

The positive and negative effects of Carbon Tax implications on Entrepreneurship and SMEs

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Mini-dissertation submitted in partial fulfilment of the requirements for the degree *Master of Business Administration* at the North-West University

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Graduation: May 2018

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ACKNOWLEDGEMENTS

I would like to convey my heartfelt gratitude for the support received from the following individuals:

- To the Almighty God for the strength and perseverance through this journey.
- My mentor Joko Khobo who believed in me against all odds.
- My supervisor, Johan Jordan, for the guidance and encouragement.
- To my loving family, especially dearest mother, who had no clue on what I was doing, but boosted my morale when the chips were down.
- To the (MOES) Masters of Excellent Syndicate, for being great team players, and hardworking individuals.
- Not forgetting the Society of Chemical Engineering from The Vaal University of Technology for the assistance in rolling out the questionnaires, and providing contact details of most of the respondents.
- To the hard working entrepreneurs, who shared insight to their business and allowing me in their busy lives.
- To my two dogs, Starring and Mo – you guys were great company throughout my journey.

ABSTRACT

Carbon in the atmosphere has increased from a historical average of 275 parts per million in the first half of the 20th century to approximately 400 parts per million. Moreover, this rate is increasing by approximately two parts per million annually (Mbadlanyana, 2013:90). This rate is higher than ever previously recorded within the planet's history, resulting in disastrous impacts both on people and the environment.

Since carbon tax is new to South Africa, and as with any tax, it is expected that it will have an impact on both entrepreneurships and SMEs, which may be either positive or negative. This study seeks to determine exactly what this impact is on these organizations.

This study has an objective of assessing the impact of Carbon tax on entrepreneurship and SMes in South Africa. The carbon tax has been a contravention tax, and purpose of the study is to explore how it affects the business environment, and explore any possible opportunities that arise from the tax implementation.

This specific study uses a mixed research model, allowing both quantitative and qualitative data to be considered in the analysis.

The purpose of selecting the mixed research model was to allow opportunities for subjective data (through participant opinions) to be used to support the objective data as far as carbon tax is concerned. The study also presented an opportunity for viewpoints and perspectives to be provided regarding the implications of carbon tax. This option is the most effective for this study because it provides the opportunity for comparison of results based on the objectives established in the introductory chapter.

As a result of the data analysis, the researcher was able to offer conclusions regarding majority viewpoints on carbon tax implementation and its implications. The major goals for this study are threefold: the exploration of the relationship between the carbon tax and entrepreneurs/SMEs; the exploration of the ability/plans of entrepreneurs/SMEs of taking advantages of opportunities related to the Carbon Tax Bill; and exploring the negative aspects of the Carbon Tax Bill as it impacts entrepreneurships/SMEs. In this case, the quantitative data was instrumental in the understanding of the impacts on the

different business types—entrepreneurships and SMEs. The study shows that there are positive relationships regarding entrepreneurships and SMEs in relation to carbon tax.

Key words: SMEs, South Africa, carbon tax, implications, finance, entrepreneurship

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CHAPTER 1: INTRODUCTION

1.1. Introduction

The purpose of this study is to provide information regarding carbon in the atmosphere, initiatives to reduce carbon in the atmosphere, and the South Africa carbon tax, and its implications on small and micro enterprises.

1.1.1. Carbon in the Atmosphere

South Africa is ranked within the top 20 countries measured through absolute carbon dioxide emissions. The emission per capita is close to 10 metric tons per annum. Therefore, there have been recommendations by departments within the South African government that greenhouse gas emissions must be reduced without endangering economic growth. (The ideal is therefore to reduce carbon emissions whilst decreasing the unemployment rate and reducing of the poverty rate and reducing inequality). At the Copenhagen Conference of Parties (COPA) in 2011 it was noted that the South African government reiterated and emphasized the country's commitment to support efforts that address concerns relating to climate change (Hoffmann, 2011:236).

A report published by KPMG (2015) postulates that South Africa is the 13th most active country in the world in its attempts to reduce carbon emissions. Initially, South Africa's strategy, aimed at making a contribution towards greenhouse gas emissions mitigation, was adopted by the government in 2011 when the cabinet approved the Government National Climate Change Response White Paper. This commitment was made following the prior commitment by South Africa to undertake appropriate national actions to reduce greenhouse emissions by 34% by the year 2020 and an additional 42% by the year 2025 (KPMG, 2015).

The reasoning behind these commitments is the recognition that climate change is one of the major environmental threats facing the world today, leading South Africa to believe that it is their responsibility – as a global citizen – to reduce its use of fossil fuels through the implementation of renewable energy programmes, focused at reducing the reliance South Africa has on conventional fossil fuels (KPMG, 2015).

1.1.2. Initiatives to Reduce Carbon in the Atmosphere

Carbon dioxide is an increasing problem within the atmosphere and controlling the impacts on the environment, as well as on people, is increasingly difficult. Still, the problem must be addressed and this often requires major changes in countries, which in turn creates additional difficulties. For example, South Africa, is known for being a fossil fuel-based and emission-intensive country, which means that this region would encounter more barriers in implementing legislation such as carbon tax, in order to reduce greenhouse gas emissions (Pegels, 2010:79).

The electricity sector within South Africa is vital to the economy. However, the sector is the largest contributor to carbon emissions in the country. The South African government has therefore taken steps, such as the promotion of renewable energy, to increase energy efficiency. Despite these efforts, there have been failures in the provision of large-scale effects on the environment, suggesting that other actions need to be taken (Pegels, 2010:79). As a result, the Carbon Tax Bill was introduced in 2015. (South African National Assembly, 2015).

1.1.3. South Africa Carbon Tax

The Carbon Tax Bill of 2016 suggests that the use of a carbon tax would lead to the increase in the price of carbon intensive products and services to match real environmental costs. Currently, the carbon tax rate is quite low. The focus is to promote incentives for individuals and businesses to reduce carbon usage in innovative ways in order to pay less tax. The greatest benefit of reducing emissions would therefore be for those parties with the least emission of carbon into the atmosphere (Devarajan, Go, Robinson, & Thierfelder, 2009:229). Thus it is important to understand the carbon tax, including how incentives are impacted, and the implications that exist for entrepreneurs and small and medium enterprises (SMEs) with environmental and commercial goals.

1.2. Statement of the Problem

As stated in the beginning of the chapter, carbon in the atmosphere has increased from a historical average of 275 parts per million in the first half of the 20th century to approximately 400 parts per million. Moreover, this rate is increasing by approximately two parts per million annually (Mbadlanyana, 2013:90). This rate is higher than ever

previously recorded within the planet's history, resulting in disastrous impacts both on people and the environment. As a result, climate scientists have revised the levels of carbon dioxide within the atmosphere that is generally regarded as safe to be 350 parts per million. Despite these concerns, little has been done in a coordinated way to alleviate the carbon emission rate into the atmosphere. Although the objective of implementing the carbon tax is to reduce greenhouse gases which is encompassed in the field of environmental sustainability, the impact of this tax implementation on entrepreneurs and SMEs needs to be considered.

1.3. Purpose of the Study

It is envisaged that carbon tax in South Africa would lead to changes in the behaviour of companies emitting carbon, as well as incentivizing a shift towards the use of cleaner technology (Pegels, 2010:79). The Carbon Tax Bill was published by the South African National Assembly in 2015 following the announcement made by the Minister of Finance (South African National Assembly, 2015:57). Therefore, the purpose of this study is to increase awareness regarding the South African Carbon Tax Bill, with the objective of unpacking why the bill is necessary as well the anticipated impact of this bill on businesses such as entrepreneurships and SMEs.

Through the implementation of carbon tax it is expected that all South African businesses will have to adjust business operations in order to adapt to the tax. There should also be an awareness of opportunities that could arise as a result of the carbon tax. For instance, entrepreneurs within the emission and clean air industries can use the carbon tax to their advantage through the establishment of innovative products or by finding solutions to challenges faced by other companies as they comply with the carbon tax legislation.

1.4. Research Aims and Objectives

1.4.1. Research Aims

The research aims informing this study are:

- exploring the relationship between the carbon tax and entrepreneurships/SMEs

- exploring the ability/plans of entrepreneurships/SMEs of taking advantage of opportunities related to the Carbon Tax Bill
- exploring the negative aspects of the Carbon Tax Bill as it impacts entrepreneurships/SMEs.

1.4.2. Research Objectives

The research objectives informing this study are therefore:

- understanding the reasons for the carbon tax
- How the carbon tax will affect entrepreneurs and SMEs in South Africa
- Assess industries where the carbon tax has been implemented
- understanding the components of the carbon tax
- understanding the implications of the carbon tax on entrepreneurships/SMEs
- understanding opportunities/consequences derived from the implementation of the carbon tax.

1.5. Research Questions

Based on the research aims and objectives, the researcher was able to formulate the following research questions .

1.5.1. Research Questions

The research questions informing the study are as follows:

- From the perspective of entrepreneurs and SMEs, what led to the establishment of the carbon tax in South Africa?
- From the perspective of entrepreneurs and SMEs, what kind of implications does the carbon tax implementation entail?
- From the perspective of entrepreneurs and SMEs, what are the opportunities and consequences derived from the implementation of the carbon tax?

1.6. Significance of the Study

This study is significant because it provides an in-depth understanding of the carbon tax and how it is impacting entrepreneurships and SMEs.

It is known that non-combustion energy sources (such as wind, sunlight, hydropower, and nuclear) do not convert hydrocarbons to carbon dioxide – a heat-trapping greenhouse gas, which represents a negative externality on the climate system (Robinson, Robinson, & Soon, 2007:90). Since greenhouse gas emissions are caused by the combustion of fossil fuels, they are closely related to the carbon content of the respective fuels. This suggests that a tax on these emissions can be levied by taxing the carbon content of fossil fuels at any point in the product cycle of the fuel (Department of Energy, 2016:80).

According to the Department of Minerals and Energy (2004), carbon tax aims to establish consequences for polluters and acts in the best interest of the planet. As a result, all South Africans need to know how the carbon tax will impact them individually as well as in a business sense for entrepreneurships and SMEs (Department of Minerals and Energy, 2004:22). According to Mandy (2010), the primary objective of carbon tax implementation is to change current and future behaviour, as opposed to increasing revenue.

Therefore, the carbon tax starts with a low carbon price, which is then progressively increased significantly after a set period of time. This approach provides the industry and other major emitters with the opportunity to innovate and invest in greener technologies for future operations. This study focuses on the impact of the carbon tax on entrepreneurships and SMEs, including innovation strategies.

1.7. Overview of the Research Methodology

One of the problems identified is the lack of available information relating to the impact of the Carbon Tax Bill on entrepreneurships/SMEs. It is believed that this impact is both positive and negative, depending on the nature of the company and on the ways chosen by the company to respond to the Carbon Tax Bill (Department of Energy, 2016:22). However, it is clear that action is needed to reduce the rate of greenhouse

gas emissions in the atmosphere in order to ensure the planet remains healthy (Mbadlanyana, 2013:90). A mixed methods approach was therefore followed.

The purpose of this mixed methods research project was to test the correlation between impact of the Carbon Tax Bill and entrepreneurs and SMEs. The independent variable was therefore the Carbon Tax Bill and the dependent variable was the impact of the Carbon Tax Bill on entrepreneurs and SMEs. The variables were measured using descriptive statistics. Several tests were made, namely, Pearson's correlation coefficient, linear regression, and the chi-square test.

1.8. Definition of Terms

The focus of this section is to define common key terms and concepts found within this study. In the context of this study, the following definitions are used:

Carbon Dioxide – Carbon dioxide is defined as a colourless and odourless gas that is produced through the burning of carbon and organic compounds, as well as through respiration. Carbon dioxide is naturally present within the atmosphere (resulting in about 0.03% of the atmosphere's composition) and is absorbed by plants in photosynthesis. However, the rate of carbon dioxide being emitted into the atmosphere by the burning of fossil fuels is at a harmful rate, resulting in environmental damages (Metz, Davidson, Coninck, Loos, & Meyer, 2005:61).

Carbon Tax Bill The Carbon Tax Bill refers to tax implemented in South Africa in response to raising concerns regarding the current environmental impact of carbons. In this case, carbon tax refers to a price that will be paid for the use of carbon products and services in an effort to reduce the dependence of the country on fossil fuels (Avi-Yonah & Uhlmann, 2009:50)

Climate Change –Climate change refers to changes within global or regional climate patterns. Climate change is attributed to the increased level of atmospheric carbon dioxide produced through fossil fuel usage (Intergovernmental Panel on Climate Change, 2014).

Entrepreneurs –Entrepreneurs refer to those that organize businesses, commonly considered to be leaders (Abu-Saifan, 2012).

Entrepreneurships –Entrepreneurships refer to the activities undertaken through establishing a business, particularly if it involves financial risk-taking (Abu-Saifan, 2012).

Environmental Entrepreneurs –Environmental entrepreneurs refer to those that work to change their local culture (Abu-Saifan, 2012).

Global Warming –Global warming refers to the gradual increase in the temperature of the planet, caused by the greenhouse effect, which is caused by carbon dioxide and other pollutants (Intergovernmental Panel on Climate Change, 2014).

Greenhouse Gas Emissions –Greenhouse gas emissions refer to any pollutant that can absorb infrared radiation, causing heat to be absorbed and held in the atmosphere, causing the temperature of the planet to increase (Intergovernmental Panel on Climate Change, 2014).

Small and Medium Enterprises (SMEs) –SMEs refer to micro, small, or medium sized enterprises with fewer than 250 employees (The US Small Business Administration, 2015).

1.9. Organization of the Remainder of the Study

This study is divided into five chapters. Chapter 1 contains the introduction to the study, including background information, the problem statement, the purpose of the study, research aims, objectives, questions, and hypotheses, overview of the research methodology, significance of the study, and definitions used. Chapter 2 presents a literature review of the Carbon Tax Bill, including its requirements and consequences. The chapter also contains the theoretical framework to be used in the research methodology.

