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Senior Decision Makers' Perspectives on South Africa's Climate Change Response Strategy

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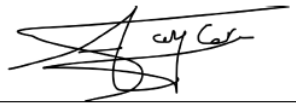
A research report submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Management in Energy Leadership

Johannesburg, October 2021

(Version 2019-2020)

DECLARATION

I, Andrew Allen Taylor, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Management in the field of Energy Leadership at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Name: Andrew Allen Taylor Signature: 

Signed at Stellenbosch, Western Cape, Republic of South Africa

On the 30th day of April 2021

DEDICATION

This report is dedicated first and foremost to my wife, Megan, my daughter, Eleanor Grace and son, Leo, whose patience and understanding have granted me the privilege of concluding this research.

This report is also dedicated to Mitchell Maximus Taylor, my loyal and steadfast hound, whose unwavering presence at my feet into the small hours of the morning is testament to the fact that man could never hope to fully understand the love a dog has for his family.

ABSTRACT

This research seeks to analyse the perspectives of senior decision makers of South Africa's climate change response strategy, using Q Methodology as the principal research methodology.

The research reveals 4 statistically significant perspectives and seeks to distil traits which exemplify these perspectives. These perspectives have been located within the current international commitments and domestic climate change response strategy of the Republic of South Africa.

This research argues that the interdependence of the actors who are responsible for driving the climate change response strategy require a coordinated and structured approach to achieve meaningful change.

This approach must be based on multi-sectoral cooperation, led by a nationally coordinated drive to implement decarbonisation strategies compatible with the undertakings made in terms of the Paris Climate Agreement.

These strategies must be underpinned by a coherent response which sufficiently balances the trade-offs implicit in balancing a complex system such as climate change, more specifically, when set against the unique background of South Africa's demographics, structural and economic inequality and natural environment.

KEY WORDS:

Carbon Tax Act

Climate Change

Climate Change Bill

National Climate Change Response White Paper

Q Methodology

United Nations Framework Convention on Climate Change

UNFCCC

Senior Decision Makers' Perspectives

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Table 1: Table of Acronyms

°C	Degrees Celsius
CCS	Carbon Capture and Storage
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide equivalent
COP	Conference of the Parties to the United Nations Framework Convention on Climate Change
CPI	Consumer Price Index
DEFF	Department of Environment, Forestry and Fisheries
DoE	Department of Energy
DMRE	Department of Mineral Resources and Energy
GHG	Greenhouse Gas
GMST	Global Mean Surface Temperature

GWC	Growth Without Constraints
IPCC	Intergovernmental Panel on Climate Change
IPCC SR15	Intergovernmental Panel on Climate Change Special Report on Global Warming of 1.5°C
IPP	Independent Power Producer
IRP	Integrated Resource Plan
LEDS	Low Emission Development Strategy
ppm	parts per million
UNFCCC	United Nations Framework Convention on Climate Change
WP-CCR	White Paper on the Climate Change Response of the Republic of South Africa (2014)

Chapter 1: INTRODUCTION

1.1 Purpose of the study

This research seeks to interrogate the perspectives of a broad cross-section of senior decision makers across industry, policy makers and civil society on the development, formulation and implementation of climate change response strategies in the Republic of South Africa.

Specifically, the research seeks to uncover the perspectives of those senior decision makers who develop climate change policy, those responsible for the implementation of - and those affected by - the policies which comprise the climate change response of the Republic of South Africa.

This will be achieved through the application of Q Methodology, a hybrid qualitative-quantitative method (Watts & Stenner, 2005) of analysis.

The examination of these perspectives is intended to allow greater insight into the subjective views of the respondents and to provide a framework to distil areas of coherence, and perspectives of policy coordination and dissonance across key actors who are likely to have influence over the direction of South Africa's climate change policy response strategy.

1.2 Context of the study

Climate change is a complex problem, characterised by a multitude of interdependent variables which interact in a manner which is often difficult, if not impossible to predict. One of the key variables in the 'system' of climate change is its human stakeholders. This is clear from the fact that climate change is a function of these actors interacting with the global climate - in particular through the release of man-made GHG emissions (Chambwera, 2010; IPCC, 2014).

Another dimension of the anthropogenic interaction with the global climate system is the interaction of the actors with each other - each with diverse, often

conflicting values and agendas rendering any response thereto one fraught with risks of unintended consequences and externalities.

While this holds true for all ‘wicked’ problems, the potential impact of unintended consequences in the realm of climate change has global implications of a potentially catastrophic scale.

Indeed, these types of policy dilemmas are interchangeably referred to as ‘unstructured’ (Hisschemöller & Hoppe, 1995) and ‘messy’ (Ackoff, 1974).

However, by interrogating the perspectives of senior decision makers within the system, we are able to potentially uncover a nuanced way of structuring the problem, which, in turn grants new opportunities to understand how other stakeholders understand, perceive and interact with the problem and the proposed solutions to the problem (Cuppen, Breukers, Hisschemöller, & Bergsma, 2010).

Climate change poses significant threats to water resources, biodiversity, ecosystem integrity, food security, health and infrastructure across the globe (IPCC, 2014). The existence of climate change as a phenomenon, has, since at least 2007, been deemed to be ‘unequivocal’ (IPCC, 2007).

The Intergovernmental Panel on Climate Change (IPCC) has identified Southern Africa as a climate change hot spot. In particular, Southern Africa is at risk of experiencing rises in mean temperature of between two and three times the global average (IPCC, 2018).

The Government of the Republic of South Africa has assented to and ratified several international protocols and accords relating to climate change including, amongst others:

- the United Nations Framework Convention on Climate Change (UNFCCC), which was signed in 1998, sought to recognise climate change and the anthropogenic impact on climate (DIRCO, 2015);
- the Kyoto Protocol, assented to in 2002, which called for stronger binding obligations on member states to reduce their greenhouse gas (GHG) emissions (DIRCO, 2015); and
- the Paris Agreement ratified in 2015 and signed in 2016, which recognised the need to stay below a rise in mean global temperatures of 2 degrees Celsius, as compared to pre-industrial levels (DIRCO, 2015).

South Africa, in seeking to deliver on the commitments made under these instruments has adopted several national policy instruments and promulgated legislation aimed at regulating, amongst other things, South Africa's response to climate change, the sustainable use of the environment, together with several draft bills, which draw their fundamental authority from the Constitution of the Republic of South Africa.

The domestic legislative and policy response is further contextualised in Chapter 2 below.

This research seeks to examine the subjective perspectives of senior decision makers on these climate change responses, with a view to contributing to the understanding of the inertia behind South Africa's policy response to the inevitable climate change events.

Further, the research may yield insight into the perceived potential impacts of the interventions which do not yet have the force of law, such as the Climate Change Bill.

The research will also contribute to the discourse surrounding climate change in South Africa, including the assumed biases, values and issues inherent in determining the trade-offs implicit in policy design and implementation, set against the backdrop of seeking to resolve a problem as complex as responding to climate change.

1.3 Research problem

The impacts of climate change in South Africa are only beginning to be felt. However, as a country and as a planet, we are approaching a tipping point which may trigger a systemic phase shift and give rise to a number of potentially grave consequences. These consequences lie squarely at the door of anthropogenic emissions since the 1750's and have likely already resulted in the rise of global mean surface temperature (GMST) of between 0.8°C to 1.2°C above pre-industrial levels (IPCC, 2018).

The 2019 GHG concentrations in the atmosphere were measured at 405.5 parts per million (ppm) of CO_2, while CH_4 stood at 1859 parts per billion (ppb) and N_2O at 329.9 ppb. These values represent increases of 146%, 257% and 122% respectively, as compared to recorded pre-industrial levels (WMO, 2018).

The IPCC SR15 also identifies a closing window of opportunity for stalling global warming beneath 1.5°C and cautions of a multitude of adverse consequences if we fail to halt the upward inertia of GMST (IPCC, 2018).

South Africa, as a developing country stands to be disproportionately affected by climate change by virtue of the demographic, social and economic composition of our country (Republic of South Africa, 2020a).

More pointedly, in the face of these consequences and as we witness a rise of climate uncertainty and volatility, a coherent and coordinated policy strategy design and implementation framework is essential.

To do this effectively, an interrogation of the perspectives of those responsible for contributing to the design, approval and implementation of the climate change policy response is required and constitutes an important area of research.

1.4 Research Questions

The principle research question sought to be examined in this research is "what are the perspectives of senior decision makers in relation to the climate change response strategy of the Republic of South Africa?".

The restriction of the research question is a function of the methodology selected - Q Methodology is, by design, exploratory in nature and does not seek to validate one or another hypothesis. Rather, it seeks to uncover the possible realm of subjective perspectives held in respect of an issue and to interrogate the perspectives revealed through the Q set responses (Cross, 2004).

1.5 Significance of the study

This research has particular regional application, since South Africa, as a part of Southern Africa is likely to experience even more drastic effects of climate change, given its designation as a climate change 'hot spot' (IPCC, 2018).

South Africa is also one of most carbon intensive economies on the planet, having emitted more than 421.7 million tonnes of CO_2 from fuel combustion alone and 456 million tonnes of CO_2 in 2017 alone, making our per capita CO_2 emissions quotient 8t CO_2 per person, more than China's 7 tCO_2 (IEA, 2019).

Climate Action Tracker, one of the most well regarded independent sources for monitoring adherence to Paris Climate Agreement's Nationally Determined Contributions lists South Africa's climate change governance efforts as "highly insufficient" (Climate Action Tracker, 2020).

The primary source of our reliance on coal is from the electricity sector, with South Africa firmly entrenched in a mineral energy complex that creates significant systemic inertia rendering it extremely difficult for the country to wean itself off coal (Wright, Bischof-Niemz, Calitz, Mushwana, & Van Heerden, 2019).

