector also noted that there is no need for inventing a new wheel, if there is an entity which have a blueprint or template on the transitioning to carbon neutrality it would be good if it can be shared amongst stakeholders to make it easier for the transitioning. The sector futher noted that as a collective, the sector can influence policies on climate change will expedite companies to join the journey of transitioning to carbon neutrality.

5.3.6.3 Conclusion on the subtheme of partnering and collaboration in transitioning to carbon neutrality

The evidence of participants on partnering and collaborating in transitioning to carbon neutrality provided similarities and differences amongst the sectors.

The academic institution sector suggested that various institutions should be involved in the transition to carbon neutrality, sharing knowledge and understanding to ensure success. The financial services sector emphasized the importance of everyone participating in the transition, as climate change impacts everyone. The mining sector noted carbon neutrality as an opportunity to partner with suppliers and suggested sharing a blueprint or template among stakeholders. The sector also believed that collectively, they can influence policies on climate change, accelerating companies' adoption of carbon neutrality. This collective effort will help mitigate the impact of climate change.

5.4 Research Question 3: How does commitment to carbon neutrality impact supply chain management?

5.4.1 RQ3: Subtheme12 – Impact of transitioning – Impact of transitioning on supply chain management

To present the findings on the research question of establishing how commitment to carbon neutrality impact supply chain management, the subtheme of impact of transitioning on supply chain management is presented which stems from the theme of impact on transitioning.

5.4.1.1 Evidence of impact of transitioning on supply chain management

By comparing mentions of impact of transitioning on supply chain management, the evidence was chosen because of the diversity of experiences within the case as well as cross-case, where a 'case' is each sector group. Table 14 is a table of evidence that demonstrated the diverse experiences of the participants who provided rich insights into the research question and contributed to a better understanding of the phenomenon.

Table 14 Evidence of social justice

Evidence of impact of transitioning on supply chain management	
Quotation	**Sector**
ACA1: "I think the supply chain can actually drive sustainability".	Academic institution
FIN3: "However, it may also present challenges, such as increased costs for suppliers in adopting sustainable practices."	Financial services
FIN3: "Increased costs for implementing sustainable practices, · Resistance to change among suppliers, and · potential disruptions in the availability of certain materials or products if suppliers fail to adapt to new sustainability standards."	Financial services
IND1: "So I think that will just make our economy more resilient and independent and and also sustainable in the long run that we are not so susceptible to outside shocks because we are not with importing as	Industry association

much and a fossil fuels and oil and and things like that."	
MIN2: "But we also need to capacity build suppliers because they don't know what's scope one, scope two and scope 3 emissions. They don't know what is carbon neutrality, and so if they don't know that, how do you, how do you say I'm I am screening you on this criteria if they don't even understand what that criteria is."	Mining
MIN2: "Does this product makes sense for my business or are you selling me over spiked pumps and therefore causing my energy to increase three times and I haven't budgeted for that energy increase? It definitely gives you an opportunity to start having some more critical, crucial conversations with suppliers."	Mining
Min2: "So it allows you to look at, look at it from a contract perspective and you can start performance managing your supplies data because you can hold them account to say well if you if you haven't reduced your emissions by what's acceptable globally by 2030, then I I no longer may want to do business with you."	Mining
MIN2: "So you it gives you an opportunity to also give your suppliers the chance to develop and innovate new products and research new products that they may have not thought of."	Mining
MIN2: "Getting access to new supplies that you wouldn't exist currently attract because you have a new uh spec for a specific pump or you have new guidelines or emission guidelines from a tender process so it or you start incorporating carbon metrics so you can start attracting suppliers that are more progressive and want to build new materials, new equipment that we want to solve, the fuel, the fuel issue or the and provide you with these kind of different solutions and alternatives."	Mining
MIN2: "You can cripple your existing supply chain or your small enterprises because when they do not have the financial resources to transition to buy electric vehicles, to use alternative fuels to maybe input solar. So that's one of the negatives when you think of it from a supply chain point of view, but then you can open yourself up to."	Mining

MIN4: "I think there's a real risk when we talk about beneficiation and local local suppliers."	Mining
MIN5: "It's a process of coaching taking, taking the suppliers with us on a journey under the so-called principles of which you are aware of under responsible sourcing."	Mining

Source: Researcher's Own.

5.4.1.2 Cross-case and In-case analysis of impact of transitioning on supply chain management

To present the analysis, the researcher used the participants' mentions of the subtheme found in the data, along with the researcher's own understanding of the subtheme, as a guide to possible similarities and differences between the various sectors. It should be noted that the number of mentions by sector do not indicate the theme's relevance, significance, or importance, but rather the comparison to other sectors was useful as an indicator of similarities and differences. The mentions are therefore reported as 'many', 'some', 'few' or 'none' for the purposes of this analysis.

Table 14a, which expands on Table 14, shows the number of times, the subtheme of impact of transitioning on supply chain management has been mentioned per sector.

Table 14a Subtheme relating to research question 3: Impact of transitioning on supply chain management

Themes from the dataset	**Mining**	**Financial Services**	**Industry Association**	**Academic Institution**
Impact of transitioning	**Mentions by sector**			
Impact of transitioning on supply chain management	Many	Some	Few	Few

Source: Researcher's Own.

With regard to the effects of transitioning on supply chain management, the sectors have identified both commonalities and differences. The academic institution pointed out that

the shift to carbon neutrality may be spearheaded by the supply chain. This can be accomplished by establishing goals that must be met in order to make the switch to carbon neutrality.

The financial services sector has observed that suppliers incur higher costs during the transition to carbon neutrality, which may lead to resistance towards modifying the process. While working to complete the transition, they also observed a possible disruption in the supply chain.

The industry association pointed out that the supply chain would gain some resilience and independence as a result of the shift to carbon neutrality, and that in the event of a disruption, there would also be some degree of self-reliance given the importation of fossil fuels.

The mining sector observed that moving toward carbon neutrality would help suppliers develop the ability to comprehend what carbon neutrality is and why it matters. The mining sector added that improved relationships between suppliers and customers would result from the transitioning starting a dialogue with suppliers. Participating businesses would also benefit from the transition in managing supplier contracts regarding emissions. Organizations would get suppliers ready for the shift so they could all work together to meet the targets for reducing their carbon footprint. Since new equipment would need to be used during the transition, suppliers would have a chance to use creativity in their search for the most effective tools and equipment to help the transition to carbon neutrality. The mining sector observed that the cost of the shift to carbon neutrality could potentially bankrupt suppliers, especially small suppliers. Beneficiation and the protection of small and medium-sized vendors as well as other local suppliers who might find it difficult to transition owing to financial concerns are at risk from this. In addition, the shift offers a chance to work together with suppliers to reduce the effects of climate change.

5.4.1.3 Conclusion on the subtheme of impact of transitioning on supply chain management

The evidence of participants of the impact of transitioning on supply chain mangement provided similarities and differences amongst the sectors.

The transition to carbon neutrality in supply chain management has been analyzed by

various sectors, with some identifying commonalities and differences. Academic institutions suggest that the supply chain can lead the transition by setting goals. Financial services sector observed higher costs for suppliers during the transition, potentially leading to resistance and disruptions. However, the industry association suggested that the transition will provide resilience and independence, and in case of disruption, self-reliance due to product importation i.e. fossil fuel. The mining sector noted that the transition is helping suppliers understand the importance of carbon neutrality and improving relationships with customers. It also benefits businesses in managing supplier contracts regarding emissions. Organizations can prepare suppliers for the shift, enabling them to work together to reduce their carbon footprint. However, the mining sector warned that the cost of the transition could potentially bankrupt small and medium-sized suppliers, who may face financial challenges in contrast to local beneficiation initiatives. Despite this, the shift offers an opportunity for collaboration to reduce climate change effects. Overall, the transition to carbon neutrality presents both opportunities and challenges for supply chain management.

5.5 Chapter conclusion on the findings

The primary research findings from the process of collecting and analyzing data were presented in this chapter with the goal of addressing the research questions as explained in Chapter 3, with the main research questio, of how firms transition to carbon neutrality and what are the drivers. The findings analyzed was from thirteen (13) semi-structured interviews which were conducted across four (4) sectors, namely, mining (7 participants) financial services (4 participants), academic institutions (1 participant), and industry associations (1 participant).

Using the deductive mapping process explained in Chapter 4 the researcher identified ten (10) themes and eighteen (18) subthemes that were mapped against the themes. To produce new insights and understanding of the research questions, the researcher selected eleven (11) subthemes of which seven (7) were new subthemes from the findings and four (4) subthemes which existed from literature. The remaining subthemes were not analyzed given that the study was not a comprehensive study. The evidence from the chosen themes was chosen based on the diversity of experiences within the case as well as cross-case, where a ‘case’ is each sector group.

The researcher presented the analysis by using the participants' mentions of the identified subtheme found in the data, along with the researcher’s own understanding of

the subtheme, as a guide to possible similarities and differences between the various sectors. The number of mentions by sector did not indicate the theme's relevance, significance, or importance, but rather the comparison to other sectors was used as an indicator of similarities and differences.

The researcher presented conclusions for each subtheme, which were based on the similarities and differences between the various sectors on a particular theme, based on the insights and new understanding as analyzed from the participants.

CHAPTER 6: DISCUSSION

6.1 Introduction

In this chapter comparison of the findings in Chapter 5 with the literature in Chapter 2 will be covered. The systematic approach used in Chapter 5 will be replicated in this chapter systematized by research questions to present the findings, and a methodical comparison of the 13 themes and subthemes covered in Chapter 5 with the literature in Chapter 2.

Referring to the mapping process in Chapter 5, each theme or subtheme that had already existed in literature and where similarities were identified as highlighted in the mapping process, a conclusion was made on the comparison analysis. The conclusion on the comparison would be the findings confirming the extant literature at the end of each section.

In instances of potential new themes and subthemes where literature could not be identified in Chapter 2, a three steps process was followed to confirm the potential differences or nuances of differences to the literature reviewed in Chapter 2. The researcher conducted the three steps process to confirm if these were valid differences or if any literature could be found. Although these three steps are not exhaustive, the researcher pointed out that they were created to adhere to a methodical and uniform analysis approach. The three steps process is discusssed below:

Step 1 – Using three published articles from the body of literature already reviewed in Chapter 2, the researcher performed a word search for the theme or subtheme. A declaration was made regarding the search terms / words.

Step 2 – In case Step 1 produced no relevant literature, the researcher chose three top scholars who were already included in the literature reviewed in Chapter 2 and looked for pertinent articles they had written and published on the subject in the previous five years. The words used in the theme or subtheme of those recent articles were declared after a word search was done. Any literature on the theme or subtheme that surfaced through a word search, it was examined to determine any simalirities and differences in comparison to the research findings. Step 3 was completed if there was no literature pertaining to the theme or subtheme found through the word search.

Step 3 – In case Step 2 produced no relevant literature, the researcher through a Google Scholar search and by applying Boolean search string conducted a search for literature from the last five years using the pertinent theme, subtheme or construct. The words used in the theme, subtheme or construct of those recent articles were declared after a word search was done. Any literature on the theme, subtheme or construct that surfaced through a word search, it was examined to determine any simalirities and differences in comparison to the the research findings. If there was no literature pertaining to the theme, subtheme or construct found through the word search this suggested potential differences and a fresh addition to the body of literature. The reference list was updated with literature identified in this chapter. In conclusion, based on the results of the analysis and comparison of the research findings to literature, an amended conceptual framework is created.

6.2 Research Question 1: Transitioning to carbon neutrality

6.2.1 Understanding carbon neutrality

The literature had an existing theme of understanding carbon neutrality as identified in Chapter 2. There was no need to take any further steps because a search of the relevant literature was adequate to compare the research findings in Chapter 5 from this theme to extant literature in Chapter 2. Net zero, carbon offsetting, carbon credits, and carbon neutrality were among the words that were targerted in the search.

6.2.1.1 Recap of the findings on understanding carbon neutrality

The four sectors have similar understandings of carbon neutrality. Academic Institution sector focuses on eliminating carbon dioxide emissions to zero, while mining sector targets reducing scope 1 and scope 2 emissions by at least 90%. Scope 1 and scope 2 emissions are internal company-controlled emissions, while scope 3 emissions are external from vendors and customers. Financial services sector focuses on implementing renewable energy sources to transition to carbon neutrality. Academic Institution sector supports offsetting measures and reducing greenhouse gas emissions. The Industry Association suggested reducing reliance on fossil fuels and replacing them with alternative green fuels to achieve carbon neutrality. The Industry Association also emphasized the importance of renewable energy sources in achieving carbon neutrality. The mining sector's transition to carbon neutrality is a key tool for achieving this goal.

6.2.1.2 Recap of the literature on understanding carbon neutrality

Carbon neutrality is defined as the carbon dioxide ($CO_{2)}$ emitted by humans in the atmosphere must equate to the carbon dioxide that is being removed by humans from the atmosphere, carbon neutrality is equated to net-zero emissions (IPCC, 2018). According to J. Chen (2021) carbon neutrality is to stop the increase of carbon dioxide in the atmosphere, which causes global warming and achieiving net-zero CO_2 emissions by balancing CO_2 emissions with its removal. Y. Wang et al. (2021) defined carbon neutrality as "at a given time to reach a state of global neutrality between CO_2 emissions by humans and the global CO_2 removal by humans" and net-zero emissions (greenhouse gas neutrality) was defined as "at a given time to reach a state of balance between the human-emitted greenhouse gases into the atmosphere and the greenhouse gases removed by humans from the atmosphere". Both sentiments tackle the balance between the emissions and removal of CO_2 by humans that would result in carbon neutrality or net-zero emissions. F. Wang et al. (2021) argued that it may be possible to end our reliance on fossil fuels by using the potential of renewable and carbon-neutral resources to generate energy and other fossil-based substitutes. Carbon neutrality can also be achieved through carbon offsett and buying of carbon credits or earning carbon credits. Carbon offset also known as carbon credit is a reduction in greenhouse gas emissions used to offset emissions from other sources, or an increase in carbon storage (for example, by planting trees or restoring damaged land). When further effort is put into lowering greenhouse gas emissions, carbon credits are granted (T. Chen et al., 2019).

Organisation should develop an emissions inventory; the inventory helps businesses identify all the emissions they produce throughout their value chain and concentrate their efforts on the biggest potential for reduction which will assist with the transitioning to carbon neutrality. The inventory is classified in three scopes from scope 1 to scope 3. The emissions from sources inside the organisations are included in these inventories (Scope 1), as are emissions resulting from using grid-supplied heat, steam, electricity, and/or cooling (Scope 2), and all other greenhouse gas emissions that happen outside the organisation because of activities occurring within the organisation (Scope 3) (Wiedmann et al., 2020).

6.2.1.3 Analysis of findings to literature on understanding carbon neutrality

The academic institution sector mentioned that carbon neutrality is the doing away with the emission of carbon dioxide to a point where there is no more emission being emitted, in the absence of that goal not being achieved the emitter must commit to covering the gap by offsetting the residual emission through buying carbon credits. The literature draws similarity from IPCC (2018) and J. Chen (2021) who concluded that carbon neutrality is to stop the increase of carbon dioxide emitted by humans in the atmosphere, which causes global warming and achieiving net-zero CO_2 emissions by balancing CO_2 emissions with its removal. Y. Wang et al. (2021) shared the same sentiments by defining carbon neutrality as “at a given time to reach a state of global neutrality between CO_2 emissions by humans and the global CO_2 removal by humans”.

The mining sector noted that there should be set targets in achieving carbon neutrality which would be at least reducing scope 1 and scope 2 emissions by at least by 90%. The participant further explained that scope 1 and scope 2 specifically refers to the internal emissions which are in control of the company whereas scope 3 emissions refer to external emissions from vendors and customers. Literature agrees to an extent that measuring and monitoring inventories enables the organization to set targets of reducing emissions by increasing efforts on their biggest potential of reduction. Literature also agrees to the definition of scope 1, 2 and 3, scope 1 being emissions emitted inside the organisation, scope 2 being emissions emitted from outside the organsition but used in the organisation such as grid-supplied heat, steam, electricity, and/or cooling and scope 3 being emissions emitted outside the organisation due to activities within the organisation including all other greenhouse gas emissions (Wiedmann et al., 2020).

The financial services and industry association sector noted that carbon neutrality can be achieved by implementing of renewable energy sources, reduction of the emissions of greenhouse gases and by the reduction of reliance on the use of fossil fuels and substitute the fossil fuel with alternative green fuel. F. Wang et al. (2021) through literature concurred the findings that it may be possible to end our reliance on fossil fuels by using the potential of renewable and carbon-neutral resources to generate energy and other fossil-based substitutes.