Chapter 3 presents the methodology used for the study, including information regarding the research method and design, materials and instruments, population sampling and procedures. The chapter also includes data collection and analysis procedures, methodological assumptions, limitations and delimitations of the study along with ethical considerations. Chapter 4 provides how the data was collected through the participants.

Chapter 5 is a complete evaluation of the data collected throughout the study. This chapter is the culmination of the study and discusses all of the findings of the research

(including addressing the aims, objectives, research questions, and hypotheses) and offers recommendations for future studies and/or future actions.

1.10. Summary

Carbon found within the atmosphere has increased from 275 parts per million to 400 parts per million, which is an increase of 2 parts per million annually (Mbadlanyana, 2013:90). This number has been reported to be higher than any in the recorded history of the planet, leading to disastrous impacts on people and the environment. As such, the highest safe carbon level is deemed to be 350 parts per million. Despite the changes in the climate, there has been limited coordination among nations to reduce the carbon level in the atmosphere (Deloitte, 2014:147). South Africa has taken a stance against these concerns through the installation of carbon tax, resulting in different implications for entrepreneurships and SMEs.

Through the implementation of the carbon tax, it is expected that all South African businesses will have to adjust business operations in order to adapt to the tax. In addition, SMEs need to understand and implement opportunities that can be exploited as a result of carbon tax. For instance, entrepreneurs within the emission and clean air industries can use carbon tax to their advantage through the establishment of innovative products and establish solutions to challenges faced by other companies as they comply with the carbon tax legislation.

The research aims informing this study are: (1) exploring the relationship between carbon tax and entrepreneurs/SMEs; (2) exploring the plans and ability to generate plans of entrepreneurs/SMEs of taking advantage of opportunities related to the Carbon Tax Bill; and (3) exploring the negative aspects of the Carbon Tax Bill as it impacts entrepreneurs/SMEs. The research objectives informing this study are: (1) understanding the causes of the carbon tax; (2) understanding the components of the carbon tax; (3) understanding the implications of the carbon tax on entrepreneurs/SMEs; and (4) understanding opportunities/consequences derived from the implementation of the carbon tax.

The research questions informing the study are: (1) What led to the establishment of the carbon tax in South Africa? (2) What kind of implications does the carbon tax

implementation entail? (3) What are the opportunities and consequences derived from the implementation of the carbon tax?

CHAPTER 2: LITERATURE REVIEW

The goal of the literature review is three-fold. Firstly, literature regarding carbon dioxide in the atmosphere (such as the impact and prior initiatives to reduce carbon-related environmental pollution) is discussed. Secondly, the Carbon Tax Bill (such as the history and implementation, as well as implications) is discussed. Finally, the theoretical framework that underpins the study is established.

The burning of carbon from fuels gives rise to a form of carbon pricing, thus allowing for the carbon tax to be levied, (Parry et al., 2014:120). Carbon tax is a fee derived from the burning of carbon-based fuel such as (oil, gas, coal). The aim of this tax is to reduce the use of fossil fuel which has a combustion that is destroying our climate. The carbon tax can be a powerful monetary disincentive that can motivate switches to clean energy across the economy, and can make it an economic motive to move to non-carbon fuels and energy efficiency.

2.1. Carbon Dioxide in the Atmosphere

As per studies done on the top 20 countries responsible for the most carbon dioxide emissions, it has been shown that individual national interests will differ based on domestic needs, which impacts pricing of carbon dioxide emissions. (Parry, Veung, & Heine, 2014:119). Carbon tax prices were found to be at an average of USD 57.5 per ton of carbon dioxide in 2010. These are derived from reduced air pollution from coal plants and automobile externalities. The pricing of co-benefits leads to a reduction of carbon dioxide emissions by 13.5% by these countries, resulting in a 10.8% global reduction in carbon dioxide emissions (Parry et al., 2014:119).

2.1.1. Impact of Carbon Dioxide

Between 1993 and 2012 carbon levels in the atmosphere have increased from a historical average of 275 parts per million to approximately 400 parts per million, leading to a projected increase of approximately two parts per million on an annual basis (Mbadlanyana, 2013:90). As of 2014, most scientists confirm that the carbon levels in the atmosphere are higher than during any time in the planet's history, leading to disastrous impacts on people and the environment. As a result, climatologists have revised the highest carbon dioxide level that can be regarded as safe to be 350 parts

per million. Despite these concerns, there has been little coordinated action targeted at resolving this issue (Deloitte, 2014:147). However, carbon tax has been introduced in South Africa as part of the regulatory framework over emissions. Nevertheless, carbon tax has implications for businesses throughout the region, especially entrepreneurs and SMEs.

Research suggests that the increased levels of carbon dioxide in the 20th and the early 21st centuries had no major effects on the weather and climate. However, during this same time period, it was noted that increased carbon dioxide in the atmosphere has resulted in increased plant growth (Robinson et al., 2007:90). It is expected that the carbon dioxide levels will continue to increase, mainly as a result of the growing human population. Scientists predict that the increase in carbon dioxide will result in global warming, which could result in disastrous environmental consequences (Robinson et al., 2007:90).

One of the industries contributing most to increased carbon dioxide levels in the atmosphere is the civil aviation industry. Globally, airlines use over 5 million barrels of oil daily, causing a significant amount of carbon dioxide being emitted into the atmosphere (Grote, Williams, & Preston, 2014:224). Within the civil aviation industry, different initiatives are being pursued to address to mitigate carbon dioxide emissions coming from aircrafts. The measures addressed in the study conducted by Grote *et al.* (2014) are (1) legal-related and policy measures and (2) operational and technological measures. Through the understanding of these measures, different insights can be voiced in response to the challenges that the airline faces in mitigating their carbon dioxide emissions (Grote et al., 2014:224). It is forecasted that air traffic will experience considerable growth in the next decade, resulting in the increased contribution of the civil aviation industry to anthropogenic CO₂.

However, it is also believed that, despite the potential barriers and challenges to mitigation, improvements can be made regarding carbon dioxide emission by aircraft.

The aviation industry is a good example of how an industry can be affecting CO₂ emissions, therefore the aviation industry might be a good example of possible problems associated with CO₂, of how an industry can and should start planning around emissions and of how an industry will be affected by carbon tax, (Grote et al.,

2014:226). The aviation industry has taken some measures to reduce CO₂ or to mitigate the effect of the carbon dioxide that is being emitted. Some of these measures are on policy level (of which CO₂ tax could be one) and some are on technical level, where manpower, skills and attitudes (human capital) could be a major issue to address first in dealing with the issue. Since the aviation industry is fragmented, a global regulator might have to be employed to achieve this.

Proven is that some mitigation procedures may be based on market forces for implementation to occur, due to the reduction of fuel consumption of aircraft, as well as the impact the reduced fuel consumption has on reducing the airline's costs of fuel (Grote et al., 2014:224). It is suggested that mitigation strategies from other sources are not related to market forces. In fact, the implementation speed of these types of carbon dioxide emission mitigation strategies resolves human capital for satisfactory resolution. Currently, the global regulatory framework is not satisfactorily able to provide stewardship (Grote et al., 2014:224). In fact, it will be necessary to establish an aggressive global regulator to meet these needs. However, the establishment of such a regulator would be extremely difficult owing to the requirement of international agreement, particularly if the aim is to successfully implement all recommended mitigation procedures for the reduction of carbon dioxide emission (Grote et al., 2014:224). If the mitigation implementation procedures are established, it is expected that the aviation traffic growth will still exceed emission reduction rates.

As a result, it is theorized that the reduction of carbon dioxide emission rates from the aviation industry will require behavioural changes, such as the reduction of air travel demands. This could be resisted by industry stakeholders, creating a potential hurdle in the implementation of mitigation strategies (Grote et al., 2014:224). Part of this potential impasse would be caused by the increase in ticket cost to consumers that would establish the desired lower traffic growth rates. As a result of this possible strategy, carbon dioxide emission costs will be 7 to 100 times more expensive (Grote et al., 2014:224). Therefore, further research needs to be conducted to analyze different mitigation strategies that would effectively reduce the considerable carbon dioxide emissions by the civil aviation industry (Grote et al., 2014:224).

2.1.2. Initiatives to Reduce Carbon-related Environmental Pollution

Although international efforts have been made to reduce carbon dioxide emissions, they were ineffective for a long time. As a result, some areas have changed their focus to climate engineering as a possibility to prevent climate change consequences (Keller, Feng, & Oschlies, 2014). Different methods have been considered effective, including different carbon tax initiatives, yet none have had a significant result. Ultimately, it has been found that climate engineering is not entirely effective at reducing carbon dioxide related pollution (Keller et al., 2014).

Other areas have turned to economic policy to reduce carbon dioxide emissions. For instance, the Chinese government recently established its 13th Five Year Plan. This plan focuses on economic development from 2016 to 2020. Moreover, this plan considers energy and environmental policy. According to one study by Green and Stern (2016), it is possible to use the plan to estimate the trajectory of emissions attributed to China for the subsequent decade. For instance, based on historical evidence, China had significant developmental implications (economic growth) between 2000 and 2013. In fact, during this time period, the Chinese government focused on the development of an energy-intensive and industry-based growth, which was likely the primary cause of the high greenhouse gas emission in the atmosphere by the nation (Green & Stern, 2016:15).

China is developing a new plan to transform to a developmental model that focuses on the achievement of growth that is of better quality, inclusive, and more sustainable. As a result, there are numerous economic challenges associated with this transition (Green & Stern, 2016:15). In 2014 and the first three quarters of 2015, there is an indication that in light of the underlying changes that have occurred within the Chinese economy and governmental policy, carbon dioxide emissions will grow on a limited basis, if at all, and will be based on the prior economic model. This suggests that carbon dioxide emission rates will most likely peak prior to 2025. This is determined through different measurements, such as gross domestic product (GDP), energy/GDP ratios, and carbon dioxide/energy ratios (Green & Stern, 2016:15). Based on these ratios, it is expected that there will be considerable improvements in China's greenhouse gas emission rates during the next decade. Through the study conducted by Green and Stern (2016), it is suggested that there are important areas of the developing Chinese policy that needs to

be emphasized in order to mitigate risks and challenges that may delay the reduction of carbon dioxide emissions. It is suggested that, in conjunction with the international climate policy, the Chinese government establish its commitment to the policy and the reduction of carbon dioxide emissions (Green & Stern, 2016:15). It is suggested that the anticipated peak of 2025 should be considered a conservative upper limit, particularly as the Chinese government tends to promise on a limited basis (known as under-promising) and show results in a significant way (known as over-delivery). It is also recommended that a dynamic approach may be virtuous towards international climate cooperation, particularly in consideration of the Paris Agreement. According to the Paris Agreement, the target goals and policies of different countries are routinely updated based on new information, suggesting that there is an increasing importance on macroeconomic analysis for emissions projection and the develop of climate policy (Green & Stern, 2016:15).

A study conducted by Snyder (2015) promotes a regulation system that focuses on a 'tax and trade' standpoint in order to control emission quantities and costs. In this system, the emitters are taxed using a fixed price for carbon emissions. As a result of this taxation, the government purchases carbon offsets from the existing emissions market. This concept is different than a traditional carbon tax because regulated companies can produce carbon credits, which allows for increased revenue for these companies because the credits can be sold to the government (Snyder, 2015:750). Through this programme, the compliance cost risk is held by the government as opposed to the company. Moreover, the government is able to control how many offsets are purchased, as well as establishing the effective reduction of emissions. This type of hybrid law is the most unusual owing to the possible political advantages that comes from the creation of economic incentives that may impact corporate choices, which is more significant than the trading price, reducing financial transfers that are part of most policies (Snyder, 2015:750).

2.2. Carbon Tax Bill

Contrasting commitments emphasizing greenhouse gas emission reductions leads to border carbon adjustment (BCA) demands. The purpose of BCAs is to prevent the negative competitive effects, as well as possible loopholes related to carbon dioxide. As a result, BCAs that are able to accomplish specific economic objectives, are feasible on

an administration basis, legal in recognizing of the World Trade Organization (WTO) agreements, and are acceptable in the political arena, may be impossible to develop and much less implement (McLure, 2014:556). As a result, it is suggested that the implementation of BCAs be limited to few trade-exposed and energy-intensive products, allowing the BCA to be based on the lower production-related carbon content for the importing country as compared the actual carbon content.

Another possible option is the most innovative technology to reduce carbon dioxide emissions (McLure, 2014:556). However, due to high cost associated, these tactics are currently not feasible, nor acceptable by the WTO, promoting the implementation of carbon taxes. The possible innovations need intensive finding, and will not be discussing further in this study.

2.2.1. History and Implementation of the Carbon Tax Bill

According to the South African Department of Energy (2016), the implementation of a carbon tax would increase the price of carbon-intensive products and services to match environmental costs. Since the price of these products and services would increase, it is suggested that incentives will exist, for both businesses and individuals alike, to establish new ways to reduce carbon usage. At the same time, it is noted that global emissions are not just a local issue, but a global issue. Therefore, in order to meet its obligation to the global environment, the South African government seeks to have a positive influence on the reduction of greenhouse gases through carbon tax. Since carbon tax is new to South Africa, and as with any tax, it is expected that carbon tax will have an impact on both entrepreneurships and SMEs, which may be either positive or negative. This study seeks to determine the extent to which these organizations are impacted by carbon tax.

The understanding of the carbon tax could lead to the generation of different responses from the different stakeholders within South Africa and the world. For instance, the price of carbon-based products and services will increase owing to increased prices to offset the costs associated with the carbon tax. However, these costs will be instrumental in capturing the accurate costs of carbon on the environment (Department of Energy, 2016:22). At the same time, carbon tax does not have any real implications because there are no physical implications of carbon tax, except the increasing harm to the

environment. Therefore, there are few incentives to encourage behavioural changes of people, unless some mechanism exists for the dissemination of knowledge of the tax, the requirements of the tax, and the consequences for not adhering to tax requirements. Commonly, knowledge of carbon tax can be provided through media and word of mouth (Department of Energy, 2016:22).