The demographics of our country also leave us particularly vulnerable to the adverse impact of climate change, with significant levels of inequality and poverty (Climate Action Tracker, 2020; Republic of South Africa, 2020b).

It is clear, therefore, that much needs to be done about our contribution to climate change globally and to mitigate the acute regional impacts of our coal intensive economy, but to do this requires the deployment of significant political, economic and social capital.

South Africa has embarked on a number of decarbonisation strategies, comprised of policies, legislation, international accords and agreements and many others, but the unique context of South Africa referred to above, together with the delayed and often unanticipated impact of changes to the system makes this a policy area fraught with complexity.

The government of the Republic of South Africa, on 8 June 2018, published the Climate Change Bill for public comment (Republic of South Africa, 2018). While the window to submit comments on the Climate Change Bill has closed, this research remains a topical evaluation of the subjective views of those stakeholders responsible for this legislative intervention and those most directly impacted by these and other strategic responses to climate change.

That this research is topical is further amplified by the recent release by the National Treasury's technical paper on "Financing a Sustainable Economy" (Republic of South Africa, 2020a).

The technical paper, seeks to, amongst other things, interrogate the impact of climate change on various sectors of the South African economy and to plot a way to stimulating growth in a world impacted by changes in the global and regional climate (Republic of South Africa, 2020a).

Moreover, the Climate Change Bill identifies that the "anticipated domestic climate change impacts have the potential to undermine many of the gains made in meeting the Republic's developmental goals" (Republic of South Africa, 2018).

GHG emissions from developing countries, such as South Africa, are likely to surpass those of developed countries before 2050 (Chandler et al., 2002).

Indeed, South Africa is already ranked as one of the top 20 global emitters (Republic of South Africa, 2020b). This amplifies the need for developing countries to design and implement interventions to mitigate the inevitable impact of climate change which will be felt disproportionately by those least able to respond to it (Chandler et al., 2002; Wright et al., 2019).

An interrogation of the perspectives of these key stakeholders may well reveal opportunities to establish common ground and forge a mutual understanding of a complex systemic response, while seeking to balance the inherent trade-offs in any intervention.

Importantly, the interrogation may also serve to highlight the urgency of the time dimension of the climate change response strategy, which has been conspicuously absent from the roll out of South Africa's climate change response strategy, as borne out by the pace of policy interventions and their implementation.

The use of Q methodology, a hybrid qualitative- quantitative methodology, as described below, represents a contextually novel approach for interrogating these perspectives and revealing unanticipated conflicts or agreement across stakeholders, providing these stakeholders with a greater level of insight into the arena within which they operate, insight that is of significant value, given the import and potential impact of the consequences should an incorrect intervention be initiated.

By exposing the underlying assumptions, value frameworks, knowledge claims and interests of stakeholders, it is possible that more structured and informed dialogue on climate change can be facilitated in future (Cuppen et al., 2010).

These stakeholders in turn may become more self-aware and aware of the perspectives of others who either impact or are impacted by the policy design and implementation under analysis.

The perspectives of the stakeholders would also contribute to one of the knowledge gaps identified in the IPCC Special Report on Global Warming: "How can different actors and processes in climate governance reinforce each other and hedge against the fragmentation of initiatives" (IPCC, 2018). This research would uncover latent areas of agreement and discord amongst stakeholders, potentially allowing for targeted resolution under a re-structured problem.

Finally, the research may serve to ensure that the issue is receiving the necessary prioritisation and is being dealt with by stakeholders who are engaging

critically with the intended and unintended consequences of their policy interventions. This research seeks to uncover these perspectives.

1.6 Delimitations of the study

This research is limited by perspectives on climate change responses in the Republic of South Africa.

Further, the bounded analysis of particular respondents deliberately seeks to limit the responses to senior decision makers. These senior decision makers are people who, by virtue of the office they hold or their organisational affiliation and/or the constituents that they represent, have significant influence on, or are significantly impacted by, the policies adopted by the Republic of South Africa in relation to Climate Change.

The study does not seek to evaluate the objective quality or merit of the climate change strategies implemented in the Republic of South Africa.

Q Methodology will be the sole instrument of enquiry into the research problem to allow a focused analysis of the respondent set.

1.7 Definition of terms

All definitions, where possible and relevant, have been kept consistent with those contained in the Climate Change Bill, unless specifically indicated to the contrary or as appears from the context.

i) “adaptation” in relation to natural, human, social and ecological systems, means the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities; in relation to natural systems, the process of adjustment to actual climate and its effects (Republic of South Africa, 2018);

i) “climate change” means a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability

observed over comparable time periods(Republic of South Africa, 2018);

ii) “greenhouse gas” means gaseous constituents of the global atmosphere, both natural and anthropogenic, that absorb and re-emit infrared radiation (Republic of South Africa, 2018);

iii) “Just Transition” means, for purposes of the current analysis, the requirement to transition to a low-carbon economy which prioritises the future and livelihoods of communities and workers and balances the needs and objectives of government, employers and communities to provide better and more secure jobs, opportunities for advancement through training and social protection for all workers affected by climate change policies (Strambo, Burton and Atteridge, 2019);

iv) “mitigation” “means a human intervention to reduce the emissions of greenhouse gases by sources or enhancing their removal from the atmosphere by sinks” (Republic of South Africa, 2018);

v) “resilience” means the ability of a social, economic or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organisation and the capacity to adapt to stress and change (Republic of South Africa, 2018);”and

vi) “senior decision maker” means, for purposes of the current analysis, a stakeholder who, by virtue of the office they hold or the organisation or constituents that they represent have the capacity to significantly influence or, conversely, are influenced by, the direction, quality, nature and contents of South Africa’s climate change policy response;

vii) “stakeholder” means an actor involved in or impacted by, knowledgeable of or having relevant expertise, experience or insight into the issue under examination (Cuppen et al., 2010).

1.8 Assumptions

Climate change is accepted as an irrefutable fact in this research. This is a reasonable assumption given the scientific evidence available and the fact that the Climate Change Bill acknowledges the “irrefutable” nature of climate change as a phenomenon(Republic of South Africa, 2018).

Second, respondents are assumed to have expended sufficient time and applied sufficient effort and rigour in the Q sort process and to engage with the Q sort process in good faith.

Finally, respondents are assured of their confidentiality of response and respond accordingly, without fear of penalty or reprisal.

1.9 Structure of the Report

This report has been structured into 6 (six) distinct chapters which seek to holistically analyse the perspectives of senior decision makers' in relation to South Africa's climate change response strategy.

Chapter 1 introduces the report and contextualises the research problem and the seeks to underscore the importance of the research as yielding meaningful insights to the aforementioned perspectives to trigger constructive debate aimed at achieving policy coherence at a national level as it pertains to climate change and South Africa's response thereto.

Chapter 2 conducts an analysis of the existing response strategies which have been taken at a national level, against the backdrop of an international and domestic context against which the chosen method of enquiry is located.

Chapter 3 seeks to outline the rationale for the choice of Q Methodology as the research instrument of choice and further seeks to outline the methodological framework followed to collect, analyse and interpret the data collected in this research.

Chapter 4 presents the results of the analysis described in Chapter 3 and the four factors which are ultimately distilled as composite views of the respondent set.

Chapter 5 is dedicated to a detailed discussion of the results presented in Chapter 4 and the further interpretation of these results against the international and domestic climate change intervention landscape.

Finally, the report concludes with Chapter 6, which seeks to provide some concluding remarks and recommendations for further research and investigation.

Chapter 2: LITERATURE REVIEW

2.1 Introduction

The literature review in this research proposal will seek to contextualise the existing climate change responses which have been adopted in South Africa.

This will be achieved by a chronological analysis of South Africa's existing climate change responses in light of the international commitments or undertakings made in various international climate agreements, protocols and accords.

The historical context of legislative and policy responses will include an analysis of the Constitution, the National Climate Change Response White Paper, the Climate Change Bill, 2018 the Carbon Tax Act, 2019, the 2020 technical paper published by the Department: National Treasury on "Financing a Sustainable Economy" and concludes with an overview of the Low-Emission Development Strategy.

Finally, the literature review will conclude with an analysis of the existing use of Q methodology in policy discourses on global climate change and an examination of a comparatively focused Australian study, in an effort to illustrate the applicability and value of the research method to the current enquiry.

Importantly the literature review does not seek to identify possible answers to the research question, given that this is not the function of the selected research method. Rather, the method is located in the body of research methodologies and the topic is located within the existing climate change response frameworks nationally.

These climate change response frameworks serve as the foundations for the spectrum of possible perspectives on climate change response in South Africa and inform the generation of the Q Sort.

This research work is necessary to contribute to the climate change dialogue in South Africa and to demonstrate the need for a cogent response to climate change and its pervasive and often unanticipated impact.

2.2 Contextual discussion- South Africa's climate change response

Despite this research being focused on the subjective perspectives of stakeholders and not an analysis of the qualitative merits of the climate response, it is essential to analyse the background against which those perspectives exist.

In particular, South Africa's economy is one of the most carbon intense economies in the world, with South Africa's per capita emissions nearly double the world average (IPCC, 2018).

Through various commitments in international agreements, accords and protocols, South Africa has undertaken to change this. To this end, South Africa promulgated the Carbon Tax Act in June 2019, and the Climate Change Bill has been gazetted for public comment. These two instruments are explored in greater detail below.

The incumbent President, Cyril Ramaphosa, recently addressed an open letter to the United Nations Climate Summit outlining a number of additional commitments and reiterating previous undertakings to formulate a national climate change response that seeks to balance the objectives of the National Development Plan in a manner consistent with necessary climate change mitigation and adaptation responses (DIRCO, 2019).