Findings from the academic sector mentioned that carbon neutrality is doing away with the emission of carbon dioxide to a point where there is no more emission being emitted and in the absence of that goal not being achieved the emitter must commit to covering

the gap by offsetting the residual emission through buying carbon credits. T. Chen et al. (2019) through literature noted that carbon credits is accorded when there are further efforts by an organization into lowering greenhouse gas emissions that can be offset against emissions from other sources.

6.2.1.4 Conclusion on understanding carbon neutrality

The research findings about how people understand carbon neutrality was similar to those found in extant literature, with little variation in terms of definition or methods required to reach carbon neutrality. The research findings supported the understanding of carbon neutrality found in the body of existing literature (IPCC, 2018; J. Chen, 2021 and Y. Wang et al., 2021). The research findings also supported the necessity of measuring carbon emissions in order to achieve carbon neutrality, and they indicated that efforts ought to be directed toward areas with higher rates of greenhouse gas emission reduction (Wiedmann et al., 2020). The research findings further supported the idea that using carbon-neutral and renewable resources could eventually replace fossil fuels (F. Wang et al., 2021). The research findings also supported the idea that more efforts to reduce greenhouse gas emissions could be rewarded with carbon credits (T. Chen et al., 2019). The theme understanding carbon neutrality is an extant theme identified in Chapter 2, the research findings identified similarities to extant literature, even though no differences were identified, it is therefore a potential expansion to the body of knowledge.

6.2.2 RQ1: Subtheme1 – External drivers: Coercive pressure – Communities' approvals

The communities' approvals subtheme is a potential new subtheme identified in Chapter 5, it stems from the coercive pressure theme and its role relates to the the extent of pressure being exerted by the communties on achieving carbon neutrality.

6.2.2.1 Recap of the findings on communities' approvals

Mining operations must make the shift to sustainable mining, which will undoubtedly guarantee their continued economic success while taking care of the environment and the planet's inhabitants. Only if sustainable mining is included in the mining operations strategy will these initiatives be successful. The communities in which traditional mining

operations operate stand to lose out if mining operations continue in this manner. Traditional mining, in particular, relies heavily on fossil fuels for its vehicles and equipment, as well as coal-aided electricity for its operations.

Even though it was mentioned that Namibia as a nation emits relatively little greenhouse gas emissions, especially in the mining industry, Namibia cannot be left out of the global effort to become carbon neutral. Relentless droughts are one way that communities experience the effects of climate change, so policies that would mitigate these effects are favored. People who live close to the mines therefore put pressure on the industry to make sure that mining operations are carried out in a way that is safe, ethical, and environmentally responsible. Communities have the authority and clout to restrict business licenses to those that give the environment and their citizens first priority. Communities prefer to work with mining companies that guarantee their economic well-being long after the mine closes and have sustainable plans beyond that time. It is essential that mining companies choose to become carbon neutral in order to gain community support for their operations.

6.2.2.2 Recap of the literature on communities' approvals

Chapter 2's review of the key literature contained no evidence of the communities' approval subtheme. The three-step procedure outlined in section 6.1 above will be used to find additional literature that could be compared to the research findings.

Step 1 – The researcher chose three published articles from the body of literature already reviewed in Chapter 2, then performed a word search for the subtheme of communities' approval. The following articles identified from Chapter 2 were selected and reveiwed: Zhang et al. (2022), Jones et al. (2018) and Gong et al. (2018). The key words used for the search were: "approval", "approv", "buy-in", "consent", "consensus", "agreement", "agree", "autorization", "authori", "safe", "protect" and "support".

The word "consensus" was found in Zhang et al., (2022) but had no relevance to the subtheme being explored. Matches of the following words were found in the Jones et al., (2018) article: "safe" and "consensus". Revelant matches to the subtheme found in Gong et al. (2018) were: "buy-in", "protect" and "agree".

Presenting key literature

Organisation should have profit-sharing program, policies on how the organisation acts towards a particular group and what the organisation does in terms of corporate social responsibility. The article further noted that were there is a difference consensus should be reached to resolve the difference (Jones et al., 2018). In addition to reviewing their operations and products to provide more environmentally friendly goods and services, businesses should also consider the social aspects of sustainability, such as community outreach and safety. Businesses should spread awareness and educate customers about environmental protection and persuade buy-in to work toward long-term sustainable objectives (Gong et al., 2018).

6.2.2.3 Analysis of findings to literature on communities' approvals

The mining sector noted that communities are vulnerable, and they should always be protected, and this protection should also include the protection of the envrionment, biodiversity and the well being of people. The academic institution sector also noted similarities with regards to the protection of the environment, while the financial services sector was concerned about the negative impacts on the environment which boils down to the protection of the environment. Findings confirmed literature as it mentioned that organisation should have policies that protects the communities from the organsition (Jones et al., 2018) and awareness should be raised about environmental protection (Gong et al., 2018).

The research findings confirmed literature from industry association that that the well-being of the community is taken care of beyond the life of mine, Jong et al. (2018) agrees that organisations should have profit-sharing program and that they should also implement corporate social responsibility programmes that targets the inhabitants. There are also similarities from Gong et al. (2018) who shares that the the organistions should review their operations and ensure that they are providing goods and services that are environmentally friendly, and that they should consider the social aspects of sustainability such as the community outreach and safety. a potential nuance of difference was identified by findings at the detail level, the literature refers to the protection of environment through raising awareness through policy (Jones et al., 2018 and Gong et al.,2018) while the findings refer to the initiatives of the protection the environment and not just raising awareness through policy.

6.2.2.4 Conclusion on communities' approvals

The evidence from research findings on communities' approval was focused on the protection of the community and the environment and ensuring that the well-being is protected at all items and beyond the life of mine. These revealed similarities to literature with no differences at topic level in the protection of the communities including their well being and the protection of the environment. The research findings at topic level were confirmed by literature (Jones et al., 2018 and Gong et al.,2018). a potential nuance of difference was identified by findings at the detail level, the literature refers to the protection of environment through raising awareness through policy (Jones et al., 2018 and Gong et al.,2018) while the findings refer to the initiatives of the protection the environment and not just raising awareness through policy.

Considering that the subtheme was highlighted as potential new subtheme in Chapter 5, the subtheme of communities' approval will remain a potential new theme due to the nuance of difference identified by findings. Furthermore, research findings and extant literature noted that community approvals had more mention of community and environmental protection rather than communities' approval, the subtheme will be updated to "community and environment protection" through a name change of the subtheme in the amended conceptual framework at the end of this chapter. No need for a new subtheme as identified by the nuance of difference as it is well covered in the updated new theme of community and environmental protection. The subtheme of community and environmental protection was updated on the amended conceptual framework at the end of this chapter. Given the similaries in research findings and literature at topic level and a nuance of difference at detail level in section 6.2.2.3 and change of name the subtheme will be highlighted in light blue and will be updated in the amended conceptual framework at the end of this chapter. The amendments and the nuance of difference identified are therefore a potential expansion to the body of knowledge.

6.2.3 RQ1: Subtheme2 – External drivers: Coercive pressure – Government / Legislation

The government and legislation subtheme is a potential new subtheme identified in Chapter 5, it stems from the coercive pressure theme and its role relates to the extent of pressure being exerted by the government through legislation on transitioning to carbon neutrality.

6.2.3.1 Recap of the findings on government and legislation

The three sectors namely, academic institution, indusry association, and mining, noted that government can exert some coercive pressure to transitioning to carbon neutrality through implemention of laws and regulations. They noted that government is key stakeholder for the transitioning. Government can implement environmental laws and regulations that would drive companies to transitioin to carbon neutrality.

The mining and industry association sectors noted some differences that even though the government should implement enforceable laws and regulations for the transitioning to carbon neutrality, the government should also be able to provide the primary infrastrucure to aide the transitioning. The other difference pertains to that although the government is proactive in establishing green hydrogen sector which addresses climate change problems, they believe that the efforts of transitioning are more in compliance with external forces who are driving the climate change agenda, rather than their own initiatives, they believe that the government faces more pertinent issues such as addressing proverty, unemployment, etc., as opposed to the transitioning to carbon neutrablity which is more an issue in developed countries.

6.2.3.2 Recap of the literature on government and legislation

Coercive pressures refer to pressures that are forced for implementation through laws, regulations and policies, these are usually exerted by government authorities and big clients who are usually instrumental (Di Maggio & Powell, 1983). In achieving carbon neutrality coercive pressures is considered effective for firms to follow as they are forced to follow regulations (Dhanda et al., 2022). Achieving carbon neutrality requires a great level of government involvement to ensure that laws and regulations are implemented that can positively impact the emissions reduction (Yuan et al., 2022).

6.2.3.3 Analysis of findings to literature on government and legislation

The participants from the academic institution, industry association and mining sectors, all asserted that the government could exert coercive pressure through legislation, laws and regulations to enable the transitioning to carbon neutrality. The reseach findings were confirmed by extant literature that achieving carbon neutrality would require great

level of involvement from government through laws and regulations (Dhanda et al., 2022 and Yuan et al., 2022). A potential nuance of difference was identified by findings from a Namibian setting, that to enable successful transitioning to carbon neutrality requires government to provide primary infrastructure which are currently not available and secondly that transitioning to carbon neutrality is not a pertinent issue for Namibia as opposed to developed countries, considering the minimal carbon emissions from a Namibian context.

6.2.3.4 Conclusion on government and legislation

The evidence on government and legislation was focused on coercive pressure being extered by government through legislation, laws and regulations to enable the transitioning to carbon neutrality. These revealed similarities to literature with no differences. The research findings were confirmed by literature (Dhanda et al., 2022 and Yuan et al.,2022). The subtheme of government and legislation was highlighted as an extant subtheme in Chapter 5, the research findings identified similarities to extant literature, it is therefore a potential expansion to the body of knowledge. Given the similaries in research findings and literature in section 6.2.3.3, the subtheme will no longer be highlighted and will be updated as an extant theme in the amended conceptual framework at the end of this chapter. A potential nuance of differences was identified by findings that successful transitioning to carbon neutrality requires government to provide primary infrastructure and transitioning to carbon neutrality is not a pertinent issue for Namibia. Provision of primary infrastruture by government and government prioritization of pertinient issues would be recorded as a new subtheme under the normative pressure and challenges of transitioning themes, respectively, in the amended conceptual framework at the end of this chapter.

6.2.4 RQ1: Subtheme3 – Transitioning to carbon neutrality: Opportunities of transitioning – Opportunity for new skills and employment in the industry

The opportunities for new skills and employment in the industry subtheme is a potential new subtheme identified in Chapter 5, it stems from the transitioning to carbon neutrality theme and its role relates to potential of new skills set and employment resulting from the transitioning to carbon neutrality.

6.2.4.1 Recap of the findings on opportunity for new skills and employment in the industry

The mining sector is transitioning to renewable energy sources, such as solar and wind power plants, to power their operations and feed excess into the national grid. This shift is fostering the development of new skills and job opportunities in the sector. The sector also acknowledges the need for new technology and skills, which will be required for the introduction of new technology and job creation. The shift towards carbon neutrality, which includes carbon capturing, will also lead to new jobs, education, and skill sets. Suppliers will have the opportunity to create and innovate new products and acquire new skills through research and innovation. The sector advocates for developing necessary skill sets in the country of operations rather than importing them from abroad.

6.2.4.2 Recap of the literature on opportunity for new skills and employment in the industry

Chapter 2's review of the key literature contained no evidence of the opportunity for new skills and employment in the industry subtheme. The three-step procedure outlined in section 6.1 above will be used to find additional literature that could be compared to the research findings.

Step 1 – The researcher chose three published articles from the body of literature already reviewed in Chapter 2, then performed a word search for the subtheme of opportunity for new skills and employment in the industry. The following articles identified from Chapter 2 were selected and reveiwed: Zhang et al. (2022), Jones et al. (2018) and Gong et al. (2018). The key words used for the search were: “opportunity”, “opportun”, “skill”, “opportunity”, knowledge”, “job”, “work”, “employment”, and “employ”.

No matching words were found in Zhang et al. (2022). The following words: “opportun”, “skill”, “job”, “knowledge”, “work” and “employ” were found in Jones et al. (2018) and Gong et al. (2018) but had no relevance to the subtheme being explored. No relevant literature was found in step 1, the researcher explored step 2.

Step 2 – The following scholars were selected using the same word searches as listed in step 1: Abraham Zhang, Haydn Burke and Kanwalroop Kathy Dhanda.

The below articles were reviewd:

Scholar	Article
Abraham Zhang	Zhang et al., (2022a)
Kanwalroop Kathy Dhanda	Dhanda and Malik (2020)
Haydn Burke	Burke et al., (2023)

Although matching words were found in the Zhang et al., (2022a) and Dhanda and Malik (2020) articles, the literature did not relate to the subtheme being explored. Matches of words with relevance to the subtheme were found in the Burke et al. (2023) article.

Presenting key literature

The article of Burke et al. (2023) relates to the “intergrating product design and supply chain management for a circular economy”. Circular economy offers a different development model to the prevalent take-make-dispose linear approach, and with it, a fresh perspective on resolving sustainability-related issues. The article is relevant due to the topic being researched of achieving carbon neutrality as it also provides a perspective on resolving sustainability challenges.

As a result, unlike linear economies, products created with the principles of circular economy are the solution, not the cause, for the ecosystem. In addition to improving environmental performance through waste reduction and biological decomposition, the products and their embedded resources in the circular system create economic opportunities (e.g., reduction in production and procurement costs) and create jobs in both high-skill and low-skill areas. Transitioning into circular economy demonstrated the potential shifts in employment and the new labor skill requirements (Burke et al., 2023).

6.2.4.3 Analysis of findings to literature on opportunity for new skills and employment in the industry

From the research findings in Chapter 5 the mining and industry association sectors noted that the transitioning to carbon neutrality provides an opportunity for new technology, new skills, and provision of employment in the industry. Findings confirmed literature that transitioning provides an opportunity for improving environmental performance as well as creating economic opportunities. The findings further confirmed literature that transitioning provides a potential shift in employment by providing new

employment opportunities and brings along the element of acquiring new skills sets (Burke et al. 2023).

6.2.4.4 Conclusion on opportunity for new skills and employment in the industry

The evidence from participants on opportunity for new skills and employment in the industry was focused on potential employment and new skills set that could be achieved with the transitioning to carbon neutrality. These revealed similarities to literature with no differences noted. Literature noted that transitioning provides potential for employment and new skills while at the core is the protection of the environment. The research findings were confirmed by literature (Burke et al., 2023).

Considering that the subtheme of opportunity for new skills and employment in the industry was highlighted as potential new subtheme in Chapter 5, but no differences between findings and literature about the subtheme noted, the subtheme is no longer considered as a potential new subtheme, but it is still considered as a potential expansion to the body of knowledge. Given the similaries in research findings and literature in section 6.2.4.3, the subtheme will no longer be highlighted and will be updated as an extant theme in the amended conceptual framework at the end of this chapter.

6.2.5 RQ1: Subtheme4 – Transitioning to carbon neutrality: Challenges of transitioning – Lack of buy-in

The lack of buy-in subtheme is a potential new subtheme identified in Chapter 5, it stems from the challenges of transitioning theme and its role relates to potential resistance of transitioning to carbon neutrality.

6.2.5.1 Recap of the findings on lack of buy-in

The research findings emphasized the importance of transitioning to carbon neutrality, but identified challenges due to lack of buy-in. The findings emphasized the need to contribute to the global agenda and build resilience to climate change challenges. However, research findings noted differences in the lack of infrastructure, people's aversion to carbon neutrality, and industry targeting for emissions reduction. From a country perspective, the emissions currently released do not justify prioritizing transitioning to carbon neutrality. They believe that even achieving zero emissions would

not be significant enough to curb global warming challenges. The findings emphasized the need for role players to be educated about the importance of addressing climate change challenges, and that small steps or contributions can contribute to reducing the impacts of climate change and reducing the rate at which the world increases global average temperatures to within 1.5°C pre-industrial levels.

6.2.5.2 Recap of the literature on lack of buy-in

Chapter 2's review of the key literature contained no evidence of lack of buy-in to transitioning to carbon neutrality subtheme. The three-step procedure outlined in section 6.1 above will be used to find additional literature that could be compared to the research findings.

Step 1 – The researcher chose three published articles from the body of literature already reviewed in Chapter 2, then performed a word search for the subtheme of lack of buy-in. The following articles identified from Chapter 2 were selected and reveiwed: Zhang et al. (2022), Jones et al. (2018) and Gong et al. (2018). The key words used for the search were: “buy-in”, “change management”, “change”, “resistance”, and “resist”.