The other part of carbon tax focuses upon enforcement. For instance, carbon tax does incorporate resources, particularly as it takes more manpower and equipment to monitor and enforce the requirements of the tax (Robb, Tyler, & Cloete, 2010:559). Through democratic governments, such as the one in South Africa, power is balanced, which helps ensure that the carbon tax is adhered to (Van Zyl, 2009:278).

Therefore, carbon tax is in essence an incentive scheme focused on the promotion of behaviour that will lead to reduced pollution. Most proponents of the carbon tax argue that it is necessary to save the natural environment. While the sentiment is true, it is not enough to warrant the implementation of carbon tax. Through the use of carbon tax and refund scheme, it is possible to change incentives through altering 'structure,' also known as the form and shape of behaviour (Harrison & Huntington, 2000:132). As carbon emissions are harmful in the aggregate, action must be taken in the aggregate. However, each individual cannot typically readily monitor their own small contributions, making it increasingly difficult to persuade a complex society to alter behaviour through typical cultural pressure, particularly when it is regarding time-sensitive issues. Certain sub-cultures place considerable value on the natural environment, meaning that carbon tax is not necessary as the individuals within these sub-cultures are willing to purchase carbon-free products and services. However, this is an exceedingly small proportion of the population, resulting in little overall effect on the environment and cannot support enough demand to create a competitive business environment.

Through the implementation of carbon tax, there could be profound implications for environmental entrepreneurs. As people learn of the carbon tax requirements, their knowledge and ability to reflect on changes allows for new activation of information. Therefore, some well-positioned or motivated individuals will see new opportunities resulting from cultural change, promoting new ways of producing emission free energy, as well as products and services with a low carbon impact. Entrepreneurs under the new regime will begin to increase their innovations of socially valuable products and

services, which will add value to the economy. Positive feedback, in this sense, begins as investment and entrepreneurship increasingly enter the competition, driving down costs of emission free products and services, allowing for economic growth (Department of Energy, 2016:80).

In consideration of entrepreneurship processes within this holistic cultural view, it is shown that entrepreneurship is a response to changing cultural beliefs. This is in direct opposition to being a technological solution and preferences in how the natural environment is valued. As leaders of social movements rally support for environmental ideals, it is theorized that entrepreneurs can rally support of commercial interests (van Heerden et al., 2006: 117). Therefore, the actions to implement can establish profound cultural and technological change to society, including the implementation of sustainability standards to ensure that fossil fuels are not replaced with other types of environmental degradation.

It is possible that a double or triple dividend can be passed on to households and industry through the lowering of existing taxes, based on the revenues caused by environmental taxes (such as carbon tax). Common environmental taxes include tax on greenhouse gas emissions, fuel tax, tax on electricity use, and energy tax. Taxes are constructed such that they have a comparable effect on emissions (van Heerden et al., 2006:115). Revenue recycling can occur through “a direct tax break on both labour and capital, an indirect tax break to all households, or a reduction in the price of food” (van Heerden et al., 2006:115). The study results indicate that a triple dividend could result in a decrease in carbon dioxide emissions, an increase in GDP, and a decrease in the poverty rate based on the recycling of any of the four environmental taxes through the reduction of food prices (van Heerden et al., 2006:115).

2.2.2. Implications of the Carbon Tax Bill

A related study that was conducted by (Alton et al., 2014), considered the motivations for the consideration of carbon tax through analysing the anticipated impacts that are associated with the law. It was found that, as of 2014, a carbon tax of USD 30 per ton of carbon dioxide could lead to South Africa being able to meet greenhouse gas emission reduction targets established for 2025. However, it was also found that lack of international or trading partner change and/or support could lead to the reduction of

national welfare and employment in South Africa. Therefore, in order for carbon tax to be more effective, it is important that South Africa introduces carbon adjustments, allowing for the recycling of carbon tax revenue. The latter has a significant influence on outcomes, particularly in relation to growth and equity trade-offs (Alton et al., 2014).

Part of the call for carbon tax was derived for the emergence of sustainability reporting within the last decade. As a result of these sustainability reports, corporate social responsibility is a dominant factor for environmental consciousness, particularly in consideration of the most influential publicly-listed companies all over the world (Pillay & Buys, 2014:823). As a result, there are sustainability reporting requirements that incorporate the South African motor vehicle industry. As of September 2010, South Africa is subject to a carbon excise tax, (Motor Vehicle Carbon dioxide CO₂ Emissions) for all passenger vehicles. In consideration of accounting principles, the carbon tax recognition and disclosure requirements and adequacy suggest that compliance levels by motor vehicle manufacturers may prompt the completion of sustainability reporting and increase of corporate social responsibility measures (Pillay & Buys, 2014:823).

It has been suggested by Winkler and Marquand (2009) that climate change mitigation involves multiple challenges for South Africa. This is because the country's energy development (electricity, green, nuclear) has been highly intensive on a historical basis. However, there are numerous development challenges that South Africa faces. According to Winkler and Marquand (2009), it is possible to achieve positive development through alternative energy mixes. Energy efficiency, for instance, has strong mitigation potential, leading to energy savings in the short-term Winkler and Marquand (2009) -ibid-. In the medium-term, it is suggested that altering the fuel mix, which is currently 75% dependent on coal, is a more significant challenge that is expected to take decades to achieve. It is also expected that the most impactful, yet will take the longest to accomplish, transformation needed is an economic structure alteration, using specific policy instruments Winkler and Marquand (2009). However, a low-carbon economy will not be realized immediately and will require an industrial policy paradigm shift, including provisions for those sectors that are sensitive to energy price changes. At the same time, it will be necessary to establish climate-friendly industries in order to establish and sustain employment and both domestic and foreign direct

investment. Similarly, for the transition to be just, emissions-intensive sectors will have to be phased out over a period of time. In order to meet these requirements, South African government is focused on a vision that is guided by a specific strategic direction and framework to do its part in improving the environment through climate policy. This has been wrought through the understanding by policymakers “that the future will be carbon constrained and that South Africa's emission will have to stop growing, stabilize and decline before mid-century” Winkler and Marquand (2009). The climate change challenge is based on long-term change, yet requires immediate action to establish transformative change within the country.

A similar study to the prior study, done in 2010, suggests that the transformation process is more enormous than thought, especially owing to South Africa’s intensive reliance on fossil fuel, resulting in exceedingly high carbon dioxide emissions. However, as the world becomes more carbon constrained and faces significant climate change impacts, South Africa is focused on the reduction of greenhouse gas emission intensity (Pegels, 2010:823). Within South Africa, one of the most vital sectors of the economy is the electricity sector; yet, this sector contributes the most to the carbon dioxide emissions rate. Essentially, the South African government has promoted energy efficiency and renewable energy usage, despite the lack of significant effects on the emissions rate. One of the most significant challenges, causing the carbon tax to be implemented, is based on economic costs of technologies relating to renewable energy and investment planning issues (Pegels, 2010:823).

2.3. Theoretical Framework

Based on the information presented in the literature review, the theoretical framework is based on the impact of carbon itself or the carbon tax and the innovations implemented and/or planned by the organization. Therefore, the questions used in the survey instrument (see Appendix A) are focused on the theoretical framework, as shown in Table 1:

Table 1: Justification for Survey Questions based on Theoretical Framework

Category	Question	Justification
o l U s l d	My company has become	Focuses on the

	more aware of the impacts of carbon on the environment following the passing of Carbon Tax Bill.	awareness of carbon dioxide impacts and climate change concerns
	My company is impacted by carbon tax on a limited basis.	Shows that there are impacts to business operations owing to carbon tax
	My company is impacted by carbon tax on a significant basis.	
	My company's costs have increased significantly owing to carbon tax and a return has begun to be seen in the financial information.	Shows that there are short-term costs owing to carbon tax, yet returns are occurring
	My company has passed the costs of carbon tax to our customers and do not expect to reduce the prices within the next year.	Short-term returns are not expected despite increased selling prices to customers.
Innovations Implemented for Carbon Dioxide Emission Reduction	My company has begun implementing innovations for renewable energy to reduce our carbon footprint on the environment.	Innovations within the business have occurred to reduce carbon emission.
	My company is an advocate of the use of renewable energy and feel the tax is a fair way to promote awareness, as	Advocates the benefits of the carbon tax, signifying that implementations have been made for

	well as create change in society.	emission reductions
	My company is investing in advanced renewable energy sources to meet business objectives in the future.	Supports renewable energy through example by implementation
	My company is working to implement sustainable processes in our daily operations.	Plans for sustainability and reduced carbon emissions
	My company has passed the costs of carbon tax to our customers and do not expect to reduce the prices within the next five years.	Long-term costs are expected to remain with no return due to the innovations.

The theoretical framework is summarized in Figure 1:

Carbon Dioxide or Carbon Tax Impact	Innovations Implemented for Carbon Dioxide Reduction
• Increased awareness = increased climate concern awareness • Limited impact of carbon tax = causes business operation impacts • Significant company cost increased due to carbon tax with a visible return = short-term costs and short-term revenue improvements • No short-term cost relief expected in the next year = lack of short-term financial benefits	• Innovation implementations have begun occurring = reduced carbon emissions • Renewable energy advocate - supports implementations for carbon emission reductions • Advanced renewable energy sources for business objective purposes = implementation of renewable energy to reduce costs and improve environment • Implementation of sustainable processes = sustainability plans for reduced carbon emission • No long-term cost relief expected in the next 5 years = lack of long-term financial benefits

Figure 1: Summary of Theoretical Framework

2.4. Summary

The literature review focuses on three major components. The first component provided information regarding the impact of carbon dioxide in the atmosphere. It was established that much of the negative impact relates to economic and societal consequences, such as increased costs owing to climate change. The subsection to this major section provides a discussion of prior initiatives and potential initiatives for the reduction of carbon dioxide emissions. This information provides the framework for the establishment of carbon tax in South Africa. The second major section first provides a brief section regarding the cost of carbon emission, which leads to the first subsection, which discusses the history and implementation of the carbon bill. The second subsection discusses the implications of carbon tax, such as expected benefits. The third and final major section had a discussion regarding the theoretical framework is based on two major concepts: impact of carbon dioxide/carbon tax and innovations to combat carbon emissions.

CHAPTER 3: METHODOLOGY

3.1. Introduction

The goal of the research methodology chapter is to provide information regarding the methodology utilized in the completion of this study. The chapter opens with an introduction to the research design, followed by a problem and purposes overview, as well as a restatement of the research questions and hypotheses. Next, there is information provided regarding the research method and design, leading to information detailing the materials and instruments associated with the study. A discussion is held regarding the population sampling prior to discussion the procedures used in data collection and data analysis respectively. The final major section provides a discussion of assumptions, limitations, delimitations, and ethical concerns relating to the study. The chapter concludes with a brief summary.

Common research methods are quantitative and qualitative (Sale, Lohfeld, & Brazil, 2002:53). Within a quantitative approach, theory is tested through deduction, commonly conducted using numerical values. Therefore, quantitative approach is considered to be positivist and objectivist (Feilzer, 2010; Rugg & Petre, 2007:16). Conversely, a qualitative approach is based on induction, making these approaches interpretivist in nature (Feilzer, 2010; Rugg & Petre, 2007:16). By using qualitative research, the researcher can establish new knowledge from differing perspectives.

The study's construction is informed by the goals of the study (identified in Chapter 1), which leads to research question development (also identified in Chapter 1 and restated in this chapter). Within the literature review, the topic was expanded from the introductory topic and explored in greater detail. This specific study uses a mixed research model, allowing both quantitative and qualitative data to be considered in the analysis. The purpose of selecting the mixed research model was to allow opportunities for subjective data (through participant opinions) to be used to support the objective data, allowing viewpoints and perspectives to be provided regarding the implications of the carbon tax. This option is the most effective for this study because it provides the

opportunity for comparison of results based on the objectives established in the introductory chapter. As a result of the data analysis, the researcher will be able to offer conclusions regarding majority viewpoints regarding the carbon tax implementation and its implications.

The major goals for this study are threefold:

- the exploration of the relationship between the carbon tax and entrepreneurships/SMEs;
- the exploration of the ability/plans of entrepreneurships/SMEs of taking advantages of opportunities related to the Carbon Tax Bill; and
- the exploration of the negative aspects of the Carbon Tax Bill as it impacts entrepreneurships/SMEs.

In this case, the quantitative data was instrumental in the understanding of the impact on the different business types—entrepreneurships and SMEs.

3.2. Problem and Purposes Overview

The key findings through the introductory chapter are the lack of information relating to the impact of the Carbon Tax Bill on entrepreneurships/SMEs. It is believed that this impact is both positive and negative, depending on the nature of the company, and the ways chosen by the company to react to the Carbon Tax Bill (Department of Energy, 2016:80). However, it is clear that action is needed to reduce the rate of greenhouse gas emissions in the atmosphere in order to ensure the planet remains healthy (Mbadlanyana, 2013:90). The purpose of this mixed methods research project was to test the correlation relating the impact of the Carbon Tax Bill to entrepreneurships and SMEs. The independent variable was the Carbon Tax Bill. The dependent variables were the impact of the Carbon Tax Bill on entrepreneurships and SMEs. The variables were measured using descriptive statistics, Pearson's correlation coefficient, linear regression.