This must, however, be evaluated against the background of South Africa's progress toward promulgating climate change centred legislation- the WP-CCR was published 11 years before the Climate Change Bill was published for comment in 2018. This bears out the slow pace at which South Africa has tackled the climate change crisis, but also the complexity and interdependent variables impacting any policy response to the climate change crisis.

2.3 South Africa's Climate Change Response

As intimated above, South Africa is currently in the process of designing and iterating on its climate change response - it has only recently promulgated the Carbon Tax Act. This represents a significant step forward because, although its enforcement will be achieved through a phased in approach and carbon pricing will be below global standards for carbon emissions, it entrenches in legislation the scientifically demonstrated existence of climate change and South Africa's role and responsibility in the global dialogue on climate change.

This section then, will discuss the following interventions which constitute the spectrum of climate change policy response in South Africa:

- International Context:
    - United Nations Framework Convention on Climate Change 1992;
    - Kyoto Protocol 1997;
    - Copenhagen Accord; and
    - Paris Climate Agreement.
- Domestic Context:
    - Constitution of the Republic of South Africa, Act 108 of 1996;
    - National Climate Change Response White Paper;
    - Climate Change Bill, 2018;and
    - Carbon Tax Act, Act 15 of 2019.

2.4 International Context

2.4.1 United Nations Framework Convention on Climate Change

The United Nations Framework Convention on Climate Change (UNFCCC), which was first ratified in 1994, but only ratified by the Republic of South Africa in 1997, seeks to achieve a global stabilisation of GHG concentrations at a level which does not cause dangerous levels of anthropogenic interference with the climate system(Oppenheimer & Petsonk, 2005).

The UNFCCC is significant as it is the framework around which all subsequent international climate cooperation and negotiation has been constructed.

In particular, it acknowledges the trade-offs implicit in economic development, food production and climate change and seeks to introduce the notion of sustainable development (Oppenheimer & Petsonk, 2005).

It furthermore imposes on member states an obligation to address their emissions sources and the removal of natural GHG sinks together with several reporting measures which member states are required to implement in order to comply with the UNFCCC's overall objectives.

The UNFCCC also sought to draw a distinction between developed and developing countries- a distinction which has been the subject of significantly divergent positions in the climate change discourse (Oppenheimer & Petsonk, 2005).

In particular, the role of historical emissions from developed countries is acknowledged and developing countries were permitted leniency in order to meet their 'social and development needs' (Oppenheimer & Petsonk, 2005).

As a consequence of this, developed countries were burdened with a greater share of responsibility for addressing climate change, with more stringent obligations applying to developed countries. These obligations require the implementation of policies designed to decrease existing emissions to mitigate climate change, while preserving sustainable socio-economic development and eradicating poverty (Oppenheimer & Petsonk, 2005).

2.4.2 Kyoto Protocol

The Kyoto Protocol was borne of the UNFCCC's objectives to hold developed economies, the so called Annex 1 countries, to account by seeking commitments to reduce overall emissions of GHG by an average of 8% below 1990 levels during the period 2008-2012 (United Nations, 1997).

All parties to the Protocol were required to establish programmes to implement climate change mitigation efforts aimed at improving individual country's emissions profiles according to their "common but differentiated responsibilities and priorities" (United Nations, 1997).

In addition, the Kyoto Protocol launched the first large scale carbon offset programme, in the form of the Clean Development Mechanism, which allowed countries to direct funding to decarbonisation initiatives in other countries and apply the resultant carbon offsets to mitigate their own carbon intensity (United Nations, 1997).

The Kyoto Protocol has been widely criticised as being an instrument without any meaningful enforcement mechanisms. This is borne out by the increasing emissions profile of both developed and developing countries who are seeking economic growth and development at all costs (IPCC, 2018).

The first commitments under the Kyoto Protocol expired in 2012, with many of the primary objectives of the Protocol left unfulfilled (IPCC, 2014).

However, several developed countries did enact legislation to deal with climate change and made some bold steps toward addressing their countries contribution to the global emissions profile.

For instance, The United Kingdom, under their Climate Change Act seeks to reduce their GHG emission profile by 80% below the 1990 baseline, before 2050 giving statutory force to a carbon reduction budget (Bowen & Rydge, 2011).

2.4.3 Copenhagen Accord

The Copenhagen Conference of Parties in 2009 was intended to build upon and expand the climate mitigation efforts of the parties to the Kyoto Protocol, but no agreement could be reached in relation to global reduced emissions profiles of Annex 1 countries nor were any specific reduction targets agreed (Lau, Lee, & Mohamed, 2012).

In all, the Copenhagen Accord contributed little to the global climate change response context, but served as an illustration of the conflicting agendas, value frameworks and diverging opinions surrounding this complex global problem.

2.4.4 Paris Climate Agreement

The 2015 Paris Climate Agreement received conflicting reception from the international climate change community, with one commentator lamenting that the best that could be said of the Paris Climate Agreement was that some agreement was reached and this was better than no agreement (Clémençon, 2016).

Significantly, however, the Paris Climate Accord abandoned the notion entrenched in the Kyoto Protocol of 'equitable burden sharing' which entailed the multilateral and negotiated GHG emissions reduction targets under the 1997 Protocol, together with abandoning the time frames agreed therein (Clémençon, 2016).

In so doing, the burden of responding to climate change was lifted from the shoulders of developed countries, effectively requiring developing countries to reduce their carbon emissions on their pathway to economic development even as developed countries were no longer obliged to account for their historical emissions, nor could they be forced to adhere to their GHG reduction targets.

The Paris Climate Agreement required all parties to put forward their "best efforts through nationally determined contributions" and seek to hold GMST to well below 2°C and to "pursue efforts to limit the temperature increase to 1.5°C" (Viñuales, 2015).

The Climate Agreement has been ratified or acceded to by 186 nations and the European Union. However, it must be noted that the United States, under the Trump administration began the process of withdrawing from the Agreement, citing prejudice to its economic development pathway as the reason therefor (Kemp, 2017). This withdrawal was reversed by the Biden administration and the

United States has once again assented to the accord, as of 19 February 2021 (South, Vangala, & Hung, 2021).

South Africa, for its part, submitted its first nationally determined contribution in 2015 and is required to measure and report on the emissions profile of the country on an ongoing basis. South Africa is required to submit its next target in 2021, where South Africa has, between 2020 and 2025, identified a strategy aimed at a 'peak, plateau and decline' emissions trajectory with a net zero emissions profile to be achieved by 2050 (Schoeman, 2019).

This has been confirmed in the submission of the LEDS to the UNFCCC which details South Africa's path to net zero emissions by 2050. This is further addressed in the domestic context below.

Finally, it is worth noting that in a number of international forums, President Cyril Ramaphosa has underscored the importance of a commitment to climate change, but this has, largely, fallen short of being translated into actionable steps being taken by the country (Climate Action Tracker, 2019).

2.5 Domestic Context

As a signatory to the Kyoto Protocol and the Paris Climate Agreement, South Africa has made some headway in designing and implementing a climate change response strategy.

2.5.1 Constitution of the Republic of South Africa

This strategy is anchored by the provisions of Section 24 of the Constitution of the Republic of South Africa, which enshrines the right to an environment that is not harmful to one's well-being and health and further provides that everyone has the right:

> "to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that-

(i) prevent pollution and ecological degradation;
(ii) promote conservation; and
(iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development"
(Republic of South Africa, 1996).

It is significant for purposes of the current research that the Constitution acknowledges the inherent trade-offs implicit in environmental protection and provides prioritisation guidance in the supreme law of the country.

More specifically, the preservation and conservation of the ecological resources cannot take place ahead of ensuring 'justifiable economic and social development'. This stance is aligned to the human-centric focus of the Constitution, as opposed to an environmentally-centric focus.

This approach is also congruent with the recognition of the importance of economic and social development outlined in the Kyoto protocol (Article 2) and the subsequent Paris Climate Agreement. It does not, *per se*, elevate economic and social development above the environment, since a failure to meaningfully adapt to and mitigate climate change may result in development being impossible.

However, the approach does raise the question of how the determination of what is considered justifiable is arrived at. More specifically, it implies the necessity for the creation of objective metrics to, for example, attribute value to the environment, the economy, human welfare, concepts which are often inherently difficult to quantify and define. This requires a determination of whether the damage caused by a stakeholder to the environment is justifiable at the altar of 'justifiable economic and social development'.

This once again outlines the import of interrogating these subjective perspectives to establish what stakeholders in the debate consider 'justifiable'.

2.5.2 National Climate Change Response White Paper

The WP-CCR was published, partially, in response to the undertakings and commitments made to the international community under the aforementioned Kyoto Protocol and the Copenhagen Accord. It acknowledges the role of GHG emissions and their contribution to climate change, as also South Africa's role as an energy intensive economy. The WP-CCR seeks to identify the transition to cleaner energy pathways as an opportunity for job creation, economic stimulus and social development (DEA, 2011; Smith, 2013).

The position of many of the critical elements feeding into South Africa's energy intensity are left unresolved in the WP-CCR - for instance, adjusting South Africa's energy pathways away from coal dependence through diversification of energy sources should only "occur if it makes economic sense" and that it is likely that coal will continue to be "a primary energy source for many decades to come" (DEA, 2011).

It is worth noting, however, that 'economic sense' is not defined as a concept and thus on a broad reading, could include climate change considerations.

Indeed, the WP-CCR notes the discord between the Department of Environmental Affairs and other departments, recording that other departments "often do not see climate change as a priority and some even see it as working against national development priorities" which is contrasted with the need to ensure a "coordinated, coherent, efficient and effective response to the global challenge to climate change" (DEA, 2011).