No matching words relevant to the subtheme were found in Jones et al. (2018) and Gong et al. (2018). Matches relevant to the subtheme were found in Zhang et al. (2022). The matches in Zhang et al. (2022) were incorporated in the presentation of key literature below. The Zhang et al. (2022) article did not provide sufficient data for the analysis of the research findings to literature, therefore researcher explored step 2.

Step 2 – The following scholars were selected using the same word searches as listed in step 1: Abraham Zhang, Haydn Burke and Kanwalroop Kathy Dhanda.

The below articles were reviewd:

Scholar	**Article**
Abraham Zhang	Zhang et al., (2022a)
Kanwalroop Kathy Dhanda	Dhanda and Malik (2020)
Haydn Burke	Burke et al., (2023)

No matching words relevant to the subtheme were found in the Dhanda and Malik (2020) article. Matches of words with relevance to the subtheme were found in the Burke et al.

(2023) and Zhang et al. (2022a) articles.

Presenting key literature

Since people are accustomed to the conventional ways of thinking and conducting business, resistance to change is frequently one of the biggest obstacles in business improvement initiatives (Burke et al., 2023). The biggest obstacle organisations encounters are the unwillingness of some of its suppliers and consumers to accept the necessity of making the switch to carbon neutrality (Zhang et al., 2022a). There might be some pushback when adjustments and transformations are needed during the transition due to power dynamics in the supply chain. Resistance and pushback are common when dealing with mega-vendors. Thus, to maintain decarbonization efforts, cooperative partnerships with value-aligned supply chain partners are crucial (Zhang et al., 2022). Some businesses have a "resistant mindset" which prevents them from seeing the urgency or significance of becoming carbon neutral. This barrier may stem from a mindset of disbelief or disregard for climate change, but it can also be partially attributable to a lack of awareness of emissions-related environmental issues (Zhang et al., 2022 and Zhang et al., 2022a). Updating organizational vision and missions in accordance with sustainability principles is something that the top management team should do. This will enhance employee buy-in to the implementation of circular economy principles and significantly lessen resistance to the additional workload to the employees that comes with circular economy development (Burke et al., 2023). Due to variations in the availability of renewable energy sources, emissions intensity, industrial structure, and infrastructure, each country's route to carbon neutrality is probably going to be different (Zhang et al., 2022a).

6.2.5.3 Analysis of findings to literature on lack of buy-in

All four sectors noted similarities in the chanllenges that relates to buy-in when it comes to the topic of transitioning to carbon neutrality. Findings confirmed literature that people prefer conventional ways of conducting business which makes resistance to change an obstacle in business improvement initiatives (Burke et al., 2023). Research findings noted a lack of awareness with regards to where the emissions should be reduced, current emissions being insignificant, and a lack of enthusiasm. Findings confirmed literature that there is lack of awareness of emissions-related environmental issues and no urgency or significance of becoming carbon neutral, which makes it a challenge for transitioning to carbon neutral. Research findings noted that a lack of infrastructure leads

to the the lack of buy-in to transitioning. Literature reviewed noted each country route to carbon neutrality is unique and availability of infrastracture is vital to the transitioning to carbon neutrality (Zhang et al., 2022a).

6.2.5.4 Conclusion on lack of buy-in

The evidence from research findings on lack of buy-in noted that there is resistance to transition to carbon neutrality due to lack of awareness of the impact of carbon emissions, preference of conducting business the traditional way, avoiding changes and no urgency of transitioning to carbon neutrality. Lack of infrastructure was also highlighted as a hinderance to the transitioning to carbon neutrality. These revealed similarities to literature with no differences noted. The research findings were confirmed by literature (Burke et al., 2023; Zhang et al., 2022 and Zhang et al., 2022a).

Considering that the subtheme of lack of buy-in was highlighted as potential new subtheme in Chapter 5, but no differences between findings and literature noted about the subtheme, the subtheme is no longer considered as a potential new subtheme, but it is still considered as a potential expansion to the body of knowledge. Given the similaries in research findings and literature in section 6.2.5.3, the subtheme will no longer be highlighted and will be updated as an extant theme in the amended conceptual framework at the end of this chapter.

6.2.6 RQ1: Subtheme5 – Transitioning to carbon neutrality: Challenges of transitioning – Lack of skills and knowledge

The lack of skills and knowledge subtheme is a potential new subtheme identified in Chapter 5, it stems from the challenges of transitioning theme and its role relates to the non-existant expertise, understanding and knowledge required for transitioning to carbon neutrality.

6.2.6.1 Recap of the findings on lack of skills and knowledge

Namibia's mining and academic institutions sectors have highlighted the country's lack of knowledge and enthusiasm for carbon neutrality, a topic in its infancy. They also noted a lack of research and enthusiasm for the subject. To successfully transition to carbon neutrality, a well-informed nation is needed, and individuals with the necessary

skills and knowledge are essential for this transition.

6.2.6.2 Recap of the literature on lack of skills and knowledge

Chapter 2's review of the key literature contained no evidence of lack of skills and knowledge needed for transitioning to carbon neutrality subtheme. The three-step procedure outlined in section 6.1 above will be used to find additional literature that could be compared to the research findings.

Step 1 – The researcher chose three published articles from the body of literature already reviewed in Chapter 2, then performed a word search for the subtheme of lack of skills and knowledge. The following articles identified from Chapter 2 were selected and reveiwed: Zhang et al. (2022), Jones et al. (2018) and Gong et al. (2018). The key words used for the search were: “skills”, “skill”, “knowledge”, and “awareness”.

No matching words relevant to the subtheme were found in Zhang et al. (2022), Jones et al. (2018) and Gong et al. (2018), because of that the researcher explored step 2.

Step 2 – The following scholars were selected using the same word searches as listed in step 1: Abraham Zhang, Haydn Burke and Kanwalroop Kathy Dhanda.

The below articles were reviewd:

Scholar	**Article**
Abraham Zhang	Zhang et al., (2022a)
Kanwalroop Kathy Dhanda	Dhanda and Malik (2020)
Haydn Burke	Burke et al., (2023)

No matching words relevant to the subtheme were found in the Dhanda and Malik (2020) and Burke et al. (2023) articles. Matches of words with relevance to the subtheme were found in the and Zhang et al. (2022a) articles.

Presenting key literature

Zhang et al. (2022a) agued that the knowledge and expertise needed for low-carbon logistics is lacking in emerging economies. The public's and organization personnel's lack of understanding, knowledge, and expertise of the concept of carbon neutrality

constituted an obstacle and hindered achieving carbon neutrality. The following stakeholder groups were affected by lack of expertise: suppliers, customers, workers, and consumers. Because they were unsure of how they would profit from carbon neutrality initiatives, stakeholders refrained from taking the risk by getting involved.

6.2.6.3 Analysis of findings to literature on lack of skills and knowledge

The research findinds noted that the topic of carbon neutrality is a nascent topic and there is lack of knowledge on the topic in Namibia. No evidence of research on the topic was noted from research findings in Namibia. Reseach findings noted low appetite on the topic of transitioning to carbon neutrality. The research findings confirmed literature that knowledge and expertise in low carbon is lacking in emerging economies. The research findings further confirmed literature that the lack of expertise and knoweledge hindered the apetitie of achieving carbon neutrality. A difference in literature from research findings was noted that stakeholders did not see the benefits of transitioning to carbon neutrality and that is why they refrained from embarking on the journey of transitioning to carbon neutrality (Zhang et al., 2022a).

6.2.6.4 Conclusion on lack of skills and knowledge

The evidence from research findings on lack of skills and knowledge noted that there is shortage of people with the necessary knowledge and expertise with regards to the concept of transitioining to carbon neutrality and this hindered the transitioning to carbon neutrality. The research findings confirmed literature and revealed similarities to literature with difference being noted in literature that stakeholders have zero understanding of the benefits of transitioning to carbon neutrality (Zhang et al., 2022a).

Considering that the subtheme of lack of skills and knowledge was highlighted as potential new subtheme in Chapter 5, but the research findings identified similarities to extant literature, therefore the subtheme is no longer regarded as a potential new subtheme, but it is still considered as a potential expansion to the body of knowledge. Given the similaries in research findings and literature in section 6.2.6.3, the subtheme will no longer be highlighted and will be updated as an extant theme in the amended conceptual framework at the end of this chapter.

6.3 Research Question 2: Carbon neutrality impact on firm performance

6.3.1 RQ2: Subtheme6 – Sustainabl value creation – Social justice

The social justice subtheme is a potential new subtheme identified in Chapter 5, it stems from the sustainable value creation theme and its role relates to that everyone merits equal possibilities in transitioning to carbon neutrality.

6.3.1.1 Recap of the findings on social justice

The four sectors of academia, financial services, industry association, and mining have all emphasized the importance of social justice in generating sustainable value. Academic institutions focused on job creation and sustainability, similarities were also noted in the financial services sector who acknowledged the potential for increased jobs and environmental benefits from transitioning to carbon neutrality. The two sectors emphasized the need to prioritize the welfare of the workforce and support local communities post-mine closure.

The industry association sector emphasized the importance of prioritizing people's welfare in operations and transitioning to carbon neutrality. It emphasized the need for resource conservation and careful mining with a future mindset.

The mining sector aimed at improving people's lives by bringing about positive social and environmental effects and linking it to their well-being. The mining sector noted that technology being developed aimed at reducing emissions which addresses workers' and communities' health and safety. The mining sector also recognized the growing trend of consumers becoming environmental activists and purchasing ethically sourced goods with low carbon emissions. From a social and environmental standpoint, becoming carbon neutral is the right course of action, and education about how carbon emissions contribute to climate change should be given where appropriate. By focusing on these factors, the transition to a more sustainable future can lead to improved social and environmental outcomes.

6.3.1.2 Recap of the literature on social justice

Chapter 2's review of the key literature contained no evidence of social justice for

transitioning to carbon neutrality subtheme. The three-step procedure outlined in section 6.1 above will be used to find additional literature that could be compared to the research findings.

Step 1 – The researcher chose three published articles from the body of literature already reviewed in Chapter 2, then performed a word search for the subtheme of social justice. The following articles identified from Chapter 2 were selected and reveiwed: Zhang et al. (2022), Jones et al. (2018) and Gong et al. (2018). The key words used for the search were: “social”, “justice”, “well-being”, and “welfare”.

No matching words relevant to the subtheme were found in Zhang et al. (2022) and Gong et al. (2018). Matches relevant to the subtheme were found in Jones et al. (2018). The matches in Jones et al. (2018) were incorporated in the presentation of key literature below. The idenftified article did not provide sufficient data for the analysis of the research findings to literature, therefore the researcher explored step 2.

Step 2 – The following scholars were selected using the same word searches as listed in step 1: Abraham Zhang, Haydn Burke and Kanwalroop Kathy Dhanda.

The below articles were reviewd:

Scholar	**Article**
Abraham Zhang	No relevant recent articles found
Kanwalroop Kathy Dhanda	No relevant recent articles found
Haydn Burke	No relevant recent articles found

These scholars' recent publications on carbon neutrality and social justice drivers did not contain any pertinent information. Therefore, the researcher explored step 3.

Step 3 – Using Boolean search string “carbon neutrality” and “social justice” the researcher conducted a search on Google Scholar for articles relevant to carbon neutrality and social justice drivers, the search was conducted for articles published between 2019 and 2023. The following relevant articles were found: L. Chen et al., (2022), Pulselli et al. (2021), Stern and Xie (2023).

Presenting key literature

Achieving carbon neutrality is one way that sustainable development can contribute to steady improvements in overall wellbeing and quality of life (Pulselli et al., 2021). Lowering carbon emissions brings significant benefits in terms of pollution, ecological restoration, biodiversity, and well-being (Stern and Xie, 2023).

Achieving carbon neutrality will primarily and directly help to reduce harmful environmental effects and slow the rate of global temperature rise (L. Chen et al., 2022).

People and their everyday lives are more important in the shift to a net-zero GHG economy than just technology and employment (Pulselli et al., 2021). Carbon neutrality will have a positive economic impact by promoting job growth in the clean and renewable energy sectors (L. Chen et al., 2022). Reaching carbon neutrality can reduce carbon emissions and promote growth in many other areas, including jobs, efficiency, demand, and many others (Stern and Xie, 2023).

6.3.1.3 Analysis of findings to literature on social justice

The research findings identified that the transitioning to carbon neutrality embodies the well being of people, both employees and the general community, with job creation being pointed as a vital driver of people's welfare. Scholars Stern and Xie (2023) and Pulselli et al. (2021) confirmed that achievining carbon neutrality improves the overall wellbeing and quality of life.

The research findings that carbon neutrality creates additional employment and sustains the environment drew similarities that shift to a net-zero greenhouse gas economy creates employment (Pulselli et al., 2021), this was also confirmed by L. Chen et al. (2022) that carbon neutrality promotes job growth in clean and renewable energy sector. Stern and Xie (2023) concurred that reaching carbon neutrality reduces carbon emissions but it also promote growth in many other areas including jobs.

Stern and Xie (2023) identified that achieving carbon neutrality increases demand, similarities were noted in the research findings that businesses should promote environmentally friendly sourcing, attracting demand from environmentally friendly customers.

The findings noted that carbon neutrality leads to the protection of environment, similarities noted from literature that acheving carbon neutrality reduces harmful environmental effects (L. Chen et al., 2022).

A potential nuance of difference in the findings and extant body of knowledge was indentified relating to the abolishment of the abundance mindset with regards to the extracting of minerals as it reduces the life of mine and have a potential to increase unemployment and could expedite environmental degradation.

6.3.1.4 Conclusion on social justice

The research findings confirmed that reaching carbon neutrality enhances people's quality of life and general well-being. It also demonstrated that achieving carbon neutrality results in more jobs being created. (Stern and Xie, 2023 and Pulselli et al., 2021). Reducing greenhouse gas emissions and reaching carbon neutrality improve environmental sustainability and lessen adverse environmental effects was confirmed by findings (Pulselli et al., 2021, L. Chen et al.,2022 and Stern and Xie, 2023). Findings also confirmed that becoming carbon neutral raises demand and that businesses should source ethically to draw in eco-conscious clients (Stern and Xie, 2023). A potential nuance of difference was identified by findings that the extraction of minerals is done with an abundance mindset, which has a detrimental effect on the environment, unemployment, and life of mine. It was determined that social justice is a potentially significant internal driver of carbon neutrality. If properly managed, social justice can address human wellbeing, safeguard the environment, and create jobs. It can also potentially draw in and retain customers, which will lead to the creation of sustainable value. The subtheme of social justice was highlighted as potential new subtheme in Chapter 5, but the research findings identified similarities to extant literature, therefore the subtheme is no longer regarded as a potential new subtheme, but it is still considered as a potential expansion to the body of knowledge. Given the similaries in research findings and literature in section 6.3.1.3, the subtheme will no longer be highlighted and will be updated as an extant theme in the amended conceptual framework at the end of this chapter. To abolish abundance mindset is a potential nuance of difference and would be recorded as a new subtheme under the sustainable value creation theme in the amended conceptual framework at the end of this chapter.

6.3.2 RQ2: Subtheme7 – External drivers: Mimetic pressure – Competitors / Industry

The competitors and industry subtheme is an extant subtheme identified in Chapter 2, it stems from the mimetic pressure theme and its role relates to pressures resulting from imitations, it relates to copying an opportunity which can result in a potential competitive advantage.

6.3.2.1 Recap of the findings on competitors and industry pressue

The research findings noted that businesses are starting the process of becoming carbon neutral or lowering their carbon footprint as a result of market pressure. Findings also noted that businesses are taking this action to ensure that they stay ahead of their rivals and benefit from the competitive edge that comes from switching to a lower carbon footprint. Lab-grown minerals sector asserts that they are manufacturing minerals with little to no carbon as an alternative to natural minerals, putting pressure on the natural minerals mining industry. As a result, it compels the natural mineral mining companies to reduce carbon emissions or move toward carbon neutrality to show their positive environmental impact. The mining sector also observed that, to compete from an environmentally conscious standpoint, natural mineral mining companies are forced to invest in the transition to carbon neutrality as a result of rivals' claims that they are producing zero or low carbon alternatives.