3.3. Research Questions and Hypotheses

The research questions (RQ_x), hypotheses (H₀), and null hypotheses (H₁) informing the studies are:

- RQ1: From the perspective of entrepreneurships and SMEs, what led to the establishment of carbon tax in South Africa?
- H1₀: Carbon tax was not enacted primarily owing to a need for renewable energies in order to reduce the rate of carbon in the atmosphere.
- H1₁: Carbon tax was enacted primarily owing to a need for renewable energies in order to reduce the rate of carbon in the atmosphere.
- RQ2: From the perspective of entrepreneurs and SMEs, what kind of implications does carbon tax implementation entail?
- H2₀: Carbon tax will have a negative impact on the ability of entrepreneurships and SMES to conduct business
- H2₁: Carbon tax will have a positive impact on the ability of entrepreneurships and SMES to conduct business
- RQ3: From the perspective of entrepreneurships and SMEs, what are the opportunities and consequences derived from the implementation of carbon tax?
- H3₀: Carbon tax will have no impact on the failure rate of entrepreneurships and SMEs.

3.4. Research Method and Design

This study used a mixed method focusing on both quantitative and qualitative data. The data were obtained through a survey¹ using a Likert scale. Qualitative data is obtained through answers provided to questions in the survey, allowing for personalized opinions through open-ended questions. Qualitative data was important for the understanding of how business owners viewed the enactment of carbon tax legislation. Data were

¹ To see a copy of the survey, please see Appendix A.

analysed through Microsoft Excel. This allowed qualitative data to be grouped into similar categories, based on the responses received by participants, leading to the development of themes. Microsoft Excel was also used for the statistical analysis of quantitative data, which allowed for the confirmation/refutation of the hypotheses/null hypotheses (Khan, 2011:201).

3.5. Materials and Instruments

The study was conducted using a survey for data collection. Surveys are based on participant responses, whereas questionnaires are set questions developed by the researcher (Punch, 1998). The survey is formulated as a questionnaire and is divided into three distinct sections (as shown in Appendix A). The first section allowed for demographic information collection. The second section was the Likert scale section. The Likert scale was based on a 1 to 7 scale and is designed to measure the attitudes of the participants. Therefore, agreement informs the measurement of this scale for this specific study (Boone & Boone, 2012:108). Ultimately, the question being answered for each statement was: “Do you agree more or less with this statement?” In the case of this study, 1 = least agreeable; 4 = neutral; and 7 = most agreeable. As a result, quantitative data was obtained for use in the statistical analysis. The final section consisted of open-ended questions.

3.6. Population Sampling

The participants of the study involved 167 entrepreneurs/SMEs within South Africa. In order to participate in the study, the following criteria must be met:

- The participant must be a business owner.
- The participant must be over 18 years of age.
- The participant’s business must be impacted by the Carbon Tax Bill.

The study criteria yielded 74 entrepreneurs participants and 93 SME participants through convenience sampling based on probability sampling. The participants were provided with a cover letter and an informed consent form (see Appendix B and C), advising them of their rights in relation to the study. All participants completed the quantitative portion, whereas 76 entrepreneurship participants and 91 SME participants completed the qualitative portion.

3.7. Data Collection Procedures

The survey was e-mailed to business owners of entrepreneurships and SMEs, as well as top governmental officials in South Africa. The survey delivery method (e-mail) was selected for easy return and was conducted using an account created with Google mail (Gmail) specifically for the purposes of this analysis. Information was provided in the e-mail² regarding to ethical assurances through the informed consent sheet.³ Participants were provided with three weeks to complete the survey. If the participant had not responded within the one-week mark and two-week mark from the e-mail being sent, a reminder e-mail⁴ was sent to the participant. Three days prior to the completion of the study period, a final reminder e-mail was sent to the participant. Surveys obtained after data collection close period were not considered in the final results. Participation was voluntary and respondent had option not to reply, should there be concerns of confidentiality.

3.8. Data Analysis Procedures

As noted, quantitative data is important owing to the numerical values that can be derived from the raw data.⁵ Therefore, using the quantitative data collected, a statistical analysis was conducted, allowing for the confirmation or refutation of the hypotheses. Conversely, qualitative data focused on the meaning of the raw results. Using the qualitative data collected, data results meanings were reconciled with existing information from prior studies by other researchers (Verd, 2009). Therefore, links could be established between current knowledge and new knowledge obtained from study results.

Quantitative and qualitative data used different data analysis techniques; yet, both were conducted within Microsoft Excel. The qualitative data was coded based on similar categories according to the results of the survey.⁶ The intent of the responses was identified in this manner and the messages conveyed by participants. The individual

² To see the e-mail body text, please see Appendix B.

³ To see the informed consent text, please see Appendix C.

⁴ To see the reminder e-mail body text, please see Appendix D. For simplicity, 1-week, 2-week, and 3-day prior e-mail body text are included in this appendix.

⁵ Raw data results can be found in Appendix E.

⁶ Qualitative results were obtained through Section 3 of the survey in Appendix A.

categories were labelled with an alphabetical code. This code has no significance to the study results and only allowed for easier sorting of the results.

Quantitative data analysis included descriptive statistics (mean, mode, and standard deviation), Pearson's correlation coefficient, regression analysis, and the chi-square test. The descriptive statistics were used for summation purposes of the overall data. The mean shows the central tendency measure of a single value to describe the dataset based on the central point of the dataset (Hebl, 2015). On contrary, the mode shows commonalities in the data, such as the most common response to a specific question to show majority response. The standard deviation shows variability and diversity of the variables. Thus, the standard deviation is designed to indicate the deviation of the individual data points as opposed to the average. A low standard deviation suggests a lack of diversity and the conclusion that the data points remain close to the mean and vice versa (Hebl, 2015).

The disbursement found through the standard deviation can be confirmed by the regression analysis, which shows the slope of the data. At the same time, Pearson's correlation coefficient reveals the relationship that exists/does not exist within the data through the indication/lack of indication of association (correlation) between the variables. A high correlation is 0.5 to 1.0 or the inverse of these values; a medium correlation is 0.3 to 0.5 or the inverse of these values; and a low correlation is 0.1 to 0.3 or the inverse of these values (Sedgwick, 2012:443). The association can assist in the confirmation/refutation of the hypothesis/null hypothesis. The chi-square test provides definitive conclusions to the hypothesis/null hypothesis confirmation/refutation.

3.9. Assumptions, Limitations, Delimitations, and Ethical Concerns

This section provides information regarding the assumptions, limitations, delimitations, and ethical concerns associated with the research study. The goal of addressing these concerns is to reduce concerns relating to validity and reliability.

3.9.1. Assumptions

It was assumed that data was obtained objectively. In addition, it was assumed that participants would answer honestly and with integrity, as well as complete the survey in

full. It was assumed that some information would be biased. Finally, it was assumed that some potential participants would elect to not participate in the study.

3.9.2. Limitations

Limitations refer to those characteristics of the research design that impact the interpretation of the results (Khan, 2011:201). Precisely, limitations are the constraints on the data owing to the methodology frameworks, impacting internal and external validity through methodological or researcher limitations. In the first case, methodological imitations refer to study specific factors, such as survey instrument, sample size, inclusion criteria, and data collection/analysis procedures (Khan, 2011:201). Within this research study, the possibility of research bias is acknowledged. Other research limitations exist owing to response bias, caused by flaws in the researcher bias, such as systematic errors. This is accounted for through the use of a 95% confidence level. Population definition errors exist because of the variation between the required population size and defined population by the researcher (Khan, 2011:201). These are alleviated through the inclusion of a criterion for inclusion in the study. This also alleviates sampling frame errors. Data analysis errors are alleviated through ensuring the data are appropriate for the study.

3.9.3. Delimitations

Delimitations refer to the choices made by the researcher (Khan, 2011:201). The researcher elected to survey entrepreneurship and SMEs. Moreover, the companies selected were limited to South Africa.

3.9.4. Ethical Concerns

The participants were required to be at least 18 years of age in order to ensure legal age requirements are made. Therefore, the participants did not require parental permission to participate. No identifying information was collected, ensuring anonymity. The participants were advised of their rights, such as voluntary participation and ability to withdraw from the study at any time. During the data analysis process, all information was stored on a password-protected USB stick. Following analysis, data will be destroyed and the Gmail account created for the purpose of this study will be closed.

3.10. Summary

The study's construction is informed by the goals of the study (identified in Chapter 1), which leads to research question development (also identified in Chapter 1 and restated in this chapter). Within the literature review, the topic was expanded from the introductory topic and explored in greater detail. This specific study uses a mixed methods research model, allowing both quantitative and qualitative data to be considered in the analysis. The purpose of selecting the mixed research model was to allow opportunities for subjective data (through participant opinions) to be used to support the objective data, allowing viewpoints and perspectives to be provided regarding the implications of carbon tax. This option is the most effective for this study because it provides the opportunity for comparison of results based on the objectives established in the introductory chapter. As a result of the data analysis, the researcher will be able to offer conclusions regarding majority viewpoints regarding the carbon tax implementation and its implications. In this case, the quantitative data was instrumental in the understanding of the impacts on the different business types—entrepreneurships and SMEs.

CHAPTER 4: RESEARCH RESULTS

The purpose of this chapter is to present the results of the research study as well as provide a discussion based on the literature review. The chapter is divided into four sections: (1) introduction (contains a brief review of research study purpose, research questions, population, variables, and sampling); (2) demographic information; (3) qualitative themes; and (4) statistical analysis. The chapter will conclude with a brief summary.

4.1. Introduction

The knowledge gap informing this research study was the lack of information relating to the impact of the Carbon Tax Bill on entrepreneurships/SMEs. The purpose of this mixed methods research project was to test the correlation between the impact of the Carbon Tax Bill to entrepreneurships and SMEs. The independent variable was the Carbon Tax Bill. The dependent variables were the impact of the Carbon Tax Bill on entrepreneurships and SMEs. The research questions were:

- RQ1: From the perspective of entrepreneurships and SMEs, what led to the establishment of carbon tax in South Africa?
- RQ2: From the perspective of entrepreneurships and SMEs, what kind of implications does carbon tax implementation entail?
- RQ3: From the perspective of entrepreneurships and SMEs, what are the opportunities and consequences derived from the implementation of carbon tax?

The survey used to answer these research questions can be found in Appendix A. The first section contained demographic data. The second section of the survey was used for quantitative data through the Likert scale, while the third section allowed for the collection of qualitative data. There were 165 entrepreneurs/SMEs within the population. All participants completed the quantitative portion, whereas 98 entrepreneur's participants and 67 SME participants completed the qualitative portion. The survey distribution and return was conducted through e-mail.

4.2. Demographic Information

Demographic information is crucial to understand the basic information (or characteristics) regarding the sample. For this specific study, the demographic information collected was gender, age range, ethnicity based on South African law, education level, business industry, and type of business owned.

Out of 165 responses, 93 (56.16%) were male, 64 (38.99%) were female, and 8 (4.85%) did not indicate their gender. It was established that 31 (18.59%) participants were within the 18 – 24 age range, 58 (35.35%) participants were within the 25 – 34 age range, 72 (43.43%) participants were within the 35 – 44 age range, 2 (0.40%) participants were in the 45 – 54 age range, 3 (0.61%) participants were within the 55 – 64 age range, and 1 (0.20%) participant was 65 or older. It was also found that 3 (1.41%) participants did not reveal their age. The 1991 South African law had 5 classifications for ethnicity: (1) Black African; (2) White; (3) Indians; (4) Coloureds; and (5) Other (South African History Online, 2015). Out of 165 respondents, 101 (60.81%) were Black Africans, 28 (16.77%) were White, 10 (5.86%) were Indians, 14 (8.28%) were Coloureds, and 4 (2.63%) were another ethnicity not listed in the survey. It was also shown that 9 (5.66%) did not indicate their race. Out of 165 participants, 7 (1.41%) participants had no diploma, 6 (3.84%) participants had the equivalent of a high school diploma, 30 (18.38%) participants had some college education, 32 (19.19%) participants had vocational training, 1 (0.20%) participant had an associate degree, 57 (34.55%) participants had an undergraduate degree, 21 (12.73%) participants had a master's degree, 4 (2.63%) participants had a doctorate degree, and 7 (4.44%) participants had some other type of education. It was shown that 4 (2.63%) of the participants did not indicate their educational qualifications.

Out of 165 responses, 37 (23.64%) participants were within the manufacturing industry, 36 (22.83%) participants were within the mining industry, 10 (18.79%) participants were within the agriculture industry. Furthermore, 3.3 (5.86%) participants were within the communications industry, 1.6 (1.01%) participants were within the tourism industry, 3 (1.82%) participants were within the finance/business industry, 2 (0.40%) participants were within the food service industry, 24 (14.34%) participants were within the retail industry, and 14 (8.28%) participants were within other industries not listed in the

survey. However, 5 (3.03%) participants declined to answer. Finally, 24 (44.85%) participants had an entrepreneurship and 84 (55.15%) participants had a SME.

Based on the demographic information, the majority of business owners sampled are black African males, between 35 and 44 years of age, with an undergraduate degree, and operate a SME within the manufacturing industry.

4.3. Qualitative Themes

The classification codes for qualitative data can be found in Table in Appendix E. The questions for the qualitative information were in Section 3 of the survey (found in Appendix A).