Thus, while acknowledging the contributions that South Africa makes to global GHG emissions, the WP-CCR appears to toe the line enshrined in the tenor of the Constitution by prioritising economic and social development ahead of ecological preservation.

The stakeholders currently designing and implementing the update to the policy position articulated in the WP-CCR, the Climate Change Bill would be well served by examining the perspectives of the actors affected by the cross-cutting nature of the climate response.

It is likely that the architects of the WP-CCR envisaged that the Inter-ministerial Committee on Climate Change would fulfil this stakeholder engagement function, at least in part, as its mandate is ensure that the climate change response at a sub-national and ministerial level is aligned to the national policy and legislative interventions (DEA, 2011 and Climate Action Tracker, 2020)

2.5.3 National Development Plan

The National Development Plan has, at its core, the object of eradicating poverty and reducing the inequality which currently characterises the country and its economy, but the NDP also contains a chapter which deals with “Environmental Sustainability – An equitable transition to a low-carbon economy”(Republic of South Africa, 2012).

This is a noteworthy policy intervention as it reaffirms the tension between the economic and development objectives, the mineral energy complex and associated carbon intensity of South Africa.

This is also referenced as a key underpinning of the submission of the LEDS to the UNFCCC.

2.5.4 Carbon Tax Act 2019

The Carbon Tax Act, after more than a decade of deliberation since it was first postulated in the WP-CCR, was signed into law, albeit through a gradual phase-in enforcement regime, on 1 June 2019 (Republic of South Africa, 2019).

The Act requires certain taxpayers who conduct one of the listed activities to pay tax on their GHG emissions above the permitted threshold. It enacts a reporting methodology, which was developed in consultation with, and approved by the Department of Environmental Affairs (as it was then known). Certain categories of taxpayers are required to license their activities which attract carbon tax as part of sectoral emissions targets (Steenkamp, 2017).

The Carbon Tax Act places a price on carbon emissions of R120 per ton of CO2e (Carbon Dioxide equivalent) (which increases by CPI plus two percent until

December 2022 and thereafter by CPI), the determination of which follows a scientific formula to describe the equivalence of any GHG to carbon dioxide. The Carbon Tax Act seeks to phase in these taxes and grants "allowances" to reduce the tax burden placed on emitters resulting in the effective price of the emissions tax being significantly below this price point (Schoeman, 2019).

Significantly, despite the relatively clear interaction between the Carbon Tax Act and the Climate Change Bill, neither of these interventions deal with their interaction and integration (Steenkamp, 2017). This displays a potential lack of coordination and coherence across the two pieces of legislation.

It does, however, warrant acknowledgement that the proceeds from the Carbon Tax are not ring-fenced for any specific purpose, rather, these flow directly to the fiscus (Schoeman, 2019).

2.5.5 Climate Change Bill 2018

The most critical intervention in the armoury of South Africa's response to climate change was published for comment on 8 June 2018. The gazetted version of the Climate Change Bill is currently under consideration by the National Economic Development and Labour Council (Schoeman, 2019).

The Climate Change Bill seeks to outline an overarching matrix for an "integrated and coordinated climate change mitigation and adaptation strategy"- language which bears striking resemblance to that used in the WP-CCR almost a decade earlier (Republic of South Africa, 2018).

The Climate Change Bill seeks to coordinate the response at a national, provincial and municipal government level and across all functional areas and departments (Republic of South Africa, 2018).

Much of the implementation and interaction between the various responses remains to be regulated and the Climate Change Bill appears to be best placed to act as the overarching legislative intervention.

2.5.6 Low Emission Development Strategy 2020

The LEDS seeks to comply with the requirements of Article 4 of the Paris Climate Agreement, and in so doing, South Africa reaffirmed its commitment to the pledges made in the agreement.

The LEDS makes specific reference to the fact that policy interventions are being implemented at a sub-national level on an uncoordinated basis with alignment to national objectives, already introducing some tension into the system given the range of interventions being implemented at a national level which may be inconsistent with those implemented at a sub-national level (Republic of South Africa, 2020b).

Finally, the vision statement of the LEDS uses language such as a “low carbon growth trajectory while making a fair contribution to the global effort to limit the average temperature increase, while ensuring a just transition and building of the country’s resilience to climate change” (Republic of South Africa, 2020b).

2.6 Use of Q Methodology in Policy discourse analysis

Barry and Proops (1999) note that policy making has three distinct stages:

i. Problem identification, which entails identifying specific issue requiring a policy response;
ii. the use of theory and frameworks to propose potentially effective responses to these problems; and
iii. implementation of these responses.
(Barry & Proops, 1999)

To this, a fourth may warrant inclusion:

iv) monitoring and evaluation of the efficacy of these responses.

Barry and Proops also identify that policies and policy makers are generally efficient at steps i) and ii), but lack the mechanism and tools to adequately ensure

that the policy responses are sufficiently supported by the necessary political and social capital (Barry & Proops, 1999).

The central research objective of Barry and Proops' work is to demonstrate the proposition that until perspectives on an issue are uncovered, it is difficult to know "what, and whether, environmental policies will be socially acceptable, and therefore capable of being implemented" (1999).

The deconstruction of the problem elements - of which the perspectives of stakeholders constitute a significant element, allows an examiner to reconstruct a problem in a more structured and logical manner, thereby lending itself to appropriate intervention, with greater insight into and appreciation of the potential externalities of the intervention – whether positive or negative.

This is one of the fundamental principles behind the use of Q methodology and the reason that it lends itself to the research objectives of this research.

2.7 Q Methodology in climate change response analysis

A study conducted in Australia, across members of the general public, sought to demonstrate the advantages, and outline the limitations of using Q methodology to contribute to the discourse on climate change in the Australian Capital Region, with a view to using these perspectives as part of a broader public engagement on the issue of climate change (Hobson & Niemeyer, 2011).

This study can be distinguished from the current research, not least because of its geographic delimitation, but also because it seeks to understand public perspectives. The current study seeks to understand the perspectives of a purposively selected sub-set of the public, being senior decision makers, within the definitional limitations outlined above.

The study does, however, provide useful insight into the methodology adopted and the practical value of the research conclusions in contributing to the discourse of the issue under analysis. The Q methodology outputs were then used as inputs to later semi-structured interviews aimed at establishing the value

of public deliberation in relation to adaptive capacity around climate change (Hobson & Niemeyer, 2011).

A relevant analogue to the current research is a recent study which sought to analyse the perspectives of farmers through assessing perspectives of farmers in South Africa, and using these perspectives to increase the resilience of the farmers to climate change (Elum, Modise, & Marr, 2017).

This was achieved by assessing existing mitigation and adaptation strategies such as the use of drought resistant seeds and more efficient irrigation practices, but, interestingly identified a lack of access to insurance products which were affordable and suited to the farmer and their nuanced discourse (Elum et al., 2017).

This study is valuable to the current research in that it demonstrates an alternate method of perspective analysis reaffirms the research methodology of choice in the current research and provides evidence of the practical impact of perspectives research in South Africa.

2.8 Conclusion of Literature Review

The literature review contained in this Chapter 2 has sought to analyse the existing climate change response strategy in the Republic of South Africa and locate it within the international commitments which South Africa has undertaken. The chapter concludes by highlighting a sample Q methodology study comparable to the current topic.

Chapter 3: RESEARCH METHODOLOGY

3.1 Introduction

Q Methodology, as a methodology which includes aspects of both quantitative and qualitative research methods, has its roots in the research of physicist and psychologist William Stephenson, who in the mid 1930's developed the methodology as an adaptation of standard (R) factor analysis (Brown, 1980).

Stephenson sought to challenge traditional Newtonian notions in the field of psychology, and thereby, develop research anchored in the ideals of natural science disciplines (Ramlo & Newman, 2011; Watts & Stenner, 2005).

This section is divided into a sequential outline of the research methodology to aid the reader in analysing the rigor of - and justification for - the selected research approach.

3.2 Research approach

As a hybrid qualitative - quantitative approach, Q Methodology is located in the mixed methods spectrum of research methodologies (Ramlo & Newman, 2011).

This research methodology is the most appropriate course of enquiry given its ability to uncover a wide range of viewpoints on socially contested and complex issues, such as the subject matter of the current research.

In essence, the methodology permits a researcher an opportunity to objectively explore subjectivity (Brown, 1993). More pointedly, perhaps, the motivation for selecting Q methodology lies in the fact that it provides a framework to analyse subjectivity and does so through the distillation of 'clusters' of subjectivity that are functional distinctions within each set of factors (Van Exel & De Graaf, 2005).

The methodology derives its authority from the notion that there exist a finite set of opinions in respect of any issue and that these can be measured if communicated as being representative of an amalgam of viewpoints (Cross, 2004; Van Exel & De Graaf, 2005).

This notion of ‘finite diversity’ is integral to the methodology - the “aim not being to obtain the truth, but to collect and explore the variety of accounts that people construct” (Cross, 2004).

In broad strokes, conducting a Q Methodology study involves:

i) The identification of the ‘concourse’ that is, broadly, the representative ways of interpreting, seeing and talking about a subject;
ii) the development of a set of stimuli statements related to the concourse (these statements form the Q set);
iii) the identification and selection of a purposively determined group of respondents for sampling (the P Set);
iv) administration of the study via an online platform, such as Q Sortware, software specifically designed by the University of York for collecting Q Methods data was used in the current research (University of York, 2021). This allowed for the distribution of the Q set which entails the rank ordering of the Q sets accordingly to Strongly Agree (+5) to Strongly Disagree (-5) applying forced distribution; and
v) conducting factor analysis and interpretation of the results using an additional software suite named Kade, an analysis tool designed for Q methodology (Banasick, 2019; Barry & Proops, 1999).