6.3.2.2 Recap of the literature on competitors and industry pressue

Mimetic pressures refer to pressures resulting from imitations, it relates to taking an opportunity which can impact a firm’s competitive advantage (Di Maggio & Powell, 1983). New initiatives like carbon reduction by early adopters can give a competitive advantage as this would lead to intimidation to other entities should the competitive advantage prevail and would force firms to imitate competitors (Zhang et al., 2022). Institutional legitimacy and competitive advantages could be achieved if the firms invest in green technology. It enhances the firm’s reputation which influence customers to do business with the firm. This could have a direct impact on the company’s economic value (Camilleri et al., 2023). Focus on energy restructuring by influential institutions with a consideration of cleaner energy can lead to carbon reduction which enhances the chances of reaching carbon neutrality (Yang & Liu, 2023). Influential institutions can apply pressures in that regard in return to offering some incentives to participants. A deliberate focus should be placed on energy consumption and energy structure by influential institutions, as an

increasing energy consumption should be countered with an increasing supply of clean energy (Yang & Liu, 2023). A drive of renewable energy by influential institutions has a direct impact on the reduced usage of greenhouse gases which results in the advancement of the goal to carbon neutrality (Yuan et al., 2022). Organizations committed to climate change should place emphasis on the development and growth of renewable energy as an alternative to other sources of energy which have detrimental effect on global warming (Lin & Zhu, 2019).

6.3.2.3 Analysis of findings to literature on competitors and industry pressue

The research findings confirmed literature that transitioning to carbon neutrality give early adopters a competitive advantage and that businesses transition to carbon neutrality due to market pressure (Yang and Liu, 2023 and Zhang et al., 2022). The mining sector noted that to compete from an environmentally conscious standpoint, companies are forced to invest in the transition to carbon neutrality as a result of rivals' claims that they are producing zero or low carbon alternatives, this was similar to Camilleri et al. (2023) confirmations that investing in green technology enhances the firm’s reputation which influence customers to do business with the firm which have a direct impact on the company’s economic value.

6.3.2.4 Conclusion on competitors and industry pressue

The findings supported extant literature that companies become carbon neutral due to market pressure and that early adopters gain a competitive advantage from this shift (Yang and Liu, 2023 and Zhang et al., 2022). Findings additionally validated extant literature that competitive pressure enhances a company's image and positively influences its economic worth (Camilleri et al., 2023). The subtheme of competitors and industry pressure is an extant subtheme identified in Chapter 2, the research findings identified similarities to extant literature, even though no differences were identified, it is therefore still considered a potential expansion to the body of knowledge.

6.3.3 RQ2: Subtheme8 – Transitioning to carbon neutrality: Challenges of transitioning – Short-term capital investments

The short-term capital investments subtheme is a new subtheme identified in Chapter 5, it stems from the challenges of transitioning theme and its role relates to initial capital

investments of transitioning to carbon neutrality.

6.3.3.1 Recap of the findings on short-term capital investments

The three sectors acknowledged that short-term capital investments will be necessary to cover the costs associated with the shift to carbon neutrality. It costs money to transition because you must convert your current assets/infrastructure into ones that are carbon neutrality compliant. Organizations are faced with a challenge because they would need to secure funding right away to make the switch to carbon neutrality. Businesses would have to redirect funds meant for other projects to make the switch to carbon neutrality. The financial performance of the company is negatively impacted by this because transitioning has higher short-term costs.

6.3.3.2 Recap of the literature on short-term capital investments

According to Chan et al. (2018) having a coordinated and collaborative approach towards carbon neutrality assists the firm with minimizing its own costs on the investment of achieving carbon neutrality. Transitioning to carbon neutrality requires a huge upfront investment which can have an impact on the firm's performance, but most entities foresee a long-term financial and environmental benefits. To reduce initial capital cost firms should exhaust finance options from entities who offer terms that are favorable to sustainability initiatives (Blum et al., 2021). Sustainability initiatives can also be achieved through collaborations with firms with the same drive towards sustainability or even competitors can collaborate in addressing a certain sustainable initiative, this has a direct impact on the cost involved. In terms of carbon neutrality, entities who operates in the same sector or segment could collaborate in coming up with a common standard, policy or emission reports (Camilleri et al., 2023). To effectively assess the investment cost on decarbonization it is essential to acquire advanced technologies which are vital in assessing and measuring the firms targets and producing timely reports on aspects of carbon neutrality (Bai & Sarkis, 2020). There could be requirements in future to report on the firm's emissions throughout its business, this would require short-term investments with long-term benefits both economic and environmental. With the global agenda on climate change, customers of the future would prefer doing business with firms who are environmentally friendly thus impacting the firm's revenue (Zhang et al., 2022).

6.3.3.3 Analysis of findings to literature on short-term capital investments

The research findings supported extant literature that a firm's performance may be impacted by the upfront capital investment needed to transition to carbon neutrality (Blum et al., 2021 and Chan et al., 2018). The findings corroborated extant literature that recommended using financing options to cover the initial capital costs in order to manage the impact on firm's performance during the transition to carbon neutrality (Blum et al., 2021).

6.3.3.4 Conclusion on short-term capital investments

The research findings supported extant literature that transitioning requires short-term funding, which can be obtained through financing options and affects the bottom line of the company (Blum et al., 2021 and Chan et al., 2018). The subtheme of short-term capital investments was highlighted as potential new subtheme in Chapter 5, but the research findings identified similarities to extant literature, therefore the subtheme is no longer regarded as a potential new subtheme, but it is still considered as a potential expansion to the body of knowledge. Given the similaries in research findings and literature in section 6.3.3.3, the subtheme will no longer be highlighted and will be updated as an extant theme in the amended conceptual framework at the end of this chapter.

6.3.4 RQ2: Subtheme9 – Internal driver: Potential benefits – To achieve long-term economic benefits

The subtheme to achieve long-term economic benefits is an extant subtheme identified in Chapter 2, it stems from the potential benefits theme and its role relates to enduring financial gains due to transitioning to carbon neutrality.

6.3.4.1 Recap of the findings on achieving long-term economic benefits

All four sectors agreed that companies that starts early the process of becoming carbon neutral will eventually reap financial rewards. Since alternative energy sources are thought to be less expensive in the long run than the conventional energy sources currently in use, the operational costs would go down. Research finding also mentioned that since they only have one supplier of electricity, there is no competition and an

unabatedly high price for electricity. The energy sector would experience competition from renewable energy sources, which would be advantageous since it would prevent unwarranted price increases. There could be long-term economic benefits from the shift to carbon neutrality, according to all four sectors.

6.3.4.2 Recap of the literature on achieving long-term economic benefits

Businesses should investigate all available financing options from organizations that provide terms that support sustainability initiatives in order to lower their initial capital costs (Blum et al., 2021). The ultimate benefit is the long-term incentives of becoming carbon neutral, as future consumers will choose to do business with companies that protect the environment, which will boost revenue (Zhang et al., 2022). Over time, alternative energy sources typically result in lower costs due to their reduced operational expenses and ability to control coal consumption (Wu et al., 2022). This is since providing decarbonized electricity is typically less expensive than providing fuels (Williams et al., 2021). While market power at decentralized power markets has been demonstrated in several countries, a large market share does not always indicate market power, even though market competitiveness is monitored by energy authorities. A new demand source with competitive pricing could be created by switching to renewable energy sources (Ekholm and Virasjoki, 2020).

6.3.4.3 Analysis of findings to literature on achieving long-term economic benefits

According to research findings, businesses that make the switch to carbon neutrality will eventually see financial benefits. The findings supported extant literature showing that, despite the significant upfront costs associated with transitioning, which may have a negative short-term effect, transitioning entities will reap long-term financial rewards (Blum et al., 2021). Zhang et al. (2022) concurred with findinds that businesses that made the switch to carbon neutrality would reap long-term rewards, pointing out that clients in the future will favor doing business with environmentally conscious companies, positively influencing demand, and generating higher profits. Research findings confirmed extant literature that alternative energy sources are less expensive in the long run than the conventional energy sources currently in use, the operational costs would go down and also regulate the amount of coal consumed (Wu et al., 2022). Williams et al. (2021) supported findings that the the shift from fuel-using to electric technology is driven by final energy cost which is generally less expensive. Research findings have

confirmed extant literature that reliance on a single electricity-supplier provides no competition and an unabatedly high price for electricity. Ekholm and Virasjoki, (2020) agreed that energy sector is usually controlled by a large single producer who influence pricing to their own advantage. Research findings supported extant literature that renewable energy sources are a game changer when it comes to electricity prices and this could lead to competition which would be advantageous to the end user (Ekholm and Virasjoki, 2020 and Kuik et al., 2019).

6.3.4.4 Conclusion on achieving long-term economic benefits

Research findings confirmed literature that businesses transitioning to carbon neutrality will eventually benefit financially, despite initial costs (Blum et al., 2021). (Zhang et al., 2022) supported findings that clients will favor environmentally conscious companies, influencing demand and generating higher profits. Findings confirmed extant literature that alternative energy sources are generally less expensive in the long run, reducing operational costs and regulating coal consumption (Wu et al., 2022). Similarities were also drawn between findings and extant literature that reliance on a single electricity supplier provides no competition and high electricity prices and that renewable energy sources could lead to competitive prices (Ekholm and Virasjoki, 2020 and Kuik et al., 2019). The subtheme of achieving long-term economic benefits is an extant subtheme identified in Chapter 2, the research findings identified similarities to extant literature, even though no differences were identified, it is therefore a potential expansion to the body of knowledge.

6.3.5 RQ2: Subtheme10 – Internal driver: Potential benefits – To achieve environmental benefits

The subtheme to achieve environmental benefits is an extant subtheme identified in Chapter 2, it stems from the potential benefits theme and its role relates to resulting benefits from the proctection of the environment.

6.3.5.1 Recap of the findings on achieving environmental benefits

Research findings note that the transitioning to carbon neutrality would results in the reduction of carbon emissions into the atmosphere which is a positive environmental benefit. The findings further noted that the reductions of the impact to climate changes

because of emissions of greenhouse gases is also a potential benefit for the environment, this would result in improved water and air quality which ahave a ripple effect on the health and well being of people. The mining sector noted that the shifting of mindset that resource supplies are in abundance would assist in ensuring that resources are preservered for future use and the environemnt would not be deteriorated at an expidited rate. The life cycle would be expanded due to preserving the environment. The transitioning to carbon neutrality would achieve the benefit of reducing the impact of climate change. Research findings noted that transitioning to carbon neutrality have a potential for achieving environmental benefits.

6.3.5.2 Recap of the literature on achieving environmental benefits

Yao et al. (2021) expanded to the traditional evaluation of firm performance to include social and environmental benefits in extension to profitability, return on investment and measuring of solvency of the firm. According to J. Chen (2021) carbon neutrality is to stop the increase of carbon dioxide in the atmosphere, which causes global warming and achieiving net-zero CO_2 emissions by balancing CO_2 emissions with its removal. To contribute to the environment and societies wellbeing, carbon neutrality has been considered as a driver to sustainability (Zhang et al., 2022). When compared to conventional petroleum-fueled vehicles, electric vehicle technology has demonstrated strong performance and a bright future in addressing the issues of energy scarcity and air pollution (Su et al., 2021). The concentration is predicted to significantly decrease between 2020 and 2060 as a result of the implementation of stronger energy industry restructuring driven by low-carbon policies and end-of-pipe controls driven by environmental policies. This will have a positive impact on human health through improved air quality (X. Shi et al., 2021). The global green and low-carbon transformation has a general direction that has been established by the Paris Agreement, which also outlines the necessary course of action to preserve the environment and ensure human survival. In order to accomplish this, all nations should strive to reach their global emissions peak as soon as possible. If this is done, there is a chance that the world will be carbon neutral by the middle of the century (Zhao et al., 2022).

6.3.5.3 Analysis of findings to literature on achieving environmental benefits

Research findings have confirmed extant literature that transitioning to carbon neutrality would have a positive impact on the environment due to reduced emissions (Zhang et

al., 2022). J. Chen (2021) agreed to research findings that there is a potential benefit to the environment if the carbon dioxide which is released in the air is stopped to increase. Similaries were noted between research findings and literature that transitioning to carbon neutrality would result in improved water and air quality which would have a positive impact on human health and well being of people (Su et al., 2021 and X. Shi et al., 2021).

6.3.5.4 Conclusion on achieving environmental benefits

Research findings confirmed extant literature that transitioning to carbon neutrality positively impacts the environment by reducing emissions (Zhang et al., 2022) and that there may be an environmental benefit to lowering the rise in carbon dioxide released into the atmosphere (J. Chen, 2021). Research findings showed that the move toward carbon neutrality benefits human health, improves the environment, and is corroborated by the body of research (Su et al., 2021; X. Shi et al., 2021).The subtheme of achieving long-term economic benefits is an extant subtheme identified in Chapter 2, the research findings identified similarities to extant literature, even though no differences were identified, it is therefore a potential expansion to the body of knowledge.

6.3.6 RQ2: Subtheme11 – Transitioning to carbon neutrality: Partnering and collaboration – Partnering and collaboration in transitioning to carbon neutrality

The partnering and collaboration subtheme is a new subtheme identified in Chapter 5, it stems from the transitioning to carbon neutrality theme and its role relates to the impact and benefits of partnering and collaboration in transitioning to carbon neutrality.

6.3.6.1 Recap of the findings on partnering and collaboration in transitioning to carbon neutrality

The academic institution sector suggested that similar institutions should be involved in the transition to carbon neutrality, sharing knowledge and understanding to ensure success. The financial services sector emphasized the importance of everyone participating in the transition, as climate change impacts everyone. The mining sector noted that carbon neutrality provides an opportunity for entities who transition to partner with suppliers and suggested sharing a blueprint or template among stakeholders. The sector also noted that collectively, they can influence policies on climate change,

accelerating companies' adoption of carbon neutrality. This collective effort will help mitigate the impact of climate change.

6.3.6.2 Recap of the literature on partnering and collaboration in transitioning to carbon neutrality

Curbing climate change risks can only be achieved by joint contributions through global, national, firms and individuals' initiatives (Zhang et al., 2022). According to Chan et al. (2018) having a coordinated and collaborative approach towards carbon neutrality assists the firm with minimizing its own costs on the investment in achieving carbon neutrality. Sustainability initiatives can also be achieved through collaborations with firms with the same drive towards sustainability or even competitors can collaborate in addressing a certain sustainable initiative, this has a direct impact on the cost involved. In terms of carbon neutrality, entities who operates in the same sector or segment could collaborate in coming up with a common standard, policy or emission reports (Camilleri et al., 2023). The cost of committing to carbon neutrality can be massive but this can be controlled if a coordinated and collaborative approach is taken and favourable finance options exhausted (Blum et al., 2021; Chan et al., 2018). Investments in decarbonisation could be shared through supply chain collaboration and cost could be shared (Chan et al., 2018). Sustainability initiatives can easily be implemented because of influence from stakeholders (internal and external) and institutions (Cadez et al., 2019).

6.3.6.3 Analysis of findings to literature on partnering and collaboration in transitioning to carbon neutrality

The research findings noted that similar institutions should be involved in the transition to carbon neutrality, this was supported by extant literature that entities in the same sector or segment should collaborate by developing common standards, policies and reports (Camilleri et al., 2023). Zhang et al. (2022) and Chan et al. (2018) noted that joint efforts are required to achieving carbon neutrality, the extant literature was supported by research finding that it is very important for mass participation, as climate change impacts everyone. The research findings noted that a collective approach towards influencing policies that will help with the transitioning to carbon neutrality is vital, Cadez et al. (2019) supported the findings that sustainability initiatives can easily be implemented due to influence.

6.3.6.4 Conclusion on partnering and collaboration in transitioning to carbon neutrality

The research findings supported extant literature suggesting that related organizations work together to promote common standards, guidelines, and reports in order to make the transition to carbon neutrality (Camilleri et al., 2023). Findings further supported Zhang et al. (2022) and Chan et al. (2018), who noted that since everyone is impacted by climate change, collaborative efforts are essential for achieving widespread participation in curbing climate change challenges. A collaborative approach to policymaking is essential for attaining carbon neutrality, and research findings support the ease with which sustainability initiatives can be implemented as a result of this influence (Chan et al., 2018 and Cadez et al., 2019). The subtheme of partnering and collaboration was highlighted as potential new subtheme in Chapter 5, but the research findings identified similarities to extant literature, therefore the subtheme is no longer regarded as a potential new subtheme, but it is still considered as a potential expansion to the body of knowledge. Given the similaries in research findings and literature in section 6.3.6.3, the subtheme will no longer be highlighted and will be updated as an extant theme in the amended conceptual framework at the end of this chapter.