The first question asked was regarding the purpose of carbon tax. The themes established based on the results were (1) reduce pollution, (2) increase government revenue, (3) encourage environmental innovation, (4) improve company operations through corporate social responsibility, and (5) establish new policies relating to environmental protections. The most common response resulted in 30 (33.09%) participants stating that the purpose of carbon tax was to encourage environmental innovation. The results are shown in Figure 2:

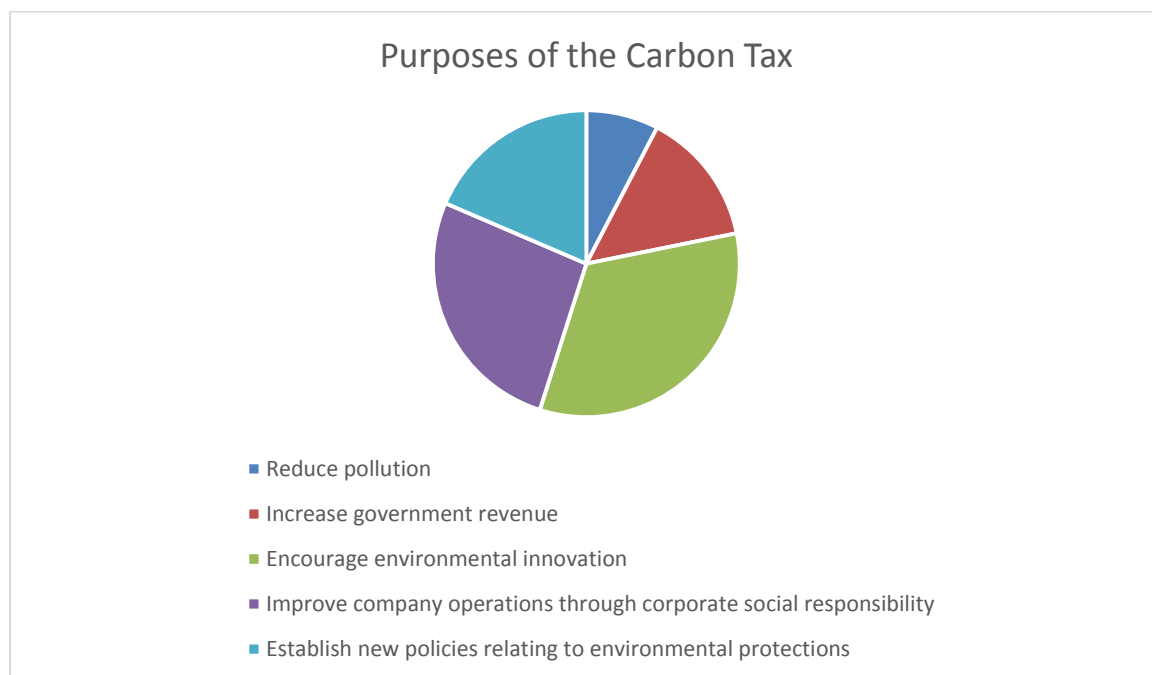


Figure 2: Purposes of the Carbon Tax

The second question asked was regarding the expected benefits of carbon tax. The themes established based on the results were (1) reduction of greenhouse emissions, (2) improved quality of life through fewer toxins being released into the atmosphere, (3) improved innovation to enhance business processes, (4) increased financial performance owing to customer loyalty and satisfaction owing to new policies, and (5) making a positive impact on the environment. The most common response resulted in 36 (38.91%) participants stating that the most significant expected benefit is the positive impact on the environment. The results are shown in Figure 3:

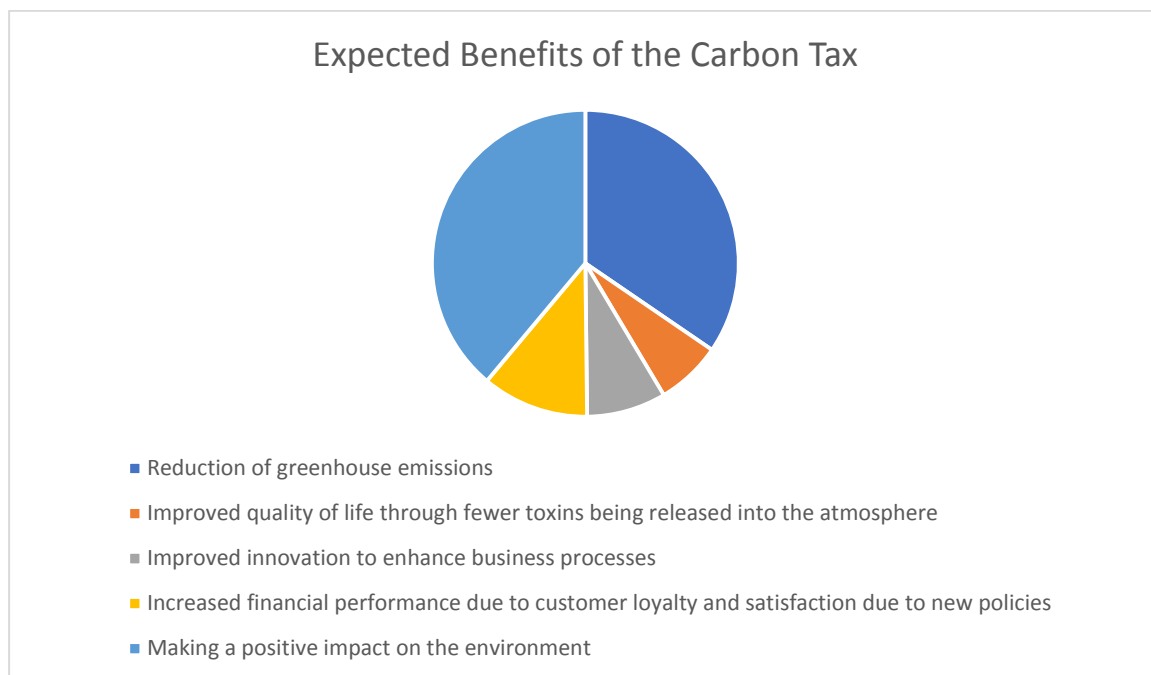


Figure 3: Expected Benefits of the Carbon Tax

The third question asked was regarding the impact of carbon tax on business strategies of entrepreneurs and SMEs. The themes established based on the results were (1) increased costs to consumers to account to increased expenses of conducting business, (2) new marketing tactics to emphasize actions taken to protect the environment, (3) improved innovation reducing production time leading to improved productivity, (4) increased expenses as well as increased revenue owing to consumer approval of the tax, and (5) shortened manufacturing processes leading to less waste. The most common response resulted in 89 (32.36%) participants stating that the carbon tax caused business strategies to accommodate increased expenses as well as

increased revenue owing to consumer approval of tax. The results are shown in Figure 4:

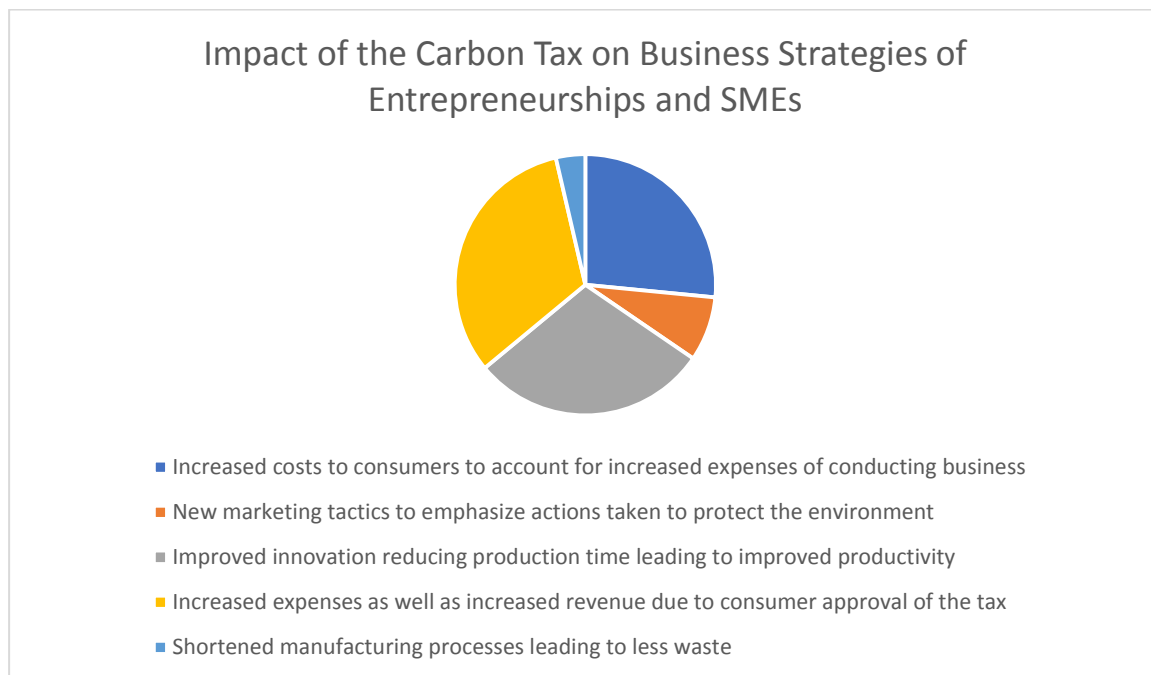


Figure 4: Impact of the Carbon Tax on Business Strategies of Entrepreneurships and SMEs

The fourth question asked was regarding the strategies implemented in response to carbon tax. The themes established based on the results were (1) provided an allowance for employees to use public transportation, (2) offered bonuses for employees to use public transportation or carpool, (3) decreased energy usage in the facility through increased insulation, (4) replaced appliances with energy efficient appliances where possible, and (5) installed solar panels to decrease energy usage. The most common response resulted in 132 (80.73%) participants stating that carbon tax prompted them to install solar panels to decrease energy usage. The results are shown in Figure 5:

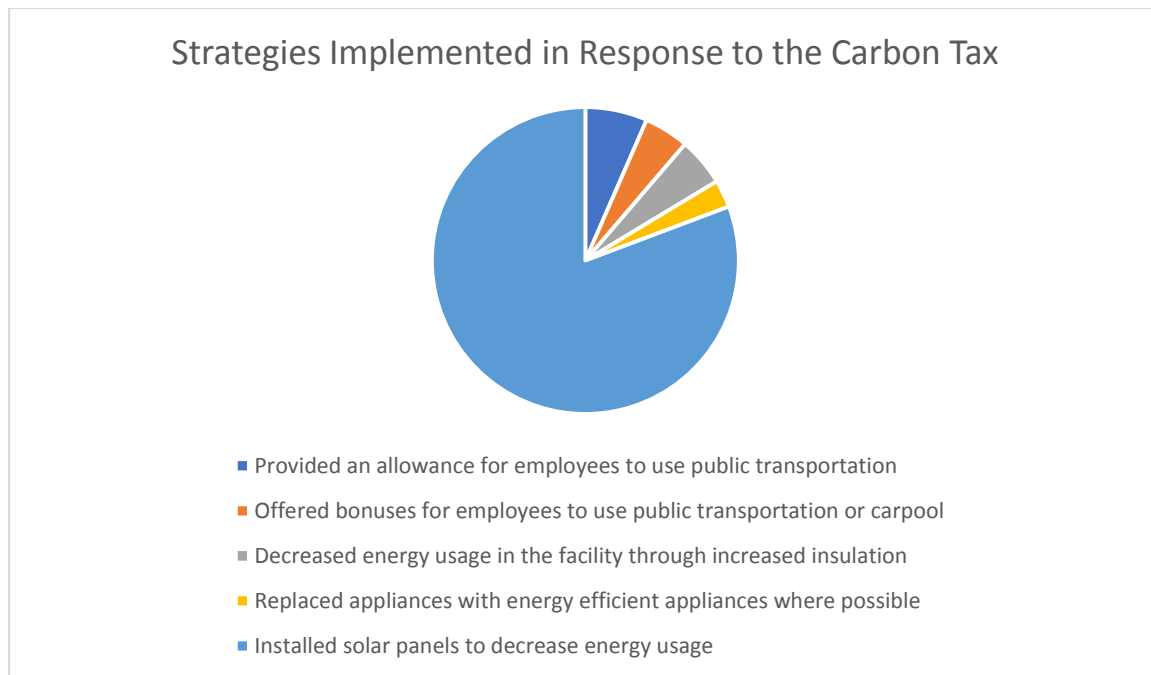


Figure 5: Strategies Implemented in Response to the Carbon Tax

The fifth and final qualitative question asked was regarding the expected benefit/harmful of the carbon tax on businesses in the long-run. The themes established based on the results were (1) beneficial because innovation expenses will eventually decrease, (2) beneficial because production processes are being developed to improve productivity, (3) beneficial because operating expenses will decrease, (4) beneficial because customer loyalty will increase causing revenue increases, and (5) beneficial because operating processes will be improved. The most common response resulted in 58 (35.27%) participants stating that carbon tax would be beneficial because operating processes will be improved. The results are shown in Figure 6:

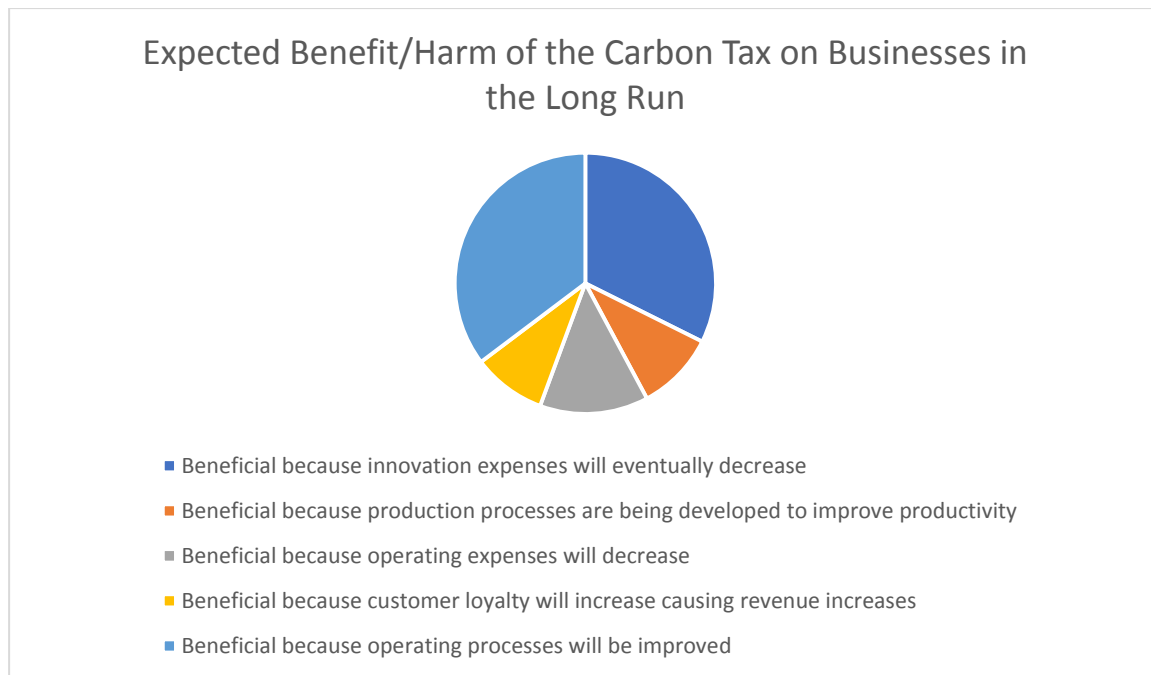


Figure 6: Expected Benefit of the Carbon Tax on Businesses in the Long Run

4.4. Statistical Analysis

Quantitative data were derived from Section 2. The statistical analysis includes descriptive statistics (mean, mode, and standard deviation). The other statistical analyses include regression analysis, Pearson's correlation coefficient, and chi square test. In order to establish validity a 95% confidence level was used within the study.