By adopting the above approach and as expanded on in the remainder of this Chapter 3, the research methodology is intended to yield meaningful data and insights into the research objectives and contribute to the discourse on climate change in South Africa.

3.3 Key Research Methodology Assumptions

A critical assumption made in the planned approach was one of access- the stakeholders who were purposively selected for participation in the P set are, as a function of their office and designation, busy and influential individuals. Thus, gaining access to these stakeholders proved challenging, but was unavoidable in order to maintain the integrity of the research. This was, in part, mitigated by

leveraging networks to gain access to the respondents and the topical and important nature of this research.

The assumption outlined in the preceding paragraph is particularly relevant given the current research intentions, for, as Brown (1980) posits, there is no exclusive domain over the factors, alternative P sets would (likely) yield different factors, different factor loadings and different composition of themes.

Further, the formulation of the Q statements is assumed to be sufficiently broadly representative of the spectrum of views across the P set- there must be sufficiently broad statements to allow for the respondent to hold a view in relation to the statement, failing which the study may yield a neutral, confounded data set.

The risks attached to this assumption were mitigated by piloting and refining the Q statements with multiple industry experts with deep sectoral knowledge until the final Q set was justifiably considered 'broadly representative' (Watts & Stenner, 2005).

An additional assumption inherent in the reliability of the data was that the P set is aware of the climate change response strategies currently being implemented, or in some cases, to be implemented. This is mitigated by the purposive selection of the P set - the respondents are deeply involved in the climate change discourse in the country, which is the reason for their inclusion.

3.4 Research design

Q methodology involves factor analysis of a data set where the variables are the respondents themselves, ultimately leading to an analysis of groupings of respondents who interpret the Q sort statements in a comparable way (Watts & Stenner, 2005).

By design, Q methodology is an exploratory technique, which does not have as its research target to proof of a hypothesis, rather, it aims to introduce coherence and coordination to research questions that have multiple answers, contested across multiple complex and contested dimensions (Watts & Stenner, 2005).

The advantages of this research approach are the isolation of potential opportunities for coherence across stakeholders in the response to climate change- a valuable endeavour, given the scale and import of the problem.

A key disadvantage of this research method are that it is not determinative of the issue- it merely contributes to and stimulates further research and debate, albeit from a more informed, potentially restructured perspective.

3.5 Data collection methods

Data collection was achieved through the use of online software suite, Q Sortware designed for administering Q methodology research, together with post Q sort questionnaire to elicit additional context and richness of responses (University of York, 2021).

This method was, in part, selected to obviate the need for in-person interviews in light of the CoViD-19 pandemic and further seeks to exclude any visible cues from the interview administrator which may convey researcher bias.

This further ensured that the respondent was able to engage with the research in an unfettered manner. Furthermore, given that the responses provided will not be identifiable to the respondent, there is a greater incentive for forthright engagement with the Q set, without fear of recrimination or reprisal (Finchilescu & Muthal, 2019).

A key disadvantage to this approach is that the administrator is not able to physically answer any clarifying questions and is unable to ensure the rigor with which the respondent completes the Q sort process, which may yield data that is not sufficiently reliable (Cross, 2004).

Finally, the Q Methods research does not permit the researcher to probe inconsistencies or conduct further analysis with the respondents, unless subsequent follow up research is conducted.

3.6 P Set

The P set was purposively isolated by seeking out stakeholders in the climate change response strategy of South Africa who thus, by implication, have theoretical relevance to the enquiry at hand. The definition of stakeholder allows for incorporation of a broad range of views from academia, non-governmental organisation, government, policy makers, corporate South Africa and others to ensure that a sufficient diversity of respondents are secured.

The accurate and considered identification of the P set is of critical import to the reliability of the conclusions which are eventually drawn. It is necessary that a sufficiently large group of respondents is selected in order to effectively cover off the broad representation of potential views on the subject domain. Naturally this must be counterbalanced by avoiding a P set too large that it becomes unwieldy (Watts & Stenner, 2012).

In this study, respondents were recruited by accessing existing professional and academic networks, relevant scientific and journalism publications and contacts from attending relevant conferences and events. The process has been utilised in several other Q Methodology studies (Cross, 2004).

This P set is calibrated to provide a breadth of subjective views which will be extracted through the Q sort process (Watts & Stenner, 2005).

3.6.1 Population Set

A P set of 29 respondents was eventually secured for the study, distributed across the categories of respondent purposively selected and identified below for their actual and potential contribution to climate change policy.

In particular, the cohort of participants was comprised of:

i) Senior government officials as the representatives of National Government responsible for designing and implementing climate change response strategies;
ii) South African senior academics and professors in the fields of climate change;
iii) Senior or executive members of corporate South Africa, who operate in industries closely aligned to or involved in business which affects or may be affected by climate change;
iv) Industry coalitions, lobby groups or associations with a mandate that extends to or is directly impacted by climate change response strategy in South Africa;
v) Climate change activists, journalists; and
vi) Senior level representatives of non-governmental organisations with mandates relating to climate change.

3.7 Sample and sampling method

As described in section 3.6.1 above, the P set was comprised of 29 individuals, selected on a purposive basis. Each respondent was required to complete a single online instrument, followed by a voluntary opportunity to provide feedback and input into the experience of participating in the Q methods research.

This purposive approach is preferred over random sampling, since random sampling assumes an even distribution of skills, experience and insights over the general population and, in the case of the current research, an equal ability to influence climate change policy. The purposive approach offers the ability to target specific areas of expertise, experience and insight and thus yield more informed perspectives into the discourse(Cuppen et al., 2010).

Description of respondent and/or title	**Organisation**	**Number to be sampled**	**Average years of professional experience**

Senior policymaker	Relevant Governmental Departments	3	12.6
Senior Executive	Extractive Industries and Energy Intensive User Group Members	2	17.5
Senior Executive	Independent Power Producers Programme	1	6
Senior journalist	Various	2	14
Climate change activist	Various	3	12.3
Executive member- Industry Association	Various	3	13.6
Senior Industry Expert	Various	4	14
Member of Board of Directors, Senior member of Sustainability Team	Energy SOE	2	32
Senior Academic(s)	SA Tertiary Education institutions	3	24
Senior Executive	Independent Power Producer	2	10.5
Senior Representatives: Commercial Banks and Donor Funded Institutions	Commercial Finance Institutions, DFI	2	10
Senior Climate Change Lawyers	Various	2	11.5

Total number of respondents		29	15.2

Table 2: Profile of P set

3.8 Development of the research instrument

The Q statements utilised in the online administration of the research are attached as Appendix 'A', together with a brief introductory letter to proposed participants which was communicated via the Q Sortware Platform ensuring informed consent.

The Q statements are drawn from the concourse of possible viewpoints about the research question, informed by research, researcher experience with the subject matter, media and academic sources. This process was repeated until the concourse was developed to the point of reaching saturation, that is, no new opinions on the concourse revealed themselves.

Upon further refinement to reduce redundancy and further piloting with appropriately qualified experts the Q statements were finally distilled to 44 statements (Van Exel & De Graaf, 2005).

Importantly, while the selection of the Q statements is extremely important, it is ultimately the communication of the respondent's subjective views on the statements that affords the statements meaning through the Q sort process, thereby obviating, in large measure any researcher bias in selecting the final Q statement set.

All statements are calibrated to reflect a sufficient diversity of views on the concourse so as to ensure that the responses are sufficiently broadly representative of the extant perceptions sought to be interrogated.

The calibration of these statements have been piloted with two independent industry experts to ensure that the statements reflect the sufficient diversity of views on the climate change response strategy of South Africa.

The Q sort process took place using Q Sortware, a purpose designed platform for Q methodology research projects.

A brief comments section was included post the completion of the Q sort process for respondents to contribute their views on the research method, the Q statements and the overall experience of the instrument, together with an opportunity to indicate why they had selected their most extreme statements (-5) and (+5).

3.9 Procedure for data collection

The purposively constructed P set was contacted via electronic mail, whereupon initial interest and willingness to participate was established. Thereafter, a link was transmitted by the online software platform, Q Sortware, which was included in Appendix B, an explanation of the process and a request for the voluntary provision of the following data, deemed relevant to the research:

- Email address;
- Title;
- Years of Professional Experience; and
- Years of Professional Experience in Climate Change policy (if any)

This procedure for data collection was selected to ensure that sufficient responses could be procured in the time frame available for conducting the research. The quality of the data was not compromised through administering the test electronically (Watts & Stenner, 2012). Rather, conducting the research process entirely online was the only available option given the current CoViD-19 pandemic afflicting the Republic of South Africa.

The proposed respondent was provided with broad instructions relating to the process of Q sorting, the focus of which is the sorting of the Q statements on a grid based score sheet, based on Strongly Agree (+5) to Strongly Disagree (-5).

Once sufficiently familiar with the Q statements, the respondent was asked to begin a rough sorting exercise by dividing the Q statements into three separate groups, on a conventional Likert Scale:

i) Those which the respondent generally agrees with;

ii) Those which the respondent generally disagrees with; and

iii) Those which the respondent generally feels neutral about

(Cross, 2004).

These grouped statements are then rank ordered in accordance with the grid structure provided (*cf* Table 3.1).

The kurtosis of this grid has been selected to allow for the extent to which climate change response is contested and debated in society in general, but, in particular, within the P set- by design. Typically, the more contested or complex a concourse, the flatter the curve ought to be. However, Brown (1993), posits that most modern Q Methodology research instruments are conducted using a standard -5 to +5 distribution, as is the case in the current research.