6.4 Research Question 3: Carbon neutrality impact on supply chain management

6.4.1 RQ3: Subtheme12 – Impact of transitioning – Impact of transitioning on supply chain management

6.4.1.1 Recap of the findings on impact of transitioning on supply chain management

The transition to carbon neutrality in supply chain management has been analyzed by various sectors, with some identifying commonalities and differences. Academic institutions suggest that the supply chain can lead the transition by setting goals. Financial services sector observed higher costs for suppliers during the transition, potentially leading to resistance and disruptions. However, the industry association suggested that the transition will provide resilience and independence, and in case of disruption, self-reliance due to product importation i.e. fossil fuel. The mining sector noted that the transition is helping suppliers understand the importance of carbon neutrality and improving relationships with customers. It also benefits businesses in managing supplier contracts regarding emissions. Organizations can prepare suppliers for the shift, enabling them to work together to reduce their carbon footprint. However,

the mining sector warned that the cost of the transition could potentially bankrupt small and medium-sized suppliers, who may face financial challenges in contrast to local beneficiation initiatives. Despite this, the shift offers an opportunity for collaboration to reduce climate change effects. Overall, the transition to carbon neutrality presents both opportunities and challenges for supply chain management.

6.4.1.2 Recap of the literature on impact of transitioning on supply chain management

Supply chain management refers to the effective management of the flow of goods and services from the supplier to the end user (Mentzer et al., 2001). Goal restrictions brought about by the shift to carbon neutrality are taken into account when making decisions and organizing supply chains (De and Giri, 2020). Top carbon-neutral companies can impart their knowledge to suppliers and customers, resulting in more decarbonization initiatives and the advantages of "supply chain learning" (Gong et al., 2018). Carbon emissions can be decreased by interacting with suppliers and customers through mimetic pressures (Di Maggio & Powell, 1983; Zhang et al., 2022). Leading industries can advocate for carbon neutrality transitions and influence stakeholders in their supply chain (Jia et al., 2019). Through supply chain cooperation, costs and investments in decarbonization could be shared (Chan et al., 2018). Implementing sustainable initiatives can be made much less expensive by partnering with businesses that share similar sustainability goals or that are competitors (Camilleri et al., 2023). Because of equipment replacement, clean energy costs, asset depreciation, and emission control laws, the transition to carbon neutrality can be expensive and negatively affect relationships with important clients (Zhong et al., 2020). The transition to carbon neutrality can be aided by increasing government financial investment, policy support, bank financing, and seeking foreign investment to get past the initial cost and financing challenges. (Wu et al., 2022). According to Broberg et al. (2013) and Rubashkina et al. (2015) (as cited in W. Liu et al., 2023, p. 5), the extra expenses related to compliance do not outweigh the potential advantages of environmental regulations for creative enterprises. Operations may suffer from higher short-term operating costs as a result of investing in technology, replacing equipment, and switching to low-carbon operations. (W. Liu and Wang, 2017). Despite their possible cost impact, the quick shift to carbon neutrality may put a strain on manufacturing capacity and encourage large investment in renewable energy units due to a number of factors (Zhuo et al., 2022). The substantial expense of becoming carbon neutral can be handled with a well-thought-out, cooperative strategy that makes use of advantageous financing alternatives (Blum et al., 2021; Chan et al., 2018). Establishing sustainable goals requires an organization to coordinate relationships with supply chain

participants in order to manage uncertainties and dependencies while fostering resilience. (Schnittfeld and Busch, 2016 and J. Shi et al., 2023). In particular, when multiple suppliers supply goods, smart supply chains help organizations manage resilience and mitigate uncertainty, lowering risk and making the transition to a resilient carbon neutral future (W. Liu et al., 2023). According to Dong et al. (2021) (as cited in W. Liu et al., 2023, p. 7), the implementation of carbon neutrality could force suppliers who already have relationships to look for new suppliers, which could lead to higher switching costs.

6.4.1.3 Analysis of findings to literature on impact of transitioning on supply chain management

According to research findings, supply chain leading firms can drive the transition by incorporating carbon neutrality targets into their operations (Jia et al., 2019). This is corroborated by literature that suggested targets should be taken into account when making decisions (De and Giri, 2020; Schnittfeld and Busch, 2016; J. Shi et al., 2023). Research findings noted that organizations can benefit through transitioning by engaging and managing their customers and suppliers, including their contracts, findings confirmed literature, which noted that major companies can lead the transition by involving stakeholders in their supply chain to achieve carbon neutrality (Di Maggio & Powell, 1983, Zhang et al., 2022, and Gong et al., 2018). The results of the research supported extant literature that transitioning offers a chance to mitigate the effects of climate change through cooperation and partnership, while also strengthening ties with stakeholders and sharing the transitioning costs (Camilleri et al., 2023 &Chan et al., 2018). According to Dong et al. (2021) (as cited in W. Liu et al., 2023, p. 7), businesses that already have relationships with suppliers will incur switching cost while higher short-term costs will be incurred as a result of the quick shift to carbon neutrality and investments in necessary equipment and technology (Zhong et al., 2020; W. Liu and Wang, 2017 & Zhuo et al., 2022). There are similarities between research findings and existing literature on the high cost of transitioning. According to research findings and supporting literature, the shift gives companies the chance to manage dependencies and uncertainties while constructing resilience to reduce and mitigate risk of reliance on single supplier and importation (Schnittfeld and Busch, 2016; J. Shi et al., 2023 & W. Liu et al., 2023). As per the existing literature, Broberg et al. (2013) and Rubashkina et al. (2015) (as cited in W. Liu et al., 2023, p. 5) have observed that although the short-term cost of transitioning was high, it does not surpass the possible advantages for the environment. Blum et al. (2021) & Chan et al. (2018) that government support and initiatives, as well as favorable financing options, can help control the cost (Wu et al.,

2022). There was a potential nuance of difference identified in the research findings that, in contrast to the local beneficiation, the high cost of making the switch to carbon neutrality may have a potential financial impact on small and medium-sized businesses (SMEs) in the area. All things considered, supply chain management faces both opportunities and challenges as a result of the shift to carbon neutrality.

6.4.1.4 Conclusion on impact of transitioning on supply chain management

Research findings confirmed literature that supply chain leaders can drive the transition to carbon neutrality by incorporating targets into their operations (Jia et al., 2019; De and Giri, 2020; Schnittfeld and Busch, 2016 & J. Shi et al., 2023). Accoding to literature and confirmed by research findings, transitioning to carbon neutrality can be achieved by engaging and managing customers and suppliers, including their contracts. Findings also confirmed that major companies can lead the transition by involving stakeholders in their supply chain to achieve carbon neutrality (Di Maggio & Powell, 1983, Zhang et al., 2022, and Gong et al., 2018). Literature noted that transitioning offers a chance to mitigate climate change effects through cooperation and partnership, strengthening ties with stakeholders, and sharing transitioning costs (Camilleri et al., 2023 &Chan et al., 2018), this was corraborated by research findings. However, extant literature was confirmed by research findings that businesses with existing relationships with suppliers may incur switching costs and businesses will incur higher short-term costs due to the quick shift to carbon neutrality and investments in necessary equipment and technology (Zhong et al., 2020; W. Liu and Wang, 2017 & Zhuo et al., 2022). Government support and initiatives can help control the cost (Blum et al., 2021; Chan et al., 2018 & Wu et al., 2022). A potential nuance of difference identified in the research findings that the high cost of transitioning may have a potential negative impact on small and medium-sized businesses. The SMEs may not meet the requirements of transitioning due to high-cost implications. Resulting in SMEs missing the opportunity to do business with entities who opt to do business with companies who ambitions of transitioning.

The theme of impact of transitioning was highlighted as potential new stheme in Chapter 5, but the research findings identified similarities to extant literature, therefore the theme is no longer regarded as a potential new theme, but it is still considered as a potential expansion to the body of knowledge. Given the similaries in research findings and literature in section 6.4.1.3, the theme will no longer be highlighted and will be updated as an extant theme in the amended conceptual framework at the end of this chapter. The high-cost impact on SMEs as a result of transitioining to carbon neutrality there is a

potential nuance of difference identified in research findings and would be recorded as a new subtheme under the impact of transitioning theme in the amended conceptual framework at the end of this chapter.

6.5 Chapter conclusion on comparison of research findings to literature

In this chapter comparison of the findings in Chapter 5 with the literature in Chapter 2 was covered. The systematic approach used in Chapter 5 was replicated in this chapter systematized by research questions to present the findings, and a methodical comparison of the 13 themes and subthemes covered in Chapter 5 with the literature in Chapter 2.

6.5.1 Adjustments from Comparative Analysis in Chapter 6

Referring to the mapping process in Chapter 5, each theme or subtheme that had already existed in literature and where similarities were identified as highlighted in the mapping process, a conclusion was made on the comparison analysis. The conclusion on the comparison would be the findings confirming the extant literature at the end of each section.

In instances of potential new themes and subthemes where literature could not be identified in Chapter 2, a three steps process as outlined in section 6.1 above was followed to confirm the potential differences or nuances of differences to the literature reviewed in Chapter 2. The researcher conducted the three steps process to confirm if these were valid differences or if any literature could be found. The research noted that these three steps are not exhaustive, and pointed out that they were created to adhere to a methodical and uniform analysis approach. Based on the analysis done, the results are depicted in Table 15 as per below:

Table 15 Summary of research, similarities, and differences to the literature as per the Comprehensive Analysis in Chapter 6

Research Question	Theorotical construct	Themes	Subthemes	Key research conclusions	
				Similar to literature	Nuanced difference to literature = New potential sub-themes / Change of name
1) How do firms transition to carbon neutrality and what are the drivers?	Understanding carbon neutrality			√	
	External drivers	Coercive pressure	Communities' approvals	√	Community and environmental protection
	External drivers	Coercive pressure	Government / Legislation	√	Provision of primary infrastructure
	Transitioning to carbon neutrality	Opportunities of transitioning	Opportunity for new skills and employment in the industry	√	
	Transitioning to carbon neutrality	Challenges of transitioning	Lack of buy-in	√	
	Transitioning to carbon neutrality	Challenges of transitioning	Lack of skills and knowledge	√	
	Transitioning to carbon neutrality	Challenges of transitioning		√	Government prioritization of pertinent issues
2) How does commitment to carbon neutrality impact firm performance?	Internal drivers	Sustainable value creation	Social justice	√	To abolish abundance mindset
	External drivers	Mimetic pressure	Competitor / industry	√	
	Transitioning to carbon neutrality	Challenges of transitioning	Short-term capital investments	√	
	Internal drivers	Potential benefits	To achieve long-term economic benefits	√	
	Internal drivers	Potential benefits	To achieve environmental benefits	√	
	Transitioning to carbon neutrality	Partnering and collaboration	Partnering / collaboration in transitioning to carbon neutrality	√	
3) How does commitment to carbon neutrality impact supply chain management?	Supply chain management	Impact of transitioning	Impact of transitioning on supply chain management	√	High cost impact on SMEs

Source: Reseacher's Own.

Similarities on all themes and subthemes, as shown in Table 15 above, were discovered during the methodical, comprehensive analysis of research findings to literature. The research findings indicated potential nuances of differences, with a potential new subtheme highlighted in yellow and a subtheme name change highlighted in blue. During the thorough analysis, the subtheme "communities' approval," which was identified based on research findings in Chapter 5, was renamed "community and environmental protection" because of the details of the comparison between findings and literature, the outcome suited a name change. Chapter 6's thorough analysis revealed the following new subthemes: 1) the provision of primary infrastructure; 2) to abolish abundance mindset; 3) the government's prioritization of pertinent issues; and 4) the high-cost impact on SMEs.

The comprehensive analysis mentioned above led to the amended conceptual framework in Figure 6 that is presented in section 6.5.2 below.

6.5.2 Amended Conceptual Framework

The conclusion discovered during the methodical, comprehensive analysis of reseach findings to extant literature are detailed below in Figure 6 in the amended conceptual framework. The revised conceptual framework presented in Chapter 5, Figure 5, presented ten (10) themes and eighteen (18) subthemes, of which eight (8) subthemes were potential new subthemes. New subthemes suggest possible distinctions as well as fresh perspectives and understanding. All new subthemes identified in the revised conceptual framework in Chapter 5 were explored and discussed together with four (4) exant subtheme and one (1) exant construct, “understanding carbon neutrality”. The results confirmed similarities between research findings and literature on all subthemes and construct explored, as a result the highlights applied in Chapter 5 were cleared. During the comprehensive analysis the research findings indicated potential nuances of differences, with potential new subthemes highlighted in yellow and a subtheme name change highlighted in blue. During the thorough analysis, the subtheme "communities' approval," which was identified based on research findings in Chapter 5, was renamed "community and environmental protection" because of the details of the comparison between findings and literature, the outcome suited a name change. Chapter 6's thorough analysis revealed the following new subthemes as presented in the amended conceptual framework, Figure 5: 1) the provision of primary infrastructure; 2) to abolish abundance mindset; 3) the government's prioritization of pertinent issues; and 4) the high-cost impact on SMEs.

Subthemes that lacked emperical data are highlighed in grey, the researcher did not delve deeper into the sub-themes that lacked research data.

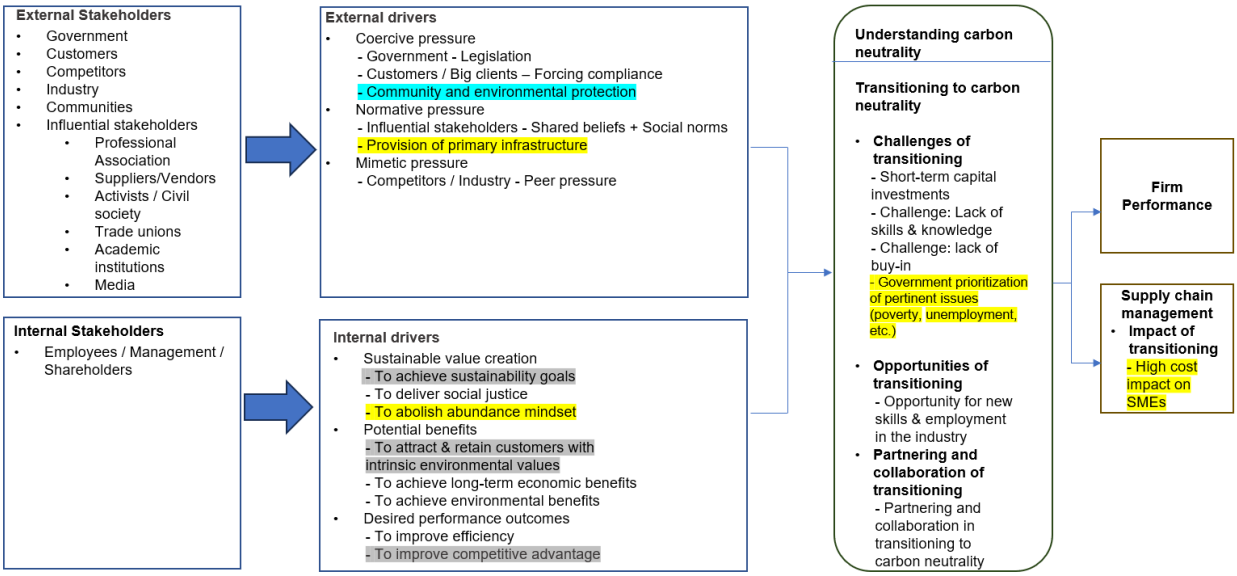

Figure 5 Amended Conceptual Framework from the Data Analysis

Source: Researcher's Own.

CHAPTER 7: CONCLUSION

7.1 Introduction

This chapter outlines the research results from the comparative analysis between the research findinds and the extant literature as discussed in Chapter 6. The research aim was to obtain an understanding and new insights of how firms transition to carbon neutrality, what drives them, and how does commitment to carbon neutrality impacts firm performance and supply chain management. This chapter will cover the research conclusions that attempt to address the research questions. The setting was a mining industry business in Namibia, with some of the organizations involved having global operations. Professional executives with knowledge and experience in four distinct sectors: academic institutions, industry associations, financial services, and mining, who were sourced from within my professional network were included as research participants.

A theorotical conceptual framework was developed as presented in Chapter 2 aimed at gaining a better understanding of the idea of moving toward carbon neutrality. Potential expansions and refinements were then made, leading to the development of a final theoretical conceptual framework, which will be presented later in this chapter.

The systematic approach used in Chapter 5 and Chapter 6 will be replicated in this chapter, systematized by research questions to present the theorotical conclusions to each research question. The chapter ends with recommendations for management and other interested parties, a review of the research's limitations, and recommendations for future research.