4.4.1. Descriptive Statistics and Regression Analysis

The first statistical analysis involved descriptive statistics and regression analysis. The first descriptive statistic considered is the mean,⁷ which is the average of all scores, based on Section 2 of the questionnaire based on a Likert scale of 1 to 7. Within this Likert scale, 1 is equal to least agreeable and 7 is equal to agreeable. The mean is being calculated to determine the average viewpoint of all participants (both entrepreneurs and SMEs) within the study. This is shown in Table 2 below:

⁷ The formula for mean used for this study is: $\frac{\sum(\text{Likert scale number} \times \text{Corresponding Responses})}{450}$

Table 2: Mean Descriptive Statistics

Statement from Section 2	Mean
My company has become more aware of the impact of carbon on the environment following the passing of carbon tax.	4.73
My company has begun implementing innovations for renewable energy to reduce our carbon footprint on the environment.	5.84
My company is an advocate of the use of renewable energy and feel the tax is a fair way to promote awareness, as well as create change in society.	5.10
My company is investing in advanced renewable energy sources to meet business objectives in the future.	5.38
My company is impacted by carbon tax on a limited basis.	5.58
My company is impacted by carbon tax on a significant basis.	5.80
My company's costs have increased significantly owing to carbon tax and a return has begun to be seen in the financial information.	6.18
My company is working to implement sustainable processes in our daily operations.	6.28
My company has passed the costs of carbon tax to our customers and do not expect to reduce the prices within the next year.	6.70
My company has passed the costs of carbon tax to our customers and do not expect to reduce the prices within the next five years.	5.42
Average Score for Section 2	5.70

The second descriptive statistic is the mode, determined as the value that occurs most often (Hebl, 2015). If there are equal numbers in more than one category, there is no mode for the statement. The mode for the company is shown in Table 3:

Table 3: Mode Descriptive Statistics

Statement from Section 2	Mode
My company has become more aware of the impacts of carbon on the environment following the passing of carbon tax.	5
My company has begun implementing innovations for renewable energy to reduce our carbon footprint on the environment.	7
My company is an advocate of the use of renewable energy and feel the tax is a fair way to promote awareness, as well as create change in society.	6
My company is investing in advanced renewable energy sources to meet business objectives in the future.	5
My company is impacted by carbon tax on a limited basis.	6
My company is impacted by carbon tax on a significant basis.	5
My company's costs have increased significantly owing to carbon tax and a return has begun to be seen in the financial information.	6
My company is working to implement sustainable processes in our daily operations.	6
My company has passed the costs of carbon tax to our customers and do not expect to reduce the prices within the next year.	7
My company has passed the costs of the carbon tax to our customers and do not expect to reduce the prices within the next five years.	5

The final portion of this subsection is regression analysis. This will be shown through a scatter plot where x is the mean and y is the mode. This will be shown for all 10 statements, as well as for the entire study. The linear regression is shown in Figure 8:

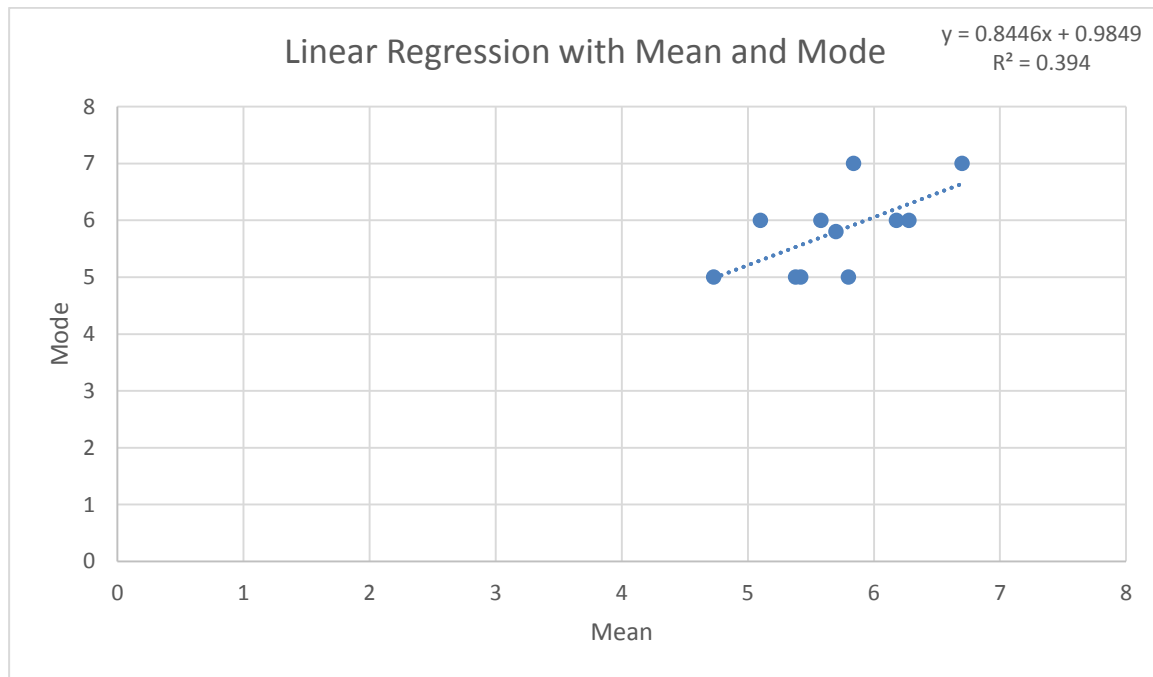


Figure 7: Linear Regression with Mean and Mode

The upward slope to the regression line suggests an increasing correlation. Therefore, the calculation of the Pearson's correlation coefficient is necessary, as shown in the following section.

The third descriptive statistic is the standard deviation,⁸ which focuses on the diversity of the data points through showing how far each data point is from the mean (Hebl, 2015). As a result, a low standard deviation indicates that the variability is low and vice versa. In the case of this study, the standard deviation is 0.08, indicating very little variability within the results. For visual purposes, the mean is shown in Figure 7 for the

⁸ The formula for standard deviation is: $\sqrt{\frac{1}{N-1} \sum_{i=1}^N (x_i - \mu)^2}$. In the case of this study, the standard deviation is calculated based on the averages for the individual statement as the data point (x) and the mean (μ) is the average for the entire survey.

individual statements as well as the entire survey. The standard deviation is compared to the mean to show the minimal variability:

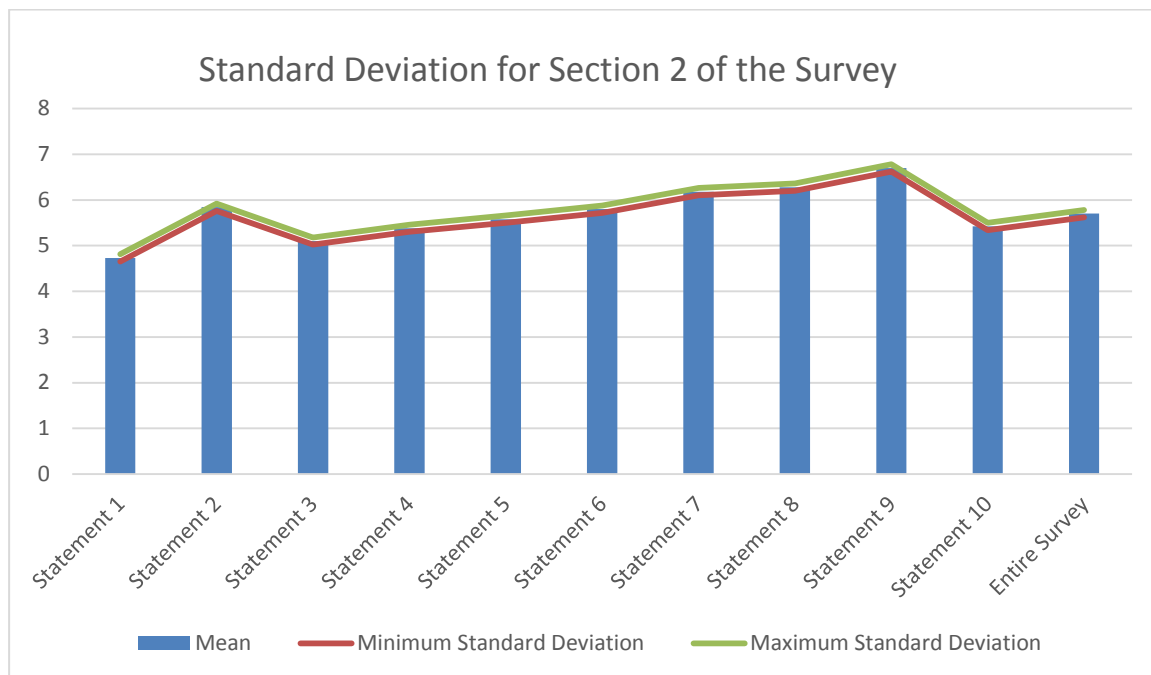


Figure 8: Standard Deviation for Section 2 of the Survey

4.4.2. Pearson's Correlation Coefficient

The second statistical analysis is Pearson's correlation coefficient.⁹ As explained in the preceding chapter, high correlations are represented by 0.5 to 1.0 or vice versa; medium correlations are represented by 0.3 to 0.5 or vice versa; and low correlations are considered 0.1 to 0.3 or vice versa. Typically, the values are based on x and y. For the purposes of this analysis, the value x will consider the questions in Section 2 of the survey that address the impact of carbon itself or the carbon tax (such as increased expenses, etc.)¹⁰ and the value y will consider the questions in Section 2 of the survey

⁹ For the purposes of this study, the formula used for Pearson's correlation coefficient is:

$$r = \frac{\sum xy - \sum x \sum y / N}{\sqrt{(\sum x^2 - (\sum x)^2 / N)(\sum y^2 - (\sum y)^2 / N)}}$$
Because it is based on averages and the statements, N=10.

¹⁰ Value x refers to statements 1, 5, 6, 7, and 9.

that address innovations implemented or planned by the organization.¹¹ The calculation for Pearson's correlation coefficient is shown in Table 4:

Table 4: Pearson's Correlation Coefficient

	<i>x</i>	<i>y</i>	<i>xy</i>	<i>x</i> ²	<i>y</i> ²
	4.7	5.	27	22	34
	3	84	.6	.3	.1
			2	7	1
	5.5	5.	28	31	26
	8	10	.4	.1	.0
			6	4	1
	5.8	5.	31	33	28
	0	38	.2	.6	.9
			0	4	4
	6.1	6.	38	38	39
	8	28	.8	.1	.4
			1	9	4
	670	5.	36	44	29
		42	.3	.8	.3
			1	9	8
S	28.	28	16	16	15
u	99	.0	2.	0.	7.
m		2	41	23	87
N	1				
	0				
	.				
	0				

¹¹ Value *y* refers to statements 2, 3, 4, 8, and 10. Although statement 10 is regarding expenses, it is included in this portion because it addresses long-term expectations of costs.

	0	
Numerator	8	
	1	
	.	
	1	
	8	
Denominator	8	
	2	
	.	
	7	
r	1	
	0	
	.	
	9	
	8	

There is a high Pearson's correlation coefficient, suggesting that the two variables are related.

4.4.3. Chi-square Test

The final statistical analysis is the chi-square test. This will allow for the confirmation/refutation of the hypothesis/null hypothesis. The chi-square test utilizes the same variables as the Pearson's correlation coefficient. This is shown in Table 5:

Table 5: Chi Square Test

Carbon/Carbon Tax Impact		Plans/Current Innovation		Total
Observed ¹³	Expected ¹⁴	Observed	Expected	

¹² The formula for the chi statistic is: $\sum \frac{(x-y)^2}{y}$. In the case of this formula, x refers to the observed value and y refers to the expected value.

¹³ See footnotes 10 and 11 to see the value division. The final row in the observed column is for the sum of the values.

4.73	5.37	5.84	5.20	
5.58	5.43	5.10	5.25	
5.80	5.69	5.38	5.49	
6.18	6.34	6.28	6.12	
	6.70	6.16	5.42	5
28.99		28.02		

The degrees of freedom¹⁵ is 4. At a 95% confidence level, the critical values table¹⁶ show that the critical value is 0.71, while the chi-square value is 0.31. The chi-square analysis was used to measure the participants in terms gender category. Most of the participants were young black males.

4.5. Summary

The results chapter focused on presenting the results of the study. At the beginning of the chapter, the data collection techniques were reviewed briefly, as was the focus of the study. The statistical analysis concluded the chapter, which provided data used to supplement/refute the qualitative results. The statistical analyses used included descriptive statistics, linear regression, Pearson's correlation coefficient, and the chi-square test. The discussion of these results will occur in the final chapter of the study, which is the conclusions chapter.