A sample grid is provided in Table 3.1 below:

Most Strongly Disagree					Neutral					Most Strongly Agree
-5	-4	-3	-2	-1	0	1	2	3	4	5
-5	-4	-3	-2	-1	0	1	2	3	4	5
	-4	-3	-2	-1	0	1	2	3	4	
			-2	-1	0	1	2			
			-2	-1	0	1				
					0					
					0					
					0					

Table 3.1: Q Sort Grid

3.10 Data analysis and interpretation

Q methodology has a prescribed method of data collection, which in the current research was facilitated by Q Sortware. Post the Q sort process, the results are submitted and stored by Q Sortware until ready for export. The raw data is then exported in Comma Separated Value (CSV) format for analysis by a tailored Q Methodology software solution, Kade.

The CSV file contains the personally identifiable responses together with their responses to the additional information requests and questions.

Thereafter, the CSV file is depersonalised so that instead of an individual's name, a participant code is inserted. In the current research, this was randomly assigned across the 29 respondents.

The CSV file, together with the full set of Q Statements in .txt format are then uploaded into Kade, a software solution programmed to process Q Methodology research instruments and conduct the factor analysis attached thereto.

The data inputs are then analysed. First, correlations are calculated by Kade which reveals the degree to which the extant views espoused by the respondents are similar or dissimilar and can be grouped together as 'factors'.

These overall configurations are then pooled together and allows the researcher to reveal broad areas of commonality or dissonance based on a factor's 'loading'. This analysis technique is referred to as a correlation matrix (Watts & Stenner, 2012).

The correlation matrix is then subjected to factor analysis, where the researcher is required to select the factor analysis methodology, which allows a choice between two broad statistical methods of analysis:

i) either Centroid Factor analysis, with a further derivative choice between Brown's Centroid Factor Analysis and Horst's 5.5 Centroid Factor Analysis; or
ii) Principal Component Analysis methodology.

In the current research, Principal Component Analysis methodology was selected as this revealed the clearest loading of factors and the most distinct groupings of factors. This selection is largely down to researcher preference.

Thereafter, the factors are rotated according to the Varimax statistical factor analysis method which reveals the loading of the factors. These factors are subjected to a researcher selected threshold to determine where a defining

variate is present. Usually, $p<0.01$ is applied to establish these defining variates, as was the case in the current research (Watts & Stenner, 2012).

These factors are then compared to each Q sort, revealing the extent to which each Q sort is associated with each factor, using the concept of Eigenvalues as a representation of correlation, expressed as statistical variance between factors (Van Exel & De Graaf, 2005).

Watts and Stenner (2012) have developed a Q Methodology Crib Sheet, which seeks to act an analytical framework to quickly achieve first blush interpretation by extracting the following:

i) Q statements ranked highest in a given factor, that is, Strongly Agree (+5) in the current research;
ii) Q statements ranked higher in the factor being analysed, compared to the other factor arrays;
iii) Q statements ranked lower in the factor being analysed, compared to the other factor arrays; and
iv) Q statements ranked lowest in a given factor, that is, Strongly Disagree (-5) in the current research.

The output of this is the four factors which are presented in Chapter 4 and discussed in Chapter 5.

Finally, the concept of a difference score requires further discussion as this permits the identification of distinguishing and consensus statements. This can often be a useful analytical tool to compare the emphasis placed on a given statement between two factors.

A difference score, then, refers to the relative difference between the placement of a statement on the distribution grid across any two factors. A difference score is calculated for each factor and serves to highlight distinctive weightings on a statement within the composite, as compared to another factor.

3.11 Validity and reliability

Q Methodology has been criticised in some academic circles because of the fact that there is no external criterion for the validity of an individual's subjective perspective and the issue of validity can thus not apply to Q Methodology research (Brown, 1980).

However, the validity of Q methodology stems from the fact that there are a finite number of distinct viewpoints on any one subject. It bears mentioning, that conventional attributes of reliability and validity are not the core focus of Q methodology research, rather it seeks to explore and uncover those extant subjectivities about a topic which are measurable or in operation (Albizua & Zografos, 2014).

3.11.1 External validity (generalisability)

Given that the set of possible distinct perspectives on a topic is finite, Q methodology does not seek to achieve generalizable sample results, rather, it seeks to uncover those distinct subjectivities on a given topic and conduct further analysis thereon (Barry & Proops, 1999).

Finally, the use of Q methods lends itself to exposing views from the margins and ensures that divergent perspectives are communicated in the discourse, which allows for a greater diversity of perspectives to be considered and new insights, rather than dominant viewpoints, more likely to be exposed (Cuppen et al., 2010).

3.11.2 Internal validity

The administration of Q methodology studies follows a relatively settled and formulaic approach (Barry & Proops, 1999). The internal validity of the assessment is secured in large part through this tried and tested approach. The research is designed to obviate the interpretation biases of the researcher and allow the subjectivities of the respondent to be distilled (Ramlo & Newman, 2011).

The internal validity is further established by the careful and deliberate formulation of the Q set- in that it should be properly balanced and ought to

sufficiently cater for the broad representation of possible views on a given discourse. The post study comments will be an opportunity for testing the internal validity of the Q set since respondents will be able to respond to whether the Q set could have been supplemented with additional statements (Brown, 1993).

3.11.3 Replicability

Replicability is the most important form of reliability in relation to Q methodology research(Van Exel & De Graaf, 2005). It is usually established through a test-retest reliability assessment. Brown (1980) found that Q sort reliability is established in ranges of 0.80 and upward.

3.11.4 Objectivity

By design, this is an exercise in subjectivity assessment, however, the objectivity of the researcher, and the attendant mitigation of any latent researcher bias, is mitigated by the Q sorting process, since the operant perspectives are uncovered by the respondent themselves, an advantage of this research method (Watts & Stenner, 2012).

3.12 Ethical considerations

Beyond adhering to the ethics policy governing this programmatic research, and having sought, and having been granted, approval from the University of Witwatersrand's Ethics Committee, the observance of ethical codes of research will be ensured through the fact that while the identities of the P set will be known to the researcher, their responses will not be personally identifiable, which is secured by pre-analysis de-identification of the Q sort post the entirely online administration of the research instrument.

In addition, the ultimate report seeks to analyse a composite of the various Q Sorts and thus the factors ultimately analysed are not definitive of any one particular Q Sort, which renders it almost impossible to attribute a factor's composite view to a single respondent. Further, no personal information was

shared or used for any other purpose other than that communicated to the respondents, being the completion of the current research.

The additional information gathered about demographic information and the responses to the questions after the Q sort is useful as a form of meta-analysis to identify any additional conclusions which may be supported.

Additionally, none of the respondents in the P set constitute vulnerable groups and their confidentiality will be ensured, particularly when reporting the study. In particular, given that the anonymity of the respondents in the P set is ensured, it is an advantage of the study's approach, given that respondents can be completely forthright, without fear of reprisal (Finchilescu & Muthal, 2019).

While a deeply significant issue, climate change and the responses thereto are not likely to induce much trauma or discomfort on the part of the respondents, nor have any unanticipated consequences been identified.

This notwithstanding, adherence to the highest ethical standards is paramount in research which relies on subjective individual response and this research is no exception (Finchilescu & Muthal, 2019).

A copy of the Ethics Approval pertaining to this Research Report is attached hereto marked Appendix C.

3.13 Conclusion

The contents of this chapter have sought to articulate the research methodology's underlying theoretical framework and best practices, with reference to some of the leading authorities in this methodology. These best practices were then compared and applied to the current research and the process followed in executing the research.

Chapter 4: RESULTS AND PRESENTATION OF FACTORS

4.1 Introduction

The contents of this chapter seek to present the results of the Kade analysis of the raw data collected in Q Sortware. The analysis is assisted by referencing the methodology contained in Chapter 3 and applied by the Kade Software, together with the 'crib sheet' developed by Watts and Stenner (2012) which distils the statements which load most strongly in each Factor to provide a guideline in revealing a composite view of the factor.

4.2 Factor Analysis

After extracting the Q Sortware CSV, and the .txt format Q Statements, the input data for Kade analysed. The current research extracted 8 (eight) principal component factors which, in unrotated factor matrix form cumulatively explained 83% (eighty three percent) of the variance between the Q Sorts.

These factors thus represented comparable 'pools' of respondents, that is, respondents whose Q sort process was completed with similar emphasis on the same statements. Brown refers to this portion of the process as distilling 'clusters' of respondents who "have ranked the statements in essentially the same fashion" (Brown, 1980, p.6).

Two of these factors, factors 7 and 8, were excluded from the rotation process as these factors displayed an Eigenvalue of less than 1. This is in accordance with the Kaiser-Guttman criterion which recommends that only factors which yield an Eigenvalue above 1 are to be considered statistically significant. The Eigenvalue is determinative of the statistical significance of a factor and the ability of the factor to explain a certain correlation (Brown, 1980; Watts & Stenner, 2012).

Thereafter, a further two factors were eliminated on the basis of only loading on a single Q sort. Brown (1980) recommends that a factor ought to load on at least two Q Sorts in order to be considered. This requirement is viewed as standard

methodological practice by Brown and is further endorsed by Watts and Stenner (Brown, 1980; Watts & Stenner, 2012). It also follows that a single Q Sort representing a factor does not elucidate any great truths, since it is, by definition not a composite, but is defined by a single Q Sort.

Accordingly, Factor 4 and Factor 5 were excluded from analysis leaving Factor 1, 2, 3 and 6 for rotation and further analysis. The Factors selected thus accounted for 63% (sixty three percent) of the total variance across the Q Sort.

Q sorts which do not express significant loading on a given factor or across two or more factors are deemed to be confounded and are equally excluded from further examination. The current research revealed 8 (eight) confounded Q Sorts after the Factor Flagging at $p>0.01$ was completed using the auto flag function on Kade (Watts & Stenner, 2005).