7.2 Principal Theoretical Conclusions

7.2.1 Research question 1: Transitioning to carbon neutrality

Research question 1 was to learn more about the firms' journey to carbon neutrality, gain fresh perspectives, and determine the factors that would motivate this kind of transition. The research question was addressed using one (1) construct and six (6) subthemes identified from extant literature and research findings. The construct understanding carbon neutrality aimed at obtaining the level of understanding and fresh understanding

with regards to conpcept neutrality was selected and discussed together with the following subthemes: communities' approvals, government and legislation, opportunity for new skills and employment in the industry, lack of buy-in, and lack of skills and knowledge. From existing literuture and as confirmed by research findigs community and environemental protection (communities' approvals), government and legislation, opportunity for new skills and employment in the industry, and provision of primary infrastructure have been identified and confirmed by literature and research findings as potential drivers to achieving carbon neutrality. Lack of buy-in, lack of skills and knowledge and government prioritization of pertinent issues have been identified as potential challenges to hinder the transitioning to carbon neutrality. The above drivers and challenges were identified as appropriate to respond to research question 1, while further drivers and challenges identified are presented below in answering the other two research questions. The other drivers idenfied are social justice, competitor and industry pressure, long-term economic benefits and partnerting and collaboration in transitioning to carbon neutrality, while the other challenge discussed is short-term capital investments.

7.2.1.1 Similarities between research findings and extant literature for RQ1

With regards to understanding of carbon neutrality, the were similarities between research findings and extant literature. The research findings supported the understanding of carbon neutrality found in the body of existing literature (IPCC, 2018; J. Chen, 2021 and Y. Wang et al., 2021). The research findings also supported the necessity of measuring carbon emissions in order to achieve carbon neutrality, and they indicated that efforts ought to be directed toward areas with higher rates of greenhouse gas emission reduction (Wiedmann et al., 2020). The research findings further supported the idea that using carbon-neutral and renewable resources could eventually replace fossil fuels (F. Wang et al., 2021). The research findings also supported the idea that more efforts to reduce greenhouse gas emissions could be rewarded with carbon credits (T. Chen et al., 2019).

With regards to communities' approvals, the were similarities between research findings and extant literature. The research findings confirmed literature from industry association that that the well-being of the community is taken care of beyond the life of mine, Jong et al. (2018) agrees that organisations should have profit-sharing program and that they should also implement corporate social responsibility programmes that targets the inhabitants. There are also similarities from Gong et al. (2018) who shares that the the

organistions should review their operations and ensure that they are providing goods and services that are environmentally friendly, and that they should consider the social aspects of sustainability such as the community outreach and safety.

With regards to government and legislation, the were similarities between research findings and extant literature. The reseach findings were confirmed by extant literature that achieving carbon neutrality would require great level of involvement from government through laws and regulations (Dhanda et al., 2022 and Yuan et al., 2022).

With regards to opportunity for new skills and employment in the industry, the were similarities between research findings and extant literature. Literature noted that transitioning provides potential for employment and new skills while at the core is the protection of the environment. The research findings were confirmed by literature (Burke et al., 2023).

With regards to lack of buy-in, the were similarities between research findings and extant literature. Research findings on lack of buy-in noted that there is resistance to transition to carbon neutrality due to lack of awareness of the impact of carbon emissions, preference of conducting business the traditional way, avoiding changes and no urgency of transitioning to carbon neutrality. Lack of infrastructure was also highlighted as a hinderance to the transitioning to carbon neutrality. These revealed similarities to literature with no differences noted. The research findings were confirmed by literature (Burke et al., 2023; Zhang et al., 2022 and Zhang et al., 2022a).

With regards to lack of skills and knowledge, the were similarities between research findings and extant literature. Research findings on lack of skills and knowledge noted that there is shortage of people with the necessary knowledge and expertise with regards to the concept of transitioining to carbon neutrality and this hindered the transitioning to carbon neutrality. The research findings confirmed literature and revealed similarities to literature with difference being noted in literature that stakeholders have zero understanding of the benefits of transitioning to carbon neutrality (Zhang et al., 2022a).

In conclusion the construct of understanding carbon neutralilty and subthemes communities' approval renamed community and environment protection, government and legislation, opportunity for new skills and employment in the industry, lack of buy-in, and lack of skills and knowledge, research findings identified similarities to extant

literature, even though no differences were identified, therefore a potential expansion to the body of knowledge. Research findings confirmed extant literature that transitioning to carbon neutrality have a lot of challenges and potential advantages that results from transitioning.

7.2.1.2 Potenital nuances of differences between research findings and extant literature for RQ1

With regards to communities' approval, a potential nuance of difference was identified by findings at the detail level, the literature refers to the protection of environment through raising awareness through policy (Jones et al., 2018 and Gong et al.,2018) while the findings refer to the initiatives of the protection the environment and not just raising awareness through policy. Furthermore, research findings and extant literature noted that community approvals had more mention of community and environmental protection rather than communities' approval, the subtheme will be updated to "community and environment protection".

With regards to government and legislation, a potential nuance of difference was identified by findings from a Namibian setting, that to enable successful transitioning to carbon neutrality requires government to provide primary infrastructure which are currently not available Literature had no mention of availing of primary infranstruture by government (Jones et al., 2018 and Gong et al.,2018).

With regards to government prioritazation of pertinent issues, research findings noted that transitioning to carbon neutrality is not a pertinent issue for Namibia as opposed to developed countries, considering the minimal carbon emissions from a Namibian context. Literature had no mention of availing of primary infranstruture by government (Jones et al., 2018 and Gong et al.,2018).

In conclusion subthemes communities' approval renamed community and environment protection, government and legislation, and government prioritization of pertinent issues, are subthemes from research findings identified as potential nuances of differences to extant literature, therefore a potential expansion to the body of knowledge.

7.2.1.3 Distinct differences between research findings and extant literature for RQ1

The research findings and the literature for research question 1 did not have distinct differences.

7.2.2 Research question 2: Carbon neutrality impact on firm performance

Research question 2 was to learn more about and obtain fresh perspectives on the ways in which a firm's performance is impacted by its commitment to carbon neutrality. The research question was addressed using six (6) subthemes identified from extant literature and research findings. The subthemes selected and discussed were social justice, competitor and industry pressure, achieving long-term economic benefits, achieve environmental benefits, and partnering and collaboration in transitioning to carbon neutrality. The research findings identified the following as impact of transitioning on firm perfromance: improved reputational image which stems for creating employment opportinties and improved enviromental sustainability, it also raises demand which results in increased sales. It also creates a competitive advantage and enable the company to compete from an environmental standpoint. Eventually companies who transition will benefit financially due to reduced operating cost, that goes while recognising that cash flows will be impacted by initial investments in carbon neutral assets. Carbon neutrality benefits human health, improves the environment while promoting common standards, guidelines, and reports through collaboration which improves the operations of the company. Transitioning also provides companies with an opportunity of building new relationships.

7.2.2.1 Similarities between research findings and extant literature for RQ2

With regards to social justice, the research findings confirmed that reaching carbon neutrality enhances people's quality of life and general well-being. It also demonstrated that achieving carbon neutrality results in more jobs being created. (Stern and Xie, 2023 and Pulselli et al., 2021). Reducing greenhouse gas emissions and reaching carbon neutrality improve environmental sustainability and lessen adverse environmental effects was confirmed by findings (Pulselli et al., 2021, L. Chen et al.,2022 and Stern and Xie, 2023). Findings also confirmed that becoming carbon neutral raises demand and that businesses should source ethically to draw in eco-conscious clients (Stern and Xie, 2023). A potential nuance of difference was identified by findings that the extraction of

minerals is done with an abundance mindset, which has a detrimental effect on the environment, unemployment, and life of mine. It was determined that social justice is a potentially significant internal driver of carbon neutrality. If properly managed, social justice can address human wellbeing, safeguard the environment, and create jobs. It can also potentially draw in and retain customers, which will lead to the creation of sustainable value.

With regards to competitor and industry pressure, the research findings confirmed literature that transitioning to carbon neutrality give early adopters a competitive advantage and that businesses transition to carbon neutrality due to market pressure (Yang and Liu, 2023 and Zhang et al., 2022). The mining sector noted that to compete from an environmentally conscious standpoint, companies are forced to invest in the transition to carbon neutrality as a result of rivals' claims that they are producing zero or low carbon alternatives, this was similar to Camilleri et al. (2023) confirmations that investing in green technology enhances the firm’s reputation which influence customers to do business with the firm which have a direct impact on the company’s economic value.

With regards to short-term capital investments, the research findings supported extant literature that transitioning requires short-term funding, which can be obtained through financing options and affects the bottom line of the company (Blum et al., 2021 and Chan et al., 2018).

With regards to achieving long-term economic benefits, the research findings confirmed literature that businesses transitioning to carbon neutrality will eventually benefit financially, despite initial costs (Blum et al., 2021). (Zhang et al., 2022) supported findings that clients will favor environmentally conscious companies, influencing demand and generating higher profits. Findings confirmed extant literature that alternative energy sources are generally less expensive in the long run, reducing operational costs and regulating coal consumption (Wu et al., 2022). Similarities were also drawn between findings and extant literature that reliance on a single electricity supplier provides no competition and high electricity prices and that renewable energy sources could lead to competitive prices (Ekholm and Virasjoki, 2020 and Kuik et al., 2019).

With regards to achieving environmental benefits, the research findings confirmed extant literature that transitioning to carbon neutrality positively impacts the environment by reducing emissions (Zhang et al., 2022) and that there may be an environmental benefit

to lowering the rise in carbon dioxide released into the atmosphere (J. Chen, 2021). Research findings showed that the move toward carbon neutrality benefits human health, improves the environment, and is corroborated by the body of research (Su et al., 2021; X. Shi et al., 2021).

With regards to partnering and collaboration, the research findings supported extant literature suggesting that related organizations work together to promote common standards, guidelines, and reports in order to make the transition to carbon neutrality (Camilleri et al., 2023). Findings further supported Zhang et al. (2022) and Chan et al. (2018), who noted that since everyone is impacted by climate change, collaborative efforts are essential for achieving widespread participation in curbing climate change challenges. A collaborative approach to policymaking is essential for attaining carbon neutrality, and research findings support the ease with which sustainability initiatives can be implemented as a result of this influence (Chan et al., 2018 and Cadez et al., 2019).

7.2.2.2 Potenital nuances of differences between research findings and extant literature for RQ2

With regards to abolishing abundance mindset, a potential nuance of difference was identified by findings that the extraction of minerals is done with an abundance mindset, which has a detrimental effect on the environment, unemployment, and life of mine. From the literature reviewed, the information could not be corraborated (Pulselli et al., 2021, L. Chen et al.,2022 and Stern and Xie, 2023).

In conclusion subtheme to abolish abundance mindset, is a subtheme from research findings identified as potential nuances of differences to extant literature, therefore a potential expansion to the body of knowledge.

7.2.2.3 Distinct differences between research findings and extant literature for RQ3

The research findings and the literature for research question 1 did not have distinct differences.

7.2.3 Research question 3: Carbon neutrality impact on supply chain management

Research question 3 was to learn more about and obtain fresh perspectives on the ways

in which a supply chain management is impacted by its commitment to carbon neutrality. The research question was addressed using one (1) theme identified from extant literature and research findings. The theme selected and discussed was impact of transitioning on supply chain management. The research findings identified the following as impact of transitioning on supply chain management:

7.2.3.1 Similarities between research findings and extant literature for RQ3

With regards to impact of transitioning on supply chain management, Research findings confirmed literature that supply chain leaders can drive the transition to carbon neutrality by incorporating targets into their operations (Jia et al., 2019; De and Giri, 2020; Schnittfeld and Busch, 2016 & J. Shi et al., 2023). Accoding to literature and confirmed by research findings, transitioning to carbon neutrality can be achieved by engaging and managing customers and suppliers, including their contracts. Findings also confirmed that major companies can lead the transition by involving stakeholders in their supply chain to achieve carbon neutrality (Di Maggio & Powell, 1983, Zhang et al., 2022, and Gong et al., 2018). Literature noted that transitioning offers a chance to mitigate climate change effects through cooperation and partnership, strengthening ties with stakeholders, and sharing transitioning costs (Camilleri et al., 2023 &Chan et al., 2018), this was corraborated by research findings. However, extant literature was confirmed by research findings that businesses with existing relationships with suppliers may incur switching costs and businesses will incur higher short-term costs due to the quick shift to carbon neutrality and investments in necessary equipment and technology (Zhong et al., 2020; W. Liu and Wang, 2017 & Zhuo et al., 2022). Government support and initiatives can help control the cost (Blum et al., 2021; Chan et al., 2018 & Wu et al., 2022).

7.2.3.2 Potenital nuances of differences between research findings and extant literature for RQ3

With regards to high-cost impact on SMEs, a potential nuance of difference identified in the research findings that the high cost of transitioning may have a potential negative impact on small and medium-sized businesses. The SMEs may not meet the requirements of transitioning due to high-cost implications. Resulting in SMEs missing the opportunity to do business with entities who opt to do business with companies who ambitions of transitioning.

7.2.3.3 Distinct differences between research findings and extant literature for RQ3

The research findings and the literature for research question 1 did not have distinct differences.

7.2.4 Final Conceptual Framework

The framework presented in Chapter 6 has not changed, instead, it has been updated for improved clarity and connected back to the research framework as presented in Chapter 2.

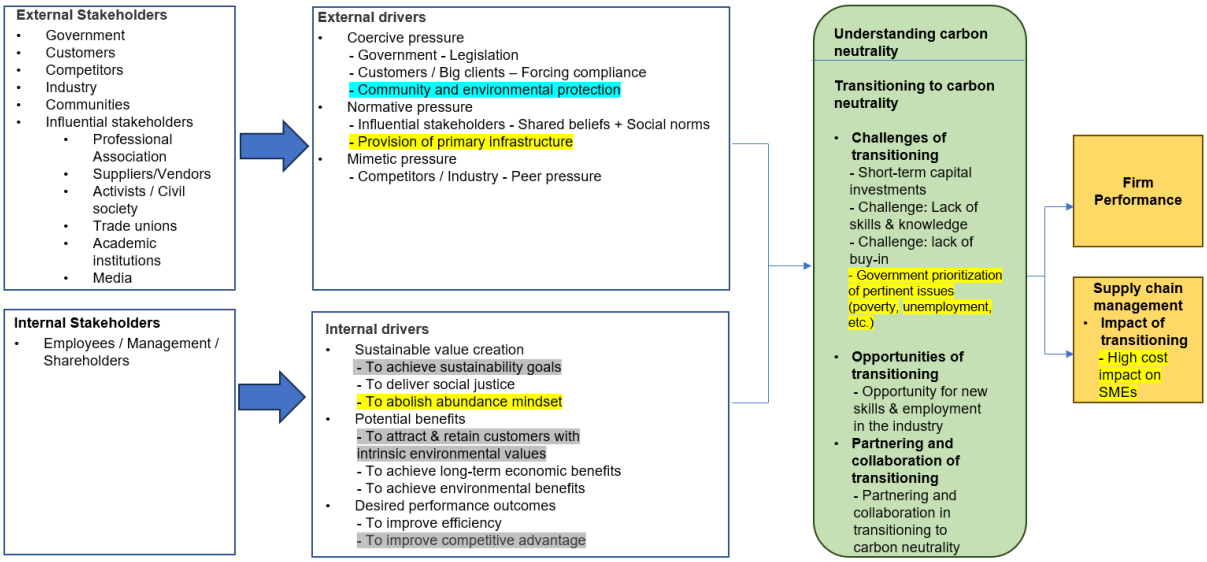

Figure 6 Final Conceptual Framework from the Data Analysis

Source: Researcher's Own.

7.3 Research Contribution

The research aim was to obtain an understanding and new insights of how firms transition to carbon neutrality, what drives them, and how does commitment to carbon neutrality impacts firm performance and supply chain management. The research contribution is divided into three groups, namely, potential expansion to the body of literature, potential refinements to the body of literature and potential extension to the body of literature.

7.3.1 Similarities between research findings and extant literature: Potential expansion to the body of literature

Even though there have been similarities between the research findings and the body of existing literature, the study was conducted in a different setting and with a different scope. As a result, adding research findings to the body of literature through confirmation is thought to be a potential contribution. The study has identified similarities between research findings and extant literature which are potential expansion and contribution to the body of literature. The potential expansions to the body of literature are listed in the table below:

Table 16 Summary of potential expansions to the body of literature

Research Question	Theorotical construct	Themes	Subthemes	Key research conclusions
				Similar to literature
1) How do firms transition to carbon neutrality and what are the drivers?	Understanding carbon neutrality			√
	External drivers	Coercive pressure	Communities' approvals	√
	External drivers	Coercive pressure	Government / Legislation	√
	Transitioning to carbon neutrality	Opportunities of transitioning	Opportunity for new skills and employment in the industry	√
	Transitioning to carbon neutrality	Challenges of transitioning	Lack of buy-in	√
	Transitioning to carbon neutrality	Challenges of transitioning	Lack of skills and knowledge	√
	Transitioning to carbon neutrality	Challenges of transitioning		√
2) How does commitment to carbon neutrality impact firm performance?	Internal drivers	Sustainable value creation	Social justice	√
	External drivers	Mimetic pressure	Competitor / industry	√
	Transitioning to carbon neutrality	Challenges of transitioning	Short-term capital investments	√
	Internal drivers	Potential benefits	To achieve long-term economic benefits	√
	Internal drivers	Potential benefits	To achieve environmental benefits	√
	Transitioning to carbon neutrality	Partnering and collaboration	Partnering / collaboration in transitioning to carbon neutrality	√
3) How does commitment to carbon neutrality impact supply chain management?	Supply chain management	Impact of transitioning	Impact of transitioning on supply chain management	√

Source: Reseacher's Own.