¹⁴ The formula for expected value is: $\frac{x \times y}{z}$. In the case of this formula, x refers to the row total (which results in 5 totals), y refers to the column total (which is constant for each of the respective columns, and z refers to the sum of all observed values. Columns are constant, meaning that for the first set of observed values, the first column total is used for the calculation of the expected value and for the second set of observed values, the second column total is used for the calculation of the expected value.

¹⁵ The formula for degrees of freedom is: $(x - 1) \times (y - 1)$. In the case of this formula, x refers to the number of rows and y refers to the number of columns (of observed values).

¹⁶(Critical Values of the Chi-Square Distribution., n.d.).

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

The final chapter in this study is the conclusions and recommendations chapter. The first section is the conclusions, which will provide definitive answers to the research questions, as well as discussions relating to the hypotheses. The final section contains recommendations for future actions.

Through the implementation of carbon tax, it is expected that all South African businesses will have to adjust business operations in order to adapt to the tax, as well as understand and implement opportunities that can be exploited as a result of carbon tax. For instance, entrepreneurs within the emission and clean air industries can use carbon tax to their advantage through the establishment of innovative product and establish solutions to challenges faced by other companies as they comply with carbon tax legislation. The research aims informing this study are:

- exploring the relationship between the carbon tax and entrepreneurs/SMEs
- exploring the ability/plans of entrepreneurships/SMEs of taking advantage of opportunities related to the Carbon Tax Bill
- exploring the negative aspects of the Carbon Tax Bill as it impacts entrepreneurs/SMEs.

The research objectives informing this study are:

- understanding the causes of the carbon tax
- understanding the components of the carbon tax
- understanding the implications of the carbon tax on entrepreneurs/SMEs
- understanding opportunities/consequences derived from the implementation of the carbon tax.

The research questions informing the study are:

- From the perspective of entrepreneurs and SMEs, what led to the establishment of carbon tax in South Africa?
- From the perspective of entrepreneurs and SMEs, what kind of implications does carbon tax implementation entail?
- From the perspective of entrepreneurs and SMEs, what are the opportunities and consequences derived from the implementation of carbon tax?

The research hypotheses informing the study are:

- Carbon tax will have a positive impact on the ability of entrepreneurs and SMEs to conduct business.
- Carbon tax was enacted primarily due to a need for renewable energies in order to reduce the rate of carbon in the atmosphere.

The independent variable was the Carbon Tax Bill. The dependent variables were the impact of the Carbon Tax Bill on entrepreneurship and SMEs. The variables were measured using descriptive statistics, Pearson's correlation coefficient, linear regression, and the chi-square test.

5.1. Conclusions

This section is divided into eight subsections, allowing for one section to summarize each demographic data and an overall summary and two subsections for each research question and its related hypothesis/null hypothesis.

5.1.1. Demographic Data Summary

The final results of the demographic information showed that, in general, the majority of business owners in South Africa are Black African males. The latter are between 35 and 44 years of age, with an undergraduate degree, and operate a SME within the manufacturing industry. These numbers and percentages are shown in Table 6:

Table 6: Demographic Data Summary

Category	Response	Number	Percentage (N = 165)
Gender	Male	92	56.16%
Age	35 – 44 years of age	72	43.43%
Ethnicity	Black African	101	60.81%
Education	Undergraduate degree	57	34.55%
Industry	Manufacturing	39	23.64%
Company Type	SME	91	55.15%

5.1.2. RQ 1: Establishment of South African Carbon Tax

The first research question was: From the perspective of entrepreneurs and SMEs, what led to the establishment of carbon tax in South Africa? This information is answered through the qualitative data. The first question asked of those participating in qualitative data was in relation to the purpose of carbon tax. Based on the thematic analysis, the most common themes were:

- reduce pollution
- increase government revenue
- encourage environmental innovation
- improve company operations through corporate social responsibility
- establish new policies relating to environmental protections.

The majority of participants (91, resulting in 33.09%) stated that the purpose of carbon tax was to encourage environmental innovation. Based on the literature review, it is suggested that through the innovations that are possible to reduce carbon dioxide emission rate, such as within renewable energy investments, the reduction of pollution would occur naturally owing to fewer toxins being released in the atmosphere (Grote et al., 2014:224). One significant concern of regulators in relation to emission rates is within the civil aviation industry because it has one of the highest, if not the highest, emission rates of all sectors.

5.1.3. RQ 1: Hypothesis and Null Hypothesis

The hypothesis and null hypothesis associated with the first research question are:

H₁₀: Carbon tax was not enacted primarily due to a need for renewable energies in order to reduce the rate of carbon in the atmosphere.

H₁₁: e Carbon tax was enacted primarily due to a need for renewable energies in order to reduce the rate of carbon in the atmosphere.

As noted in the methodology chapter (Chapter 3) and the findings chapter (Chapter 4), the chi-square test was instrumental in confirming/refuting the hypothesis/null hypothesis. Because the test statistic was 0.31 and the critical value was 0.71, the hypothesis is refuted. As a result, the null hypothesis is accepted. Therefore, it is shown that carbon tax was enacted owing to a need for renewable energies to reduce the rate of carbon emissions in the atmosphere. The quantitative analysis then supports the qualitative analysis, suggesting that the conclusions by the literature review were accurate, resulting in positive goals of carbon tax.

5.1.4. RQ 2: Implications of Carbon Tax Implementation

The second research question was: From the perspective of entrepreneurs and SMEs, what kind of implications does carbon tax implementation entail? This information is answered through the qualitative data. The second question posed to those participating in qualitative data was in relation to the expected benefits of e carbon tax. Based on the thematic analysis, the most common themes were:

- reduction of greenhouse emissions
- improved quality of life through fewer toxins being released into the atmosphere
- improved innovation to enhance business processes
- increased financial performance owing to customer loyalty and satisfaction owing to new policies
- making a positive impact on the environment.

The majority of participants (107, resulting in 33.09%) stated that the most significant expected benefit is the positive impact on the environment. Based on the literature review, this is supported owing to the projections of a lowered carbon dioxide emission rate anticipated for South Africa as well as the anticipated lowered carbon dioxide emission rate anticipated for China (Devarajan et al., 2009:229; Green & Stern:15, 2016; KPMG, 2015). The fifth question posed to those participating in qualitative data was in relation to the expected benefit/harmful of carbon tax on businesses in the long run. Based on the thematic analysis, the most common themes were:

- beneficial because innovation expenses will eventually decrease
- beneficial because production processes are being developed to improve productivity
- beneficial because operating expenses will decrease
- beneficial because customer loyalty will increase causing revenue increases
- beneficial because operating processes will be improved.

The most common response resulted in 97 (33.09%) participants stating that carbon tax would be beneficial because operating processes will be improved.

5.1.5. RQ 2: Hypothesis and Null Hypothesis

The hypothesis and null hypothesis associated with the second research question are:

H2₀: Carbon tax will have a negative impact on the ability of entrepreneurships and SMEs to conduct business

H2₁: Carbon tax will have a positive impact on the ability of entrepreneurships and SMEs to conduct business

As noted in the methodology chapter (Chapter 3) and the findings chapter (Chapter 4), the chi-square test was instrumental in confirming/refuting the hypothesis/null hypothesis. Because the test statistic was 0.31 and the critical value was 0.71, the hypothesis is refuted. As a result, the null hypothesis is accepted.

5.1.6. RQ 3: Opportunities and Consequences of Carbon Tax Implementation

The third research question was: From the perspective of entrepreneurships and SMEs, what are the opportunities and consequences derived from the implementation of the carbon tax? The third question asked of those participating in qualitative data was in relation to the impact of carbon tax on business strategies of entrepreneurships and SMEs. Based on the thematic analysis, the most common themes were:

- increased costs to consumers to account to increased expenses of conducting business
- new marketing tactics to emphasize actions taken to protect the environment
- improved innovation reducing production time leading to improved productivity
- increased expenses as well as increased revenue due to consumer approval of the tax
- shortened manufacturing processes leading to less waste.

The majority of participants (132, resulting in 79%) stated that carbon tax caused business strategies to accommodate increased expenses as well as increased revenue owing to consumer approval of the tax. The fourth question posed to those participating in qualitative data was in relation to the strategies implemented in response to carbon tax. Based on the thematic analysis, the most common themes were:

- provided an allowance for employees to use public transportation

- offered bonuses for employees to use public transportation or carpool
- decreased energy usage in the facility through increased insulation
- replaced appliances with energy efficient appliances where possible
- installed solar panels to decrease energy usage.

The majority of participants (133, resulting in 80.73%) stated that carbon tax prompted them to install solar panels to decrease energy usage. Both questions confirm information established within the literature review, particularly that of the expectations of reduced carbon dioxide emissions through economic policy transformations (Green & Stern, 2016;13).

As noted in the methodology chapter (Chapter 3) and the findings chapter (Chapter 4), the chi-square test was implemental in confirming/refuting the hypothesis/null hypothesis. Because the test statistic was 0.31 and the critical value was 0.71, the hypothesis is refuted. As a result, the null hypothesis is accepted.

5.1.8. Final Conclusions

This section is designed to summarize the descriptive statistics, linear regression, and Pearson's correlation coefficient. The descriptive statistics were based on Section 2 of the questionnaire based on a Likert scale of 1 to 7. Within this Likert scale, 1 is equal to least agreeable and 7 is equal to most agreeable. The mean (4.73) and mode (5) for the first statement: "My company has become more aware of the impacts of carbon on the environment following the passing of carbon tax" were similar. This suggests that the participants were either neutral or agreed to the statement. The latter implies that many organizations became more knowledgeable about the impact of their business operations following the implementation of carbon tax.

The mean (5.84) and mode (7) for the second statement: "My company has begun implementing innovations for renewable energy to reduce our carbon footprint on the environment" were somewhat different. This suggests that the participants either agreed or were most agreeable to the statement. The latter implies that the organization recognizes the benefits of innovation for renewable energy to decrease their costs in the long-run, which will raise net profit.

The mean (5.10) and mode (6) for the third statement: “My company is an advocate of the use of renewable energy and feel the tax is a fair way to promote awareness, as well as create change in society” are similar. This suggests that the participants either agreed or were most agreeable to the statement. The latter implies that the organization recognized that increased advocacy of renewable energy is a beneficial corporate social responsibility policy.

The mean (5.38) and mode (5) for the fourth statement: “My company is investing in advanced renewable energy sources to meet business objectives in the future” is very similar. This suggests that the participants agreed with the statement. The latter implies that policies are being changed to meet the requirements of carbon dioxide emission reduction.

The mean (5.58) and mode (6) for the fifth statement: “My company is impacted by the carbon tax on a limited basis” is similar. This suggests that the participants agreed with the statement. The latter implies that there is recognition of need for strategic changes in order to meet different expectations and new business objectives.

The mean (5.80) and mode (5) for the sixth statement: “My company is impacted by the carbon tax on a significant basis” is very similar. This suggests that the participants agreed with the statement. The latter implies that companies are aware that there may be short-term and long-term impacts of carbon tax.

The mean (6.18) and mode (6) for the seventh statement: “My company’s costs have increased significantly owing to carbon tax and a return has begun to be seen in the financial information” are similar. This suggests that the participants were most agreeable to the statement. The latter implies that companies are realizing the financial gain that can be derived from carbon footprint reduction.

The mean (6.28) and mode (6) for the eighth statement: “My company is working to implement sustainable processes in our daily operations” are similar. This suggests that the participants either agreed or were most agreeable to the statement. This implies that experiences between different companies have been different, possibly owing to the different industries.

The mean (6.70) and mode (7) for the ninth statement: “My company has passed the costs of the carbon tax to our customers and do not expect to reduce the prices within the next year” are similar. This suggests that the participants were most agreeable to the statement. The latter implies that short-term benefits may not be derived through increases of revenue, which contradicts the prior statement, possibly explained through the use of financial ratios.

The mean (5.42) and mode (5) for the tenth statement: “My company has passed the costs of the carbon tax to our customers and do not expect to reduce the prices within the next 5 years” is somewhat similar. This suggests that the participants agreed with the statement. The latter implies that long-term benefits (in terms of financially at least) are not expected to be derived from the innovations.

The mean (5.70) and mode (5.8) for the entire survey are similar. This suggests that the participants agreed with all the statements presented. The latter implies that the participants feel that carbon tax is beneficial.

The standard deviation for the means of the statements was 0.08. This suggests little variation in the data points. This was also shown in the linear regression, where the regression line was upward sloping. The latter suggest that there is a correlation between the means and modes of the statements. In consideration of Pearson's correlation coefficient, high correlations are represented by 0.5 to 1.0 or vice versa. In contrast, medium correlations are represented by 0.3 to 0.5 or vice versa; and low correlations are considered 0.1 to 0.3 or vice versa. The x value and y value were based on the tenets of the theoretical analysis (shown in Chapter 2). Therefore, the x value was represented by the impact of carbon itself or carbon tax (shown in questions 1, 5, 6, 7, and 9). The y value was represented by the innovations implemented or planned by the organization (shown in questions 2, 3, 4, 8, and 10). As a result, in some ways, the first variable can be considered in terms of short-term impacts, whereas the second variable can be considered in terms of long-term impacts. The results of the Pearson's correlation were 0.98, suggesting a high correlation. This information suggests that the relationship between short-term impacts and long-term impacts of carbon tax will continue to increase in conjunction with one another. Moreover, the high correlation shows a strong association between the variables.

5.2. Recommendations

It is recommended that further studies be conducted regarding the impact of carbon tax in South African businesses. This is recommended owing to the emphasis on entrepreneurs and SMEs, yet excludes corporations. Generally, corporations will have a higher tax liability and a higher carbon dioxide emission rate as compared to smaller organizations. At the same time, it would be beneficial to get a wider range of industries or to focus on the implications of the Carbon Tax Bill on one particular industry, such as manufacturing, with a large sample. Practically, it is recommended that organizations continue their efforts to reduce carbon dioxide emissions emitted to the atmosphere. This will help reduce the implications of climate change and will derive multiple benefits for society. Many SMEs found that not much opportunity exists in the implication of the tax bill, other than increasing cost of goods to offset the imposed tax. Many agree that scope for opportunity may results in the consultation on the tax, educating the industry and assisting with compliance.