The exclusion of the confounded Q Sorts serves to maximise the distinction between factors such that the analysis is rendered clearer and to exclude those Q sorts which do not contribute sufficiently to the composite view of one or other of the Factors. These significantly loading Q Sorts are referred to by Watts and Stenner as ‘factor exemplars’ since they “exemplify the shared item pattern or configuration that is characteristic of that factor” (Watts & Stenner, 2005).

This is clear from Table 4.1 below, which reveals the Factor Loadings Table, together with the Q sorts which were confounded and the composite reliability score:

Q-sort	Factor 1		Factor 2		Factor 3		Factor 6	
P1	0,8299	Flagged	0,2079		0,0958		0,0474	
P2	0,4988		0,3896		0,121		0,128	
P3	0,2408		0,1636		0,3939		0,7243	Flagged
P4	0,4084		0,6236	Flagged	0,2387		0,2262	
P5	0,6729	Flagged	0,0034		0,1425		0,1413	
P6	0,4616		0,3027		0,5309		0,346	
P7	0,0331		0,8239	Flagged	0,2326		0,2819	
P8	0,6427	Flagged	0,4846		0,2252		0,2714	
P9	0,158		0,4392		0,7493	Flagged	0,0392	
P10	0,7517	Flagged	-0,1059		0,0721		0,1432	
P11	0,5803		0,397		0,2078		0,4098	
P12	0,1705		0,584	Flagged	0,3069		0,409	
P13	0,782	Flagged	0,0952		-0,1379		0,3348	
P14	0,6654	Flagged	0,095		0,402		0,3161	

P15	0,7113	Flagged	0,2961		0,0962		0,2377	
P16	0,3082		0,0307		0,3588		0,272	
P17	0,722	Flagged	0,135		0,3688		0,1669	
P18	0,7322	Flagged	0,414		0,1018		0,0976	
P19	0,3361		0,573		0,0818		0,4918	
P20	0,1357		0,6854	Flagged	0,3358		-0,0355	
P21	0,5855		0,3582		0,15		0,071	
P22	0,2526		0,3049		0,1505		0,7267	Flagged
P23	0,4487		0,0265		-0,006		0,3423	
P24	0,3352		0,5619		-0,0162		0,0446	
P25	0,6836	Flagged	0,0922		0,1186		0,0262	
P26	0,31		0,4985		0,6687	Flagged	0,0975	
P27	0,0324		0,1158		0,7617	Flagged	0,287	
P28	0,722	Flagged	0,4313		0,3482		0,0946	

P29	0,22		0,4775		0,3311		0,2015	
% Var. Exp	27		16		11		9	
Total % Var.								63%
Composite reliability	0.978		0.941		0.923		0.889	

Legend:

Factor 1 Flagged
Factor 2 Flagged
Factor 3 Flagged
Factor 6 Flagged
Confounded

Table 4.1: Factor Loadings Table

4.3 Correlations between Factors

As is clear from Table 4.2 the Factors selected for further analysis on the basis of the methodology set out herein are all positively correlated. Weak correlations are preferred as this demonstrates more distinct viewpoints which have been distilled from the factor analysis process.

As is apparent from Table 4.2, Factors 2 and 3 demonstrate the strongest correlations, while Factor 1 and 3 show the weakest correlation at r = 0.4651, but even this correlation is moderate, given that r = <0.4.

	Factor 1	Factor 2	Factor 3	Factor 6

Factor 1	1	0,4927	0,4651	0,5602
Factor 2	0,4927	1	0,6548	0,5771
Factor 3	0,4651	0,6548	1	0,5614
Factor 6	0,5602	0,5771	0,5614	1

Table 4.2: Factor Score Correlations

4.4 Four Factor Array

One of the more convenient functions of the Kade software suite output is the ability to export data in MS Excel of each factor. Seen below is the complete factor array of the four factors which were the outputs of the methodological process described in Chapter 3.

The factor arrays outlined below seek to illustrate the composite, that is, if a hypothetical respondent perfectly loaded on the factor, the factor array for each factor would be determinative of that factor's Q sort, which provides a constructive basis for analysis.

Number	Statement	F 1	F 2	F 3	F 6
1	In designing and implementing climate change mitigation and adaptation responses, South Africa should ensure that it does not prejudice itself economically	1	3	5	4
2	South Africa does not meaningfully contribute to global climate change	-1	-1	1	0
3	South Africa is a developing country and should therefore be allowed to continue to increase its greenhouse gas emissions while developed	-4	-2	1	4

	countries should be required to stop their own emissions				
4	The South African government should occupy a far greater and more active role in climate change adaptation and mitigation	2	0	0	3
5	South Africa has a responsibility to reduce its greenhouse gas emissions profile	2	5	4	2
6	Climate change mitigation and adaptation response has been poorly formulated in South Africa	1	-2	-3	0
7	South Africa needs to reassess the structure of its economy and move away from fossil fuel powered electricity generation	5	4	2	5
8	Climate change is afforded sufficient priority at a national response level	-5	1	2	-1
9	Climate change legislation and regulation are the most effective methods of driving a climate change response	2	4	0	1
10	If we wait and see how climate change impacts the country we will be better placed to respond to such impacts	-4	-5	-5	-5
11	South Africa is complying with its international climate change obligations and commitments	-3	4	0	1
12	South Africa's climate change response strategy sufficiently considers all aspects of the climate change problem	0	2	3	-1
13	Man-made climate change is a scientifically proven fact;	4	5	0	5
14	Climate change policy is meaningfully addressing the issue of climate change in South Africa	0	2	1	-2
15	South Africa only contributes a small percentage of global greenhouse emissions and it is, therefore, not our responsibility to fix the problem	-5	-2	0	-2
16	Climate change response is afforded sufficient political attention in South Africa	-4	2	3	0
17	Climate change is too difficult to manage at a country level	0	-1	-2	-4
18	Failure to respond to climate change demonstrates lack of political will	4	0	-1	1
19	South Africa's environment is resilient enough to withstand the impact of climate change	-3	-4	-5	-3
20	Managing climate change mitigation and adaptation will negatively impact the South African economy	0	-1	-3	-1
21	South Africa is particularly vulnerable to climate change and we need to find an urgent and effective solution to climate change, at all costs	2	2	3	1

22	South Africa's climate change response strategy is developing too slowly to have any meaningful impact	3	-2	-1	-1
23	South Africa has more important problems to address than climate change;	-3	0	-2	3
24	The response aimed at mitigation and adaptation to climate change has been well formulated in South Africa	0	1	1	0
25	More resources should be invested in technologies aimed at mitigating and adapting to climate change	1	1	2	2
26	Government is responsible for determining the national response to climate change	1	2	2	3
27	The findings of the Intergovernmental Panel on Climate Change do not hold validity in South Africa	-1	-2	-2	-3
28	Climate change represents an immediate threat to the economy, the country and its people	5	1	5	0
29	It is already too late to prevent the impacts of climate change, as anything South Africa does will take too long to make any real difference	-1	0	-1	-2
30	South African citizens should be responsible for their own climate change responses	1	-1	1	2
31	Environmental damage is justifiable if it leads to economic growth and social development	-1	-4	-4	0
32	Climate change represents the greatest threat to society in the next two decades	4	0	4	0
33	South Africa's climate change response does not matter in a global context	-1	-3	-1	-4
34	South Africa's Climate Change policy is doing enough to address the future impact of climate change in South Africa	-2	3	0	-1
35	South Africa has the necessary skills and technical abilities to develop a meaningful climate change response	3	0	2	2
36	South Africa must abide by its international climate change commitments	2	3	0	2
37	Corporates and business in general should take more responsibility for South Africa's climate change response	3	0	4	4
38	There is not enough information to reliably say that man-made climate change is real	-2	-5	-2	-2
39	The harm anticipated to be caused by climate change is too far away to impact today's decisions about climate change	-2	-3	-4	-2
40	South Africa's commitments to international agreements such as the Paris Agreement are a sufficient response to climate change	0	1	-1	0

41	Market forces will naturally regulate responses to climate change over time and no formal climate change response is required	-2	-4	-2	-5
42	Climate Change can be solved by technological interventions alone	0	-3	-3	-4
43	Economic development is of greater importance than climate change	-2	0	-4	1
44	There is still time to decide how best to respond to climate change in South Africa	0	-1	0	-3

Table 4.3: Four Factor Array

4.5 Factor Interpretation

It is the intention of this section of the report to transition toward the interpretation of the factors, which gives credence to the gestalt nature of the instrument.

In interpreting the individual factors, it is important to give sufficient attention across the spectrum of responses – a diligent respondent would have, necessarily, taken great care in the placement of each statement on the grid and the use of the crib sheet as a framework of analysis holds great value to ensure that the analysis is sufficiently robust.

Each of the factors which have been drawn from the factor analysis phase of the research will be addressed in turn and characteristics of the composite view will be examined.

4.5.1 Factor 1: “Climate Change Response Critics”

This factor has been labelled Climate Change Response Critics given the composite view’s apparent critical perspective of the South African Climate Change response strategy.

4.5.1.1 Crib Sheet Analysis

	Highest Ranked Statements	**F 1**

7	South Africa needs to reassess the structure of its economy and move away from fossil fuel powered electricity generation	+5
28	Climate change represents an immediate threat to the economy, the country and its people	+5
	Positive Statements Ranked Higher in Factor 1 Array than in Other Factor Arrays	
18	Failure to respond to climate change demonstrates lack of political will	+4
32	Climate change represents the greatest threat to society in the next two decades	+4
35	South Africa has the necessary skills and technical abilities to develop a meaningful climate change response	+3
22	South Africa's climate change response strategy is developing too slowly to have any meaningful impact	+3
6	Climate change mitigation and adaptation response has been poorly formulated in South Africa	+1
44	There is still time to decide how best to respond to climate change in South Africa	0
42	Climate Change can be solved by technological interventions alone	0

17	Climate change is too difficult to manage at a country level	0
20	Managing climate change mitigation and adaptation will negatively impact the South African economy	0
	Negative Statements Ranked Lower in Factor 1 Array than in Other Factor Arrays	
24	The response aimed at mitigation and adaptation to climate change has been well formulated in South Africa	0
2	South Africa does not meaningfully contribute to global climate change	-1
34	South Africa's Climate Change policy is doing enough to address the future impact of climate change in South Africa	-2
23	South Africa has more important problems to address than climate change;	-3
11	South Africa is complying with its international climate change obligations and commitments	-3
3	South Africa is a developing country and should therefore be allowed to continue to increase its greenhouse gas emissions while developed countries should be required to stop their own emissions	-4
16	Climate change response is afforded sufficient political attention in South Africa	-4

	Lowest Ranked Statements	
8	Climate change is afforded sufficient priority at a national response level	-5
15	South Africa only contributes a small percentage of global greenhouse emissions and it is, therefore, not our responsibility to fix the problem	-5

Table 4.3: Factor 1 Crib Sheet Analysis

-5	-4	-3	-2	-1	0	1	2	3	4	5
** ◄ Climate change is afforded sufficient priority at a national	South Africa is a developing country and should therefore be	South Africa has more important problems to address than	South Africa's Climate Change policy is doing enough to address the	It is already too late to prevent the impacts of climate change,	There is still time to decide how best to respond to climate change	More resources should be invested in technologies aimed at	The South African government should occupy a far greater and	Corporates and business in general should take more responsibility	Man-made climate change is a scientifically proven fact;	South Africa needs to reassess the structure of its economy and
* ◄ South Africa only contributes a small percentage of	* ◄ Climate change response is afforded sufficient political	South Africa's environment is resilient enough to withstand the	There is not enough information to reliably say that man-made	South Africa's climate change response does not matter in a global context	The response aimed at mitigation and adaptation to climate change	** ► Climate change mitigation and adaptation response has been poorly	South Africa is particularly vulnerable to climate change and we need to	South Africa has the necessary skills and technical	** ► Failure to respond to climate change demonstrates lack of	Climate change represents an immediate threat to the economy, the
	If we wait and see how climate change impacts the country we will be better	** ◄ South Africa is complying with its international climate change	The harm anticipated to be caused by climate change is too far away	South Africa does not meaningfully contribute to global climate	* ► Climate Change can be solved by technological interventions	Government is responsible for determining the national response to	South Africa has a responsibility to reduce its greenhouse gas	** ► South Africa's climate change response strategy is developing too	Climate change represents the greatest threat to society in the next two	
			Economic development is of greater importance than climate change	The findings of the tergovernmental Panel on Climate Change	Climate change policy is meaningfully addressing the issue of	** ◄ In designing and implementing climate change mitigation and	South Africa must abide by its international climate change			
			Market forces will naturally regulate responses to climate change	Environmental damage is justifiable if it leads to economic growth	South Africa's commitments to international agreements such as the Paris	South African citizens should be responsible for their own climate change	Climate change legislation and regulation are the most effective			
					Climate change is too difficult to manage at a country level					
					Managing climate change mitigation and adaptation will negatively					
					South Africa's climate change response strategy sufficiently					

Table 4.4 Composite Factor Array 1

Factor 1 represents 27% of the explained variance across the complete P set and holds an Eigenvalue of 14.54, making this the most statistically significant loading in the entire research instrument. A strong composite reliability quotient of 0.978 completes the characterisation of this factor as being of significant analytical value.

Factor 1 was associated with 11 of the 29 Q sorts. These 11 responses carried cumulative professional experience in climate change related work of 144 years or an average of 13.1 years per respondent in this P set. This is the lowest average experience quotient of any of the factors analysed and is below the P set average of 15.2 years.

Interestingly, the Climate Change Response Critics hailed from across the professional spectrum and includes lawyers, climate change activists, academics, journalists, executives at independent power producers, governmental policy makers and non-governmental organisations.

The central focal point of the factor is borne out by strength of the responses aligned to a requirement for a fundamental and immediate shift of the South African economy and the policy stance. The nature of the shift is indicated by a reassessment of the structure of the economy and a move away from fossil fuel electricity generation (7;+5).

The time dimension of this shift is borne out by climate change being an immediate threat (28;5), which is supported by climate change being the greatest societal threat in the next two decades (28;5) and climate change being one of South Africa's most important problems (23;5).

Clearly, the adherents of the Climate Change Response Critics feel that the current climate change policy response strategy is inadequate (22;3);(11;-3) and the government of the Republic of South Africa is not responding to the climate clarion call by acting swiftly or convincingly enough (8;-5). This is also supported by one respondent who stated that "South Africa has the potential and resources to respond much better to the emissions of greenhouse gasses. Renewable energy is underestimated and the pace and scale of the roll out thereof is strongly affected by Political will".

Additionally, our current policy response does not appear to be garnering sufficient political bandwidth (8;-5); (16;-4) and our status as a developing country does not grant South Africa any leeway to skirt its responsibility to reduce emissions(15;-5);(3;-4) and take drastic action to recalibrate our policy strategy and our economy.

This facet of factor 1 aligns with the position articulated in the IPCC SR 1.5 report which stresses that not only is South Africa not in a position to skirt its responsibility to accelerate its decarbonisation strategy, but even from a localised impact, South Africa needs to brace itself for even more severe impacts relative to other regions (IPCC, 2018).

On a positive note, the factor does display some optimism that South Africa is endowed with the necessary skills and technical abilities to develop a meaningful climate change response strategy (35;3).

Indeed, one respondent (P10) strongly representative of this factor, whose Q sort carried a sort weight of 6.482, stated “South Africa has the potential and resources to respond much better to the emissions of greenhouse gasses”. Another respondent from the climate activist arena emphasises the regional role that South Africa has to play as both a large scale emitter and a policy leader on the continent in “influencing decisions on intervention in SADEC as well as the AU” (*sic.)*.

An analysis of the distinguishing statements characterising Factor 1 reveals strong agreement with 18 (+4), in contrast to Factor 2, 3, and 6 which place this statement around the neutral cluster (0;-1;1 respectively).

Further, the weakly positive ranking of statement 1, which deals with a climate change strategy that does not prejudice South Africa’s economy, is distinct from the emphasis placed on this statement by Factor 2 (+3), Factor 3 (+5) and Factor 6 (+4).

Similarly, the consistently strongly negative ranking of statements relating to the attention afforded to climate change at a national level (statements 8 and 16) is

distinguished from the weakly positive ranking in Factor 2(+2), Factor 3 (+3) and the neutral ranking of 0 in Factor 6.

The consensus statements, which are statements that do not statistically distinguish between any pair of factors for Factor 1 are statements 20 and 24. These statements pertain to the negative impact of climate change mitigation and adaptation efforts on the South African economy and the quality of the formulation of South Africa's mitigation and adaptation response, respectively.

These statements are clustered at 0, indicating neutrality and reaffirming that there is little that Factor 1's composite endorses about the current climate change response of South Africa.

Overall, Factor 1 reveals the richest vein of information across the broadest explained variance in the instrument and provides interesting opportunities for further analysis.

4.5.2 Factor 2: "Climate change is real, but we're doing enough"

This Factor has been given the above moniker as the perspective conveys broadly that while climate change is a reality that cannot be ignored and must be acted upon, the existing policy strategy in South Africa is, in general, sufficient and that policy interventions are sufficiently addressing the climate change dilemma.

4.5.2.1 Crib Sheet Analysis

	Highest Ranked Statements	**F 2**
13	Man-made climate change is a scientifically proven fact;	+5
5	South Africa has a responsibility to reduce its greenhouse gas emissions profile	+5

	Positive Statements Ranked Higher in Factor 2 Array than in Other Factor Arrays	
9	Climate change legislation and regulation are the most effective methods of driving a climate change response	4
11	South Africa is complying with its international climate change obligations and commitments	4
34	South Africa's Climate Change policy is doing enough to address the future impact of climate change in South Africa	3
36	South Africa must abide by its international climate change commitments	3
14	Climate change policy is meaningfully addressing the issue of climate change in South Africa	2
40	South Africa's commitments to international agreements such as the Paris Agreement are a sufficient response to climate change	1
24	The response aimed at mitigation and adaptation to climate change has been well formulated in South Africa	1
29	It is already too late to prevent the impacts of climate change, as anything South Africa does will take too long to make any real difference	0

	Negative Statements Ranked Lower in Factor 2 Array than in Other Factor Arrays	
37	Corporates and business in general should take more responsibility for South Africa's climate change response	0
35	South Africa has the necessary skills and technical abilities to develop a meaningful climate change response	0
4	The South African government should occupy a far greater and more active role in climate change adaptation and mitigation	0
32	Climate change represents the greatest threat to society in the next two decades	0
2	South Africa does not meaningfully contribute to global climate change	-1
30	South African citizens should be responsible for their own climate change responses	-1
22	South Africa's climate change response strategy is developing too slowly to have any meaningful impact	-2
31	Environmental damage is justifiable if it leads to economic growth and social development	-4
	Lowest Ranked Statements	

10	If we wait and see how climate change impacts the country we will be better placed to respond to such impacts	-5
38	There is not enough information to reliably say that man-made climate change is real	-5

Table 4.5: Factor 2 Crib Sheet Analysis

-5	-4	-3	-2	-1	0	1	2	3	4	5
If we wait and see how climate change impacts the country we will be better	Environmental damage is justifiable if it leads to economic growth	The harm anticipated to be caused by climate change is too far away	South Africa only contributes a small percentage of	Managing climate change mitigation and adaptation will