7.3.2 Potential nuances of differences between research findings and extant literature: Potential refinements to the body of literature

The study has identified potential nuances of differences between research findings and extant literature which are potential refinements and contribution to the body of literature. The potential refinements to the body of literature are listed in the table below:

Table 17 Summary of potential refinements to the body of literature

Research Question	Theorotical construct	Themes	Subthemes	Key research conclusions Nuanced difference to literature = New potential sub-themes / Change of name
1) How do firms transition to carbon neutrality and what are the drivers?	External drivers	Coercive pressure	Communities' approvals	Community and environmental protection
	External drivers	Coercive pressure	Government / Legislation	Provision of primary infrastructure
	Transitioning to carbon neutrality	Challenges of transitioning		Government prioritization of pertinent issues
2) How does commitment to carbon neutrality impact firm performance?	Internal drivers	Sustainable value creation	Social justice	To abolish abundance mindset
3) How does commitment to carbon neutrality impact supply chain management?	Supply chain management	Impact of transitioning	Impact of transitioning on supply chain management	High cost impact on SMEs

Source: Reseacher's Own

7.3.3 Distinct differences between research findings and extant literature: Potential extension to the body of literature

The research findings and the extant literature did not have distinct differences, therefore no potential extension to the body of literature was noted.

7.4 Recommendations for management and other interested parties

A conceptual framework was developed to assist companies in understanding and providing new insights of how firms transition to carbon neutrality, what drives them, and how does commitment to carbon neutrality impacts firm performance and supply chain management. Every construct in the conceptual framework offers managers direction and a deeper comprehension to help them successfully navigate the shift to carbon neutrality.

7.4.1 Recommendation on understanding carbon neutrality

- Since carbon neutrality is still a relatively new idea, managers must gain an understanding of it to successfully transition to carbon neutrality. Managers who comprehend the idea will find it easy to lead their teams through a smooth transition.

- Manager ought to put policies in place that help reduce carbon dioxide emissions to zero. A plan for reducing scope 1, scope 2, and scope 3 emissions should be developed by managers.
- To encourage every employee to participate in the fight against climate change, the idea of becoming carbon neutral should be incorporated into the company's strategy and goals and communicated throughout the entire organisation.

7.4.2 Recommendation on external drivers of carbon neutrality

- Managers need to be able to recognise external factors influencing the shift to carbon neutrality and take appropriate action to counter them.
- In addition to including sustainable initiatives into their plans, managers should be able to adapt their methods and strategies to the changing needs of their stakeholders. This might entail altering internal procedures and guidelines for environmental awareness and protection.
- Prominent companies ought to interact with the government and exert influence over it to create legislation that would facilitate the shift to carbon neutrality. They should also advocate for the government to provide the essential infrastructure required for the shift.
- To maintain a competitive advantage and gain an advantage over their competitors, managers ought to accelerate the transitioning process towards a lower carbon footprint.

7.4.3 Recommendation on internal drivers of carbon

- To benefit from the long-term economic and environmental advantages that come with the transition, managers should create and put into practise strategies that would help the transition to carbon neutrality.
- Managers ought to advocate for transitioning to carbon neutrality because it addresses issues related to human well-being, reduces the effects of climate change, and generates more jobs.
- Managers ought to destroy the notion of abundance and mine sustainably in order to extend mine life and safeguard the environment.

7.4.4 Recommendation on transitioning to carbon neutrality

- Managers should concentrate on implementing renewable energy sources, such as constructing solar and wind farms, and swapping out fossil fuel-powered machinery and cars with more environmentally friendly models in order to reach carbon neutrality.
- Managers who are transitioning successfully should quantify their greenhouse gas emissions and take corrective action.
- To give suppliers and customers a new outlook and an opportunity for innovation, managers should support their transition to carbon neutrality.
- To address the lack of knowledge and skills in the field and to create opportunities for new hires and skill development, managers should allocate and obtain funding for studies and research in the carbon neutrality space.

7.4.5 Recommendation on the transitioning impact on firm performance

- Given that alternative energy sources typically have lower long-term costs, lower operating costs, and less coal consumption, managers ought to give them priority.
- To create competition in the price of electricity, which would result in competitive prices, managers should also work with suppliers of renewable energy sources to offer an alternative to depending solely on one supplier.
- To handle the financial ramifications of transitioning, managers should create financial scenarios and work with financial institutions that provide favourable rates on green carbon projects.
- Managers ought to step up their transition efforts because they enhance the organization's image, generate jobs, safeguard the environment, and can even boost revenue by drawing in eco-conscious clients.

7.4.6 Recommendation on the transitioning impact on supply chain management

- Supply chain managers should spearhead the shift to carbon neutrality by implementing goals into their daily work.
- To begin the process of becoming carbon neutral, managers should encourage suppliers and customers to integrate sustainability goals into their business practises.
- Since transitioning offers an opportunity to lessen the effects of climate change through collaboration and partnership, fostering stronger relationships with stakeholders, and

sharing transitional costs, managers should approach it thoughtfully and foster collaboration with stakeholders.

- Managers must devise plans to minimise switching costs and guarantee that the transition has no detrimental effects on current supplier relationships.
- Additionally, managers need to make sure that their inclusive procedures cover small and medium-sized enterprises (SMEs), many of which lack the necessary funding to make the switch to carbon neutrality.

7.5 Limitations of the Research

This section focuses on the limitations of the research study as a whole. The limitations of the reseach design and methods have been discussed in Chapter 4, section 4.11.

The study has identified the below limitations:

- The study was conducted in Namibia, and other countries were excluded from the study.

- The study was conducted in mining sector, and other sectors were excluded from the study.

- The research conclusion of this study identified potential new subthemes, namely, provision of primary infrastructure by government, government prioritazation of pertinent issues, to abolish abundance mindset and high-cost impact of transitioning on SMEs, however, this study's limitation was that the potential new subthemes were not explored in greater detail.

7.6 Suggestions for Future Research

The study has identified three areas for future research.

- The scope of the study was set for Namibia, similar studies could be conducted in other developing countries as well as developed countries.

- The study only focused on the mining sector; further studies can be conducted in other sectors.

- The research conclusion of this study identified potential new subthemes, namely, provision of primary infrastructure by government, government prioritazation of pertinent issues, to abolish abundance mindset and high-cost impact of transitioning on SMEs, the potential new themes have not been explored in detail, further research may delve deeper into these potential new subthemes. The potential new themes are considered to have the potential to contribute to the body of literature.

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APPENDICES

Appendix A -Time horizon

Activity	Responsible	Output	Due Date
Submit first draft to supervisor for review	Rasta Kaeka	Proposal 1st draft	10/05/2023
Meeting to discuss feedback on proposal	Rasta Kaeka to schedule	Feedback	19/05/2023
Finalize proposal	Rasta Kaeka	Final proposal	28/05/2023
Submit proposal on aspire	Rasta Kaeka	Proposal submission	29/05/2023
Meeting to discuss feedback on marked proposal	Rasta Kaeka to schedule Dr Jill Boggie to avail herself	Feedback and agreed plan	20/06/2023
Submit draft ethical clearance	Rasta Kaeka to submit Dr Jill Boggie to review	Ethical clearance reviewed by supervisor	20/07/2023
Sign ethical clearance	Dr Jill Boggie	Ethical clearance approved by supervisor	31/07/2023
Complete ethical clearance	Rasta Kaeka	Clearance completed and approved	15/08/2023
Complete data collection	Rasta Kaeka	Data collection completed	31/08/2023
Meeting with supervisor	Rasta Kaeka to schedule Dr Jill Boggie to avail herself	Data Processed and draft chapter 5 & 6 submitted to supervisor	10/09/2023
Complete data analysis	Rasta Kaeka	Data Analysis completed	15/09/2023
Complete write-up and editing of report	Rasta Kaeka	Completed reported submitted to	31/10/2023

		supervisor	
Submission of final report	Rasta Kaeka	Report submitted on Aspire	25/11/2023

Stutent: Rasta Kaeka

Supervisor: Dr Jill Boggie

Appendix B - Consistency Matrix

Proposition/ Questions/ Hypotheses	**Literature review**	**Data Collection tool**	**Analysis**
Drivers of carbon neutrality	Zhang et al. (2022); Di Maggio & Powell, (1983); J. Chen (2021); Y. Wang et al. (2021); H. Chen et al. (2022); F. Wang et al. (2021); T. Chen et al. (2019); Wiedmann et al. (2020); Jones et al. (2018); Hong et al. (2021); J. Wang et al. (2022); Dhanda et al. (2022); Hong et al. (2021); Burke et al., (2021); Cadez et al. (2019).	Semi-structured interviews	Descriptive data analysis through MS Excel
Impact of commitment to carbon neutrality on firm performance	(Zhang et al., 2022); H. Chen et al. (2022); Williams et al. (2021); Yao et al. (2021); Su et al. (2021); Chan et al. (2018); Blum et al. (2021); Zhuo et al. (2022); Wu et al. (2022); Camilleri et al. (2023); Bai & Sarkis (2020); X. Shi et al. (2021); Yao et al. (2021); Ekholm and Virasjoki (2020); Kuik et al. (2019).	Semi-structured interviews	Descriptive data analysis through MS Excel
Impact of commitment to carbon neutrality on supply chain management	Mentzer et al. (2001); Di Maggio & Powell, 1983; Zhang et al. (2022); Jia et al. (2019); Gong et al. (2018); Chan et al. (2018); Saberi et al. (2019); W. Liu and Wang, (2017); Broberg et al. (2013); Zhong et al. (2020); De and Giri (2020); Schnittfeld and Busch (2016) J. Shi et al. (2023); W. Liu et al. (2023); Saberi et al. (2019).	Semi-structured interviews	Descriptive data analysis through MS Excel

Source: Researcher's Own.

Appendix C - Interview Protocol

Structure of the interview protocol	Types of question	Interview question
Kick-off questions	Little q1	1. Please tell me about how you got involved in the mining industry?
How do firms transition to carbon neutrality and what are the drivers?	Big Q1	2. Please tell me what you understand in the Namibian mining industry in terms of the shift to reducing carbon emissions and getting to net-zero?
	Big Q2	3. Please tell me what are the intention or commitment of your organisation towards this transition?
	Big Q3	4. Please tell me of your understanding what is driving the organisation to shift to reduce carbon emissions or decarbonisation?
How does commitment to carbon neutrality impact firm performance?	Big Q4	5. Please tell me to your understanding how is this intention to transition to decarbonisation or net-zero impact the performance of the organisation? What are the positives and negatives because of this transition to your organisation?
How does commitment to carbon neutrality impact supply chain management?	Big Q5	6. Please tell me about how the transition to decarbonisation impacts the supply chain of your organisation?
	Big Q6	7. What are the challenges to the supply chain because of this transition?
	Big Q7	8. How best can those challenges be addressed in the supply chain?
Closing question	Little q2	9. How do you this going forward?
Clarifying and probing questions		a) Please would you elaborate on what you mean by that? b) Please could you tell me more about that? c) Please illustrate that with an example? d) Please tell me about a situation like that?

Source: Researcher's Own.

Appendix D – Informed consent letter

I am conducting research on The drivers of commitment to carbon neutrality: Impact on firm performance and supply chain management. Our interview is expected to last an hour and will help us understand how a commitment to carbon neutrality lead to implications for firm performance and supply chain management? Your participation is voluntary, and you can withdraw at any time without penalty. By signing this letter, you are indicating that you have given permission for:

- the interview to be recorded;

- the recording to be transcribed by a third-party transcriber, who will be subject to a standard non-disclosure agreement;

- verbatim quotations from the interview to be used in the report, provided they are not identified with your name or that of your organisation;

- the data to be used as part of a report that will be publicly available once the examination process has been completed; and

- all data to be reported and stored without identifiers.

If you have any concerns, please contact my supervisor or me. Our details are provided below.

Researcher name: [redacted]

Email: 22029720@mygibs.co.za

Phone: +264811288115

Research supervisor name: Dr. Jill Bogie

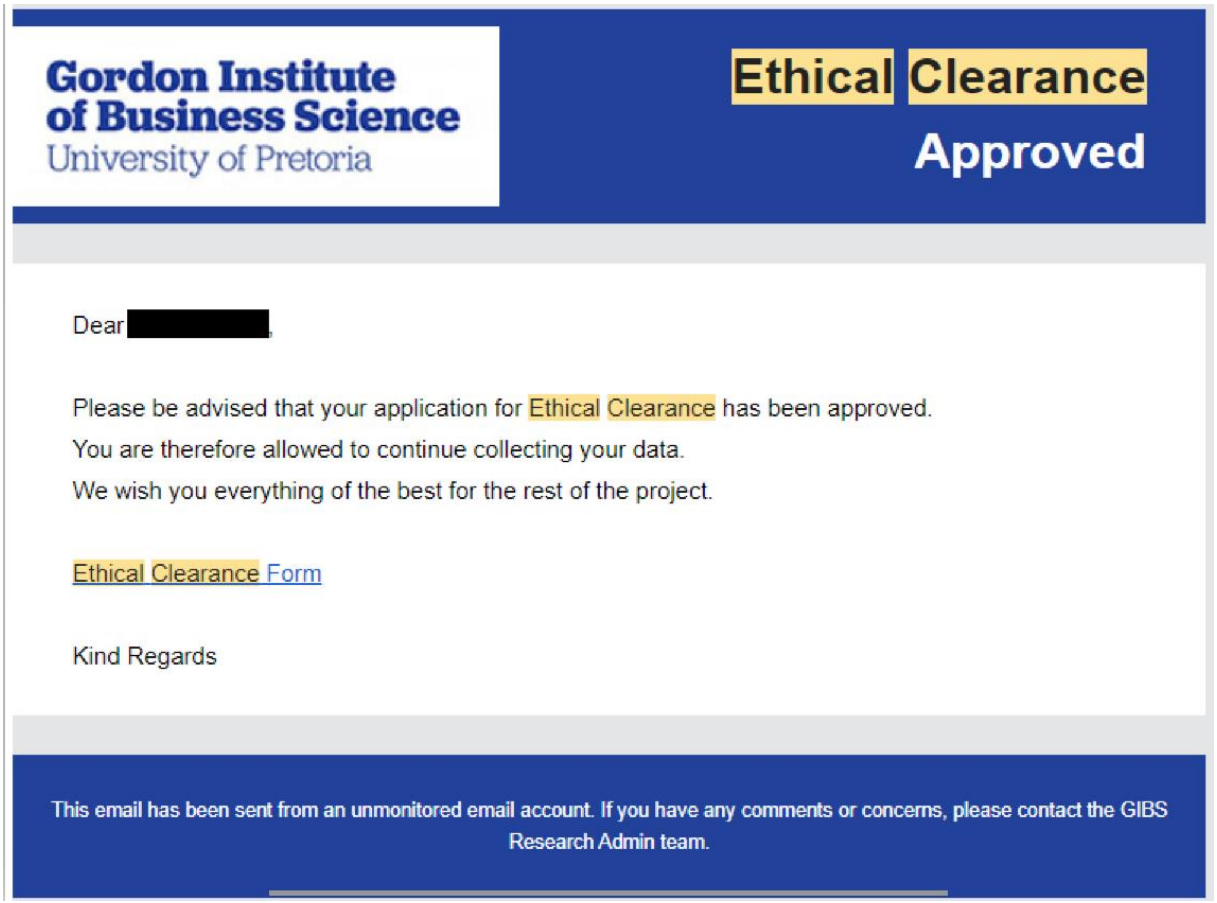
Email: bogiej@gibs.co.za

Phone: +27 11 771 4000

Signature of participant: _____ Date: _____

Signature of researcher: _____ Date: _____

Appendix E – Ethical clearance approval



Gordon Institute of Business Science
University of Pretoria

Ethical Clearance Approved

Dear [redacted],

Please be advised that your application for Ethical Clearance has been approved.
You are therefore allowed to continue collecting your data.
We wish you everything of the best for the rest of the project.

Ethical Clearance Form

Kind Regards

This email has been sent from an unmonitored email account. If you have any comments or concerns, please contact the GIBS Research Admin team.

Appendix F – ATLAS.ti Codes

1	Decarbonization
2	Shift to net zero
3	Transition to mitigate impact of business operations
4	Clear target to decarbonize
5	Working towards decarbonization
6	Importance of the transition to decarbonization
7	Positioning to meet climate goals
8	Well-being of citizens
9	Attract investments
10	Drivers of transitioning
11	Positive impact of transitioning
12	Challenges to supply chain
13	Impact of transitioning
14	Embedding carbon reduction in company practices
15	Less impact of climate change in Namibia
16	Sustainability considered a waste of time
17	Proposition of sustainability is not attractive
18	Sustainability at beginner stage, lack of knowledge on the subject
19	No sustainability reporting in Namibia
20	Lack of sustainability skilled individuals
21	Sustainability adoption requires sustainability skills
22	Companies commitment due to mimetic pressure
23	Definition of mimetic pressure
24	Understanding customers sustainability requirements
25	Customers are into circular economy
26	Process of circular economy
27	Encourage sustainability studies
28	Less enthusiasm for sustainability
29	Lack of research on the topic
30	Lack of buy-in as implementers lack knowledge
31	Preparing beyond mine closures
32	Projects that sustain communities
33	Sustainability is also social and financial
34	Companies should consider environmental, social and financial factors together
35	Resource based theory and competitive advantage
36	Resource based theories - building reputation
37	Resource based theory - ethical sourcing
38	Able to tell social, environmental and financial stories
39	Attract new customers and retain old customers through stories
40	Involvement in sustainability increases demand, customers, reveneue

Source: Researcher's Own.

Appendix F – ATLAS.ti Codes (continues)

41	Understanding the value chain
42	Competitive advantage as a result of sustainability
43	Government to regulate sustainable mining
44	Introduction of sustainability reports
45	Cost savings for going green
46	Incentives for buying sustainable technologies
47	Supply chain drives sustainability
48	Supply chain can drive circular economy
49	Definition of linear economy
50	Circular economy
51	Example of a working circular economy in Namibia
52	Recycling products
53	Local supply
54	Creating employment
55	Transition should empower local supply
56	Key driver changes in leadership
57	Incorporate new perspective
58	Own the new perspective
59	Partnership in supply chain
60	Products should not be sold in its raw form
61	Policies in place to ensure sustainable partners
62	Consideration on the disposal of used products
63	Fossil fuel will remain in use
64	Infrastructure challenges from transitioning
65	Collaboration through the use of hybrid models
66	Staggered approach with regards to the transitioning
67	Impact of climate change considered low but change is needed
68	Avoiding the impact of climate change
69	Reluctant from Namibians to apply pressure
70	Embracing nature for a successful transition
71	Mimetic pressure
72	Normative pressure
73	Pressure based on customers want
74	Conceived pressure
75	Collaboration to ensure the transition
76	No regulation of the circular economy
77	Build supply chain partnership
78	Global warming more evident
79	Countries suffering as a result of climate change
80	Sustainable sources of energy

Source: Researcher's Own.

Appendix F – ATLAS.ti Codes (continues)

81	Potential for renewable energy
82	Carbon neutrality
83	Unpredictable weather patterns
84	Minimal capacity to manage instant change
85	Act now and build resilience
86	Build resilience for climate intervention
87	Reliance on transportation
88	Electric vehicle intervention not practical
89	Build infrastructure
90	Hybrid alternative
91	Institutional pressure through funding
92	Act positively as a global citizen
93	Global agenda or drive
94	Long-term benefit - reduction operational costs
95	Country's climate agenda
96	Reduction in operational cost
97	Access to funding
98	Reducing carbon emissions or net-zero
99	Mining companies moving off-grid
100	Climate change is not a myth
101	Seasonal changes and drought
102	Reduce effects of global warming
103	Global agenda
104	New generation more conscious
105	Carbon neutral products more favorable
106	Market behavioral pressure
107	Procurement processes to influence adaptation in the supply value chain
108	Cost challenges of going green
109	Going green is capital intensive
110	Institutional pressure from government through legal framework
111	U$ 1.5 trillion of capital available for sustainable projects
112	Equity & deed funding available
113	Carbon capture funding
114	Social element of human connection
115	Reducing carbon footprint
116	Use of natural resources for economic advancements and transition to carbon neutrality
117	Carbon neutral is not only the technical but also the social aspects
118	Benefits of transitioning to carbon neutral
119	Carbon sequestration - blue kelp
120	Usage and benefits of kelp (transitioning)

Source: Researcher's Own.

Appendix F – ATLAS.ti Codes (continues)

121	Protecting the environment
122	Carbon emission graph
123	Replacing fossil fuel
124	Optimization of natural resources
125	Intentional leadership
126	Contributions to the global agenda
127	Inspiration to others
128	Offsetting and carbon credits
129	Addressing climate change (droughts) & protecting vulnerable communities
130	AI forth industrial revolution and move with times
131	Innovation that leads to efficiency
132	Skills transfer and upliftment
133	Help become an industrial country
134	Skills and education benefits
135	Health benefits
136	Change to responsible sourcing
137	Required understanding in the supply value chain
138	Ability to compile reports and being audited
139	Issues of onboarding suppliers on the journey
140	Short-term financial impact
141	Long-term financial benefits
142	Impact on mining methodology
143	Stakeholders
144	Partnerships
145	Inclusive decision making
146	Bills, acts & regulations from government
147	Transition from coal powered electricity to use of renewable energy
148	Decarbonize electricity
149	Protect citizens
150	Carbon neutral ambitions
151	Clean and alternative technologies
152	Carbon disclosure or reporting
153	3 difference lenses to transitioning, people, process and technology
154	Collect data and draw insights
155	Improve operations
156	Update policies
157	Develop new business models
158	Carbon neutral to carbon negative
159	Carbon offsetting
160	Disadvantage of offsetting

Source: Researcher's Own.

Appendix F – ATLAS.ti Codes (continues)

161	Carbon neutral
162	Net-zero
163	Causes of climate change
164	Limit climate change and build resilience
165	Resilience in finance
166	Supply chain resilience
167	Resilience in communities and employees
168	Budget provisions for business continuity
169	Right thing to do
170	Abundance mindset and inefficiency
171	Shift creates innovation and efficiency
172	Part of an ecosystem
173	Strive for efficiency
174	Shift requires shift in mindset
175	Redesign business models
176	Cost savings
177	Market or customer pressure
178	Supplier pressure
179	Reputational risk
180	Understanding your business risks
181	Investor pressure
182	Personal motivation towards global agenda
183	Passionate about the planet
184	Drive from top management
185	Employee driver through innovations
186	Financial benefits through target setting
187	Pressure to reduce costs through innovation
188	Prioritize health and safety
189	Prevent suppression through deployment of different technologies
190	Cost reduction through redesign
191	Reduce oil spills
192	Improves health and safety
193	Drives the agenda through collaboration
194	Collaborate with competitors and customers
195	Carry stakeholders along on the journey
196	Attract funding
197	Willingness to transition
198	Cripple suppliers due to cost of transitioning
199	Attract new suppliers due to transitioning
200	Opportunity to negotiate pricing

Source: Researcher's Own.

Appendix F – ATLAS.ti Codes (continues)

201	Provides in depth access to suppliers processes
202	Opportunity for suppliers management
203	Opportunities for suppliers to innovate
204	Suppliers open to new markets
205	Gain negotiating skills
206	Build trust and create transperancy
207	Open engagement with suppliers
208	Influence logistics and buying power
209	Explore supply chain dynamics
210	Dealing with middlemen who are not manufacturers
211	Potential incorrect sourcing
212	As reseller supplier does not understand carbon implications
213	Raise awareness
214	Provide guidance to suppliers
215	Capacitate suppliers to under scope 1,2,3 emissions
216	Potential collaboration with government and industry bodies to assist suppliers to transition
217	Engagement with suppliers
218	Reduction in price through negotiations
219	Value driven reputation
220	Attract the correct talent
221	Attract and retain talent
222	Save on operation cost
223	Create an innovative environment
224	Opportunity to be a leader in the transitioning
225	Opportunity to influence policies and frameworks
226	Provide an edge for acquisitions and mergers
227	Preferred by investors
228	Customer demand for your product
229	Avail information
230	No need to reinvent the wheel
231	Invest in communities beyond the end of life of mines
232	Operate within the governing laws
233	Support local supply chains
234	Namibia not a big carbon emitter
235	Minimal carbon footprint from the mining industry
236	Pressure to transition is external
237	Transition in Namibia is due to recognition from the outside world
238	Namibia absorb more than what it emits
239	No need for the mining industry to pursue carbon goals
240	Outside pressure to transition due to relations

Source: Researcher's Own.

Appendix F – ATLAS.ti Codes (continues)

241	Practically not possible for mines to rely solely on solar energy
242	In the short-term source of energy is fossil fuels
243	Supplementary measures is that mines are building own renewable power plants
244	Renewable energy not capable of providing base load
245	Mines are supplementing operations with renewable power plants
246	Investment in research - sustainability
247	Mines relies heavily on fossil fuel
248	Source of electricity is mostly fossil fuel
249	Investment in research and technology that are environmental friendly
250	Incorporate green fuel usage
251	Reduce reliance on fossil fuel
252	Low profit margins in the mining industry
253	High cost of infrastructure for transitioning
254	Mines are supplementing government to achieve the climate change agenda
255	Small population with minimal industrial activities
256	Transitioning provides an opportunity for fossil fuel reduction in supply chain
257	Reduction in the imports of fossil fuel
258	Opportunities for suppliers to source locally
259	Renewable energy not stable, nor secured and its not cost efficient
260	More resilient and independent of foreign supply and sustainable in the long run
261	Government is proactive and forward looking in terms of policies
262	Namibia popular due to its green energy transitioning
263	Stakeholders - civil society & private sectore
264	Stakeholders - government and international bodies
265	Energy efficiency to tranistion to carbon neutrality
266	Scope 1 emissions
267	Scope 2 emissions
268	Commitment of protecting the natural world
269	Commitment of carbon neutral by 2030
270	Four pillars that define the drive to carbon neutrality
271	strategy framework for carbon neutrality
272	Improving energy efficiency
273	Introduce alternative fuels
274	Replacement of fossil fuel with low emissions option
275	Capturing any residual emissions
276	Engagement and collaboration with stakeholders
277	Diamonds are key economic drivers
278	For finance sustainability protecting the environment is key
279	Customer conscious in what they buy
280	Important to reduce emissions to retain and attract customers

Source: Researcher's Own.

Appendix F – ATLAS.ti Codes (continues)

281	Social responsibility call
282	Possibility of being pushed out of business
283	They still a lot of sort of of of engagements that's required in terms of raising awareness, raising behavior, change associated with energy wastage associated with impact of energy wastage and how that can be can impact emissions.
284	Raising awareness with suppliers
285	Set trends for others to follow - suppliers
286	Support suppliers
287	Arid country
288	Rainfall variability
289	Importance to consider reduction of emisions
290	Social positive impact
291	Job creation
292	Able to tell a story
293	Increase demand for the product
294	Improve livelihoods of people
295	Government to create policies and regulations that enables the transitioning
296	Government should invest in support infrastructure
297	More avenues needed to promote transitioining
298	Transitioning should be weight against other social issues
299	Going green is not an immediate need
300	More companies having climate strategy and climate goals in the past 5 years
301	Customer pressure
302	Competitor pressure
303	Strategy of transitioning
304	3R - reduce, replace, remove
305	Cost benefits
306	Replace fossil fuel with renewables
307	Solar and wind energy
308	Alternative low carbon fuel for marine vessels
309	Reduction of emissions from vessels by 70%
310	Offset the remaining 30%
311	Scope 3 reduce indirect emissions by 25% by 2030
312	Collaborate with suppliers to reduce emissions
313	Cost savings renewable energy is a lot cheaper
314	Energy efficiency, less energy, less cost
315	Job creation from nature based solutions
316	biodiversity conservation.
317	Carbon neutrality solution should not negatively impact biodiversity or the environment
318	Smaller suppliers can be negatively impacted as a result of transitioning
319	Products might be more expensive
320	Issues to comply to laws and regulations

Source: Researcher's Own.

Appendix F – ATLAS.ti Codes (continues)

321	Insignificant emissions from small suppliers
322	No reason to burden with high demands
323	Use renewable energy and competitive advantages
324	Easier to produce low carbon products compared to other countries
325	Namibia positioned itself for green hydrogen, green economic development and innovation
326	Green hydrogen offers opportunities for local businesses
327	Financial evaluate which projects makes business sense
328	Alternatively postpone the transitioning
329	Government needed to change current agreements
330	Laws that would enable own generation of alternative energy
331	Clear laws and regulations to enable the transitioning
332	Government to allow innovation and new ideas
333	Educational institution needed for knowledge
334	Right skills needed
335	Local empowerment to avoid import of skills
336	Access to capital to innovate
337	Key stakeholders - civil society and community
338	Avoid massive protests to ensure successful transitioning
339	Collaboration with businesses to ensure smooth transitioning
340	In the long-term companies would require low carbon products
341	Supplier engagement sessions
342	Provide training and workshops on carbon measures and reporting
343	Provide technical support
344	Decarbonization is technically impossible
345	Zero emissions
346	Care for environment and care for humans
347	Mining companies big emitters
348	Protection of companies' image
349	Providing support to the environment
350	Pressure from competitors
351	Supply chain challenges with regards to finding equipment, technology, services, experts and also pricy.
352	Transition results in increased cost
353	Challenge of finding equipment needed for transitioning
354	Selling and buying carbon credits
355	Carbon credits
356	Carbon credits may hinder carbon neutrality goal
357	International bodies to provide guidance
358	Countries to set up smaller level sustainable projects
359	Big projects requires big investments and huge benefits for investors then users
360	Key stakeholders

Source: Researcher's Own.

Appendix F – ATLAS.ti Codes (continues)

361	Drive transitioining through tender and contractual requirements
362	Sharing of information
363	Coaching of suppliers
364	Project should have meaningful impact
365	Electricity main carbon emission source
366	Fossil fuel being the second biggest carbon emission source
367	Eliminate carbon footprint by 2030
368	Replace coal powered electricity with renewable energy sources
369	Source green fields as alternative to fossil fuel
370	Generate green hydrogen
371	Carbon capture
372	Educate suppliers to comply to the principles
373	Suppliers to demonstrate compliance in their processes
374	Bigger suppliers already have standards embedded and are easier to take along on the journey
375	Smaller or local suppliers impact is minimal
376	Global companies signed MOU to reduce emissions
377	No penalizing suppliers but would move into that direction in the near future
378	Namibia does not have an enabling environment for total transition
379	More savings than cost
380	Current cost of electricity have increased above inflation, more attractive to install renewable energy
381	Smaller suppliers faces challenges of installing renewable energy
382	Green hydrogen is currently expensive
383	Power utility companies are key stakeholders
384	Government for laws and regulations
385	Board of directors
386	Community we operate in
387	Service providers to assist in the transitioning by joining the journey
388	Compliance obligations drives the transition
389	Supply chain to look into technology that can reduce emissions
390	Report on sustainability progress and management
391	Lack of understanding
392	environmental social responsibility
393	Climate change issues motivates the transitioning
394	Government to introduce laws and taxes that would aid the transitioning
395	Government to introduce reporting through laws and regulations
396	Understanding what your clients do with regards to carbon neutrality
397	Internal measures of transitioning
398	Importance of carrying your customers and suppliers on the transitioning journey
399	Intentional with the internal transitioning
400	Transitioning is for the wellbeing of employees

Source: Researcher's Own.

Appendix F – ATLAS.ti Codes (continues)

401	Decarbonize means contributing to the SDGs
402	Its important to carry others on the journey
403	Change in behavior will ease the transitioning
404	Preserve the future
405	Transitioning is collective effort
406	Climate change is not a first world problem although they are the biggest emitters
407	Considering impact of climate change one needs to unpack the economic development
408	Inclusivity and collaboration to ensure successful transition
409	Climate change affects everyone
410	Need to influence
411	Buy-in from stakeholders
412	Small steps to achieve the bigger goal
413	Deliberate engagement with key stakeholders
414	Government able to include the masses
415	Traditional leaders
416	Policymakers for compliance purposes
417	Triple bottom line - profits, people and planet

Source: Researcher's Own.