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APPENDIX A: SURVEY

This appendix contains a copy of the survey sent to participants.

Thank you for taking the time to complete this survey. This research study is designed to test the correlation relating the impact of the Carbon Tax Bill to entrepreneurship and SMEs. All information collected is confidential. Your participation is voluntary and you have the option to withdraw from the study at any time, as well as have your results destroyed. There is no identifying information being taken within this study. This allows for anonymity, which will allow you to answer freely and honestly. Furthermore, this anonymity prohibits any instances of retaliation for participation in this study. Finally, this anonymity allows the researcher to provide unbiased results to the study.

Thank you for your time.

Section 1: Demographic Information

Directions: Please answer the following demographic questions.

Question and Answer Options (where applicable)		Response
What is your gender?	Male Female Prefer not to answer	
What is your age range?	18 – 24 25 – 34 35 – 44 45 – 54 55 – 64 65+ Prefer not to answer	

What is your ethnicity based on the 1991 South African Law?	Black African White Indian Coloured Other Prefer not to answer	
What is the highest degree or level of school you have completed?	No diploma Equivalent of high school diploma Some college Vocational training Associate degree Undergraduate degree Master's degree Doctorate Other Prefer not to answer	
What industry is your business within?	Manufacturing Mining Agriculture Communications Tourism	

	Finance/business services Food service Retail Other Prefer not to answer	
What type of business do you own?	Entrepreneurship SME Other Prefer not to answer	

Section 2: Carbon Tax Impact

Directions: Please rate each statement on a scale of 1 to 7. In this scenario, 1 is least agreeable, 4 is neutral, and 7 is most agreeable.

Statement	1	2	3	4	5	6	7
My company has become more aware of the impacts of carbon on the environment following the passing of the carbon tax.							
My company has begun implementing innovations for renewable energy to reduce our carbon footprint on the environment.							
My company is an advocate of the use of renewable energy and feel the tax is a fair way to promote awareness, as well as create change in society.							
My company is investing in advanced renewable energy sources to meet business objectives in the future.							

My company is impacted by the carbon tax on a limited basis.							
My company is impacted by the carbon tax on a significant basis.							
My company's costs have increased significantly due to the carbon tax and a return has begun to be seen in the financial information.							
My company is working to implement sustainable processes in our daily operations.							
My company has passed the costs of the carbon tax to our customers and do not expect to reduce the prices within the next year.							
My company has passed the costs of the carbon tax to our customers and do not expect to reduce the prices within the next 5 years.							

Please provide any additional information you feel is important to the study:

Section 3: Follow-Up Questions

Directions: Please provide supporting information to the following questions.

Question	Answer
From your understanding, why was the carbon tax enacted?	
What benefits do you see arising from the carbon tax?	
How has the carbon tax impacted your business strategy?	

What strategies have your business implemented in response to the carbon tax?	
In the long run, do you think the carbon tax will be beneficial or harmful in the success of your business? Why?	

Thank you for your participation.

APPENDIX B: ORIGINAL E-MAIL

The purpose of this appendix is to show the original e-mail body text

E-mail Subject Line: Doctorate Research Study Regarding the Carbon Tax Bill

E-mail Body Text: Thank you for taking the time to read this message. I am a student conducting a mixed method analysis regarding the impact of the carbon tax on entrepreneurship and SMEs. By receiving this e-mail and completing the survey (see attached), you are certifying that you are a business owner over the age of 18 and that your business is impacted by the carbon tax. You are also certifying that you have read the informed consent sheet (attached) and agree to its terms. You will have three weeks to complete this survey. A reminder e-mail will be sent out at one week past initial sending, at two weeks past initial sending, and at three days prior to the final deadline. The survey should not take more than 20 minutes of your time. Thank you for your kind attention. Please reply to this message if you have any questions and to return the survey.

APPENDIX C: CONSENT FORM

The following consent form was sent as an attachment to the potential participant. It is assumed that if the participant returns the completed survey, the terms on the informed consent form are agreed to as stated. The title of the saved consent form is: Informed Consent Sheet.

Consent Form for Participation in a Research Study

An Assessment of Carbon Tax Implications on Entrepreneurship and Small and Medium Enterprises

Submitted to respondents

Description of the Research and your Participation

You are invited to participate in a research study created and conducted by Neo Mashile, student number 20445644. The purpose of this study is to test the correlation relating the impact of the Carbon Tax Bill to entrepreneurships and SMEs.

The specific purposes for this research study will be as follows:

- The exploration of the relationship between the carbon tax and entrepreneurships/SMEs;
- The exploration of the ability/plans of entrepreneurships/SMEs of taking advantages of opportunities related to the Carbon Tax Bill; and
- The exploration of the negative aspects of the Carbon Tax Bill as it impacts entrepreneurships/SMEs.

Significance of the Study

It is suggested that a carbon price can result in changes in producer and consumer behaviour, which will result in addressing concerns relating to climate change. Sometimes, the manner used to regulate detrimental conduct is through placing a price on the effects – which is the goal of the South African carbon tax. According to the Department of Minerals and Energy (2004), the carbon tax aims to establish consequences for polluters and acts in the best interest of the planet. As a result, all South Africans need to know how the carbon tax will impact them individually, as well as

in a business sense for entrepreneurships and SMEs (Department of Minerals and Energy, 2004). According to Mandy (2010), the primary objective of the carbon tax implementation is to change current and future behaviour, as opposed to increasing revenue. Therefore, the carbon tax starts with a low carbon price, which is then progressively increased significantly after a set period of time. This approach provides the industry and other major emitters with the opportunity to innovate and invest in greener technologies for future operations. This study focuses on the impact of the carbon tax on entrepreneurships and SMEs, including innovation strategies.

Voluntary Participation

Your participation in this research study is voluntary. You may choose not to participate and you may withdraw your consent to participate at any time. You will not be penalized in any way should you decide not to participate or to withdraw from this study. You will receive no compensation for participating in this study

APPENDIX D: REMINDER E-MAIL

This appendix is divided into three sections. The first section provides the reminder e-mail sent to the participant at the one week mark following initial sending of the informed consent sheet and survey. The second section provides the reminder e-mail sent to the participant at the two week mark following initial sending of the informed consent sheet and survey. The third section provides the reminder e-mail sent to the participant at the three day prior to the final day for acceptance of data from participants.

D.1. E-mail Reminder Text for One Week Prior to Deadline

E-mail Subject Line: Reminder for the Survey regarding the Carbon Tax

E-mail Body Text: This is a reminder that a week has passed since the survey and informed consent was sent to you for completion of the study. Please complete the survey within the next two weeks to be included in the study results. Thanks for your time.

D.2. E-mail Reminder Text for Two Week Prior to Deadline

E-mail Subject Line: Reminder for the Survey regarding the Carbon Tax

E-mail Body Text: This is a reminder that two weeks have passed since the survey and informed consent was sent to you for completion of the study. Please complete the survey within the next week to be included in the study results. Thanks for your time.

D.3. E-mail Reminder Text for Three Days Prior to Deadline

E-mail Subject Line: Reminder for the Survey regarding the Carbon Tax

E-mail Body Text: This is a reminder that over two weeks have passed since the survey and informed consent was sent to you for completion of the study. Please complete the survey within the next three days to be included in the study results. Thanks for your time.

APPENDIX E: DATA RESULTS

The data in this section is used for the data analysis in Chapter 4. The first section summarizes the demographic data presented by the participants. The second section summarizes the Likert scale data presented by the participants. The final section summarizes the follow-up questions data presented by the participants.

E.1. Demographic Data

Table 7: Demographic Raw Data

Questions and Response Options		Response	Percentage
What is your gender?	Male	93	56.16%
	Female	64	38.99%
	Prefer not to answer	8	4.85%
What is your age range?	18 – 24	31	18.59%
	25 – 34	58	35.35%
	35 – 44	71	43.43%
	45 – 54	0.6	0.40%
	55 – 64	1	0.61%
	65+	1	0.20%
	Prefer not to answer	2.3	1.41%
What is your ethnicity based on 1991 South African Law?	Black African	101	60.81%
	White	27	16.77%
	Indians	10	5.86%
	Coloureds	14	8.28%
	Other	4.3	2.63%
	Prefer not to answer	9.3	5.66%
What is the highest degree or level of school you have completed?	No diploma	2.3	1.41%
	Equivalent of high school diploma	6.3	3.84%
	Some college	31	18.38%
	Vocational training	32	19.19%
	Associate degree	0.4	0.20%

	Undergraduate degree	57	34.55%
	Master's degree	21	12.73%
	Doctorate	4.3	2.63%
	Other	7.3	4.44%
	Prefer not to answer	4.3	2.63%
What industry is your business within?	Manufacturing	39	23.64%
	Mining	38	22.83%
	Agriculture	31	18.79%
	Communications	10	5.86%
	Tourism	1.7	1.01%
	Finance/business services	3	1.82%
	Food service	0.6	0.40%
	Retail	24	14.34%
	Other	14	8.28%
	Prefer not to answer	5	3.03%
What type of business do you own?	Entrepreneurship	74	44.85%
	SME	91	55.15%
	Other	0	0.00%
	Prefer not to answer	0	0.00%

E.2. Likert Scale Data

Table 8: Likert Scale Raw Data

Statement	1	2	3	4	5	6	7
My company has become more aware of the impacts of carbon on the environment following the passing of the carbon tax.	13	31	3	6	66	20	18

Percentage	7.88%	18.79%	6.26%	3.84%	40.00%	12.32%	10.91%
My company has begun implementing innovations for renewable energy to reduce our carbon footprint on the environment.	3	27	3	6	31	35	60
Percentage	1.82%	16.36%	1.82%	3.43%	18.99%	21.01%	36.57%
My company is an advocate of the use of renewable energy and feel the tax is a fair way to promote awareness, as well as create change in society.	8	16	24	6	35	72	4
Percentage	5.05%	9.90%	14.34%	3.84%	21.21%	44.85%	0.81%
My company is investing in advanced renewable energy sources to meet business objectives in the future.	1	23	5	1	68	65	1
Percentage	0.61%	14.14%	3.23%	0.81%	41.01%	39.60%	0.61%
My company is impacted by the carbon tax on a	10	9	11	1	33	97	4

limited basis.							
Percentage	6.26%	5.66%	6.87%	0.20%	19.80%	58.79%	2.42%
My company is impacted by the carbon tax on a significant basis.	1	0.5	5	3	111	31	15
Percentage	0.40%	0.20%	2.83%	1.62%	67.27%	18.59%	9.09%
My company's costs have increased significantly due to the carbon tax and a return has begun to be seen in the financial information.	7	3	2	5	53	54	44
Percentage	4.04%	1.62%	0.40%	2.63%	31.92%	32.93%	26.46%
My company is working to implement sustainable processes in our daily operations.	4	0	2	1	66	67	29
Percentage	0.81%	0.00%	0.40%	0.61%	40.00%	40.61%	17.58%
My company has passed the costs of the carbon tax to our customers and do not expect to reduce the prices within the next year.	0	0	4	14	31	33	84

Percentage	0.00%	0.00%	2.22%	8.28%	18.59%	20.00%	50.91%
My company has passed the costs of the carbon tax to our customers and do not expect to reduce the prices within the next 5 years.	1	1	12	3	149	10	2
Percentage	0.20%	0.20%	7.07%	0.61%	84.65%	5.86%	1.41%

E.3. Follow-up Questions Data

Table 9: Classification Codes for Qualitative Data

Question	Classification	Theme
1	A1 A2 A3 A4 A5	Reduce pollution Increase government revenue Encourage environmental innovation Improve company operations through corporate social responsibility Establish new policies relating to environmental protections
2	B1 B2 B3 B4	Reduction of greenhouse emissions Improved quality of life through fewer toxins being released into the atmosphere

	B5	Improved innovation to enhance business processes Increased financial performance due to customer loyalty and satisfaction due to new policies Making a positive impact on the environment
3	C1 C2 C3 C4 C5	Increased costs to consumers to account to increased expenses of conducting business New marketing tactics to emphasize actions taken to protect the environment Improved innovation reducing production time leading to improved productivity Increased expenses as well as increased revenue due to consumer approval of the tax Shortened manufacturing processes leading to less waste
4	D1 D2 D3 D4 D5	Provided an allowance for employees to use public transportation Offered bonuses for employees to use public transportation or carpool Decreased energy usage in the facility through increased insulation Replaced appliances with energy efficient appliances where possible Installed solar panels to decrease energy usage
5	E1 E2	Beneficial because innovation expenses will eventually decrease

	E3	Beneficial because production processes are being developed to improve productivity
	E4	
	E5	Beneficial because operating expenses will decrease
		Beneficial because customer loyalty will increase causing revenue increases
		Beneficial because operating processes will be improved

Table 10: Follow Up Question Results

Question	Classification	Number	Percent
From your understanding, why was the carbon tax enacted?	A1	7	7.64%
	A2	13	14.18%
	A3	30	33.09%
	A4	24	26.55%
	A5	17	18.55%
What benefits do you see arising from the carbon tax?	B1	32	34.55%
	B2	7	6.91%
	B3	8	8.36%
	B4	10	11.27%
	B5	36	38.91%
How has the carbon tax impacted your business strategy?	C1	25	26.55%
	C2	7	8.00%

	C3	27	29.45%
	C4	30	32.36%
	C5	3	3.64%
What strategies have your business implemented in response to the carbon tax?	D1	8	6.55%
	D2	4	4.73%
	D3	5	5.09%
	D4	3	2.91%
	D5	74	80.73%
In the long run, do you think the carbon tax will be beneficial or harmful in the success of your business? Why?	E1	30	32.36%
	E2	9	9.82%
	E3	12	13.45%
	E4	8	9.09%
	E5	32	35.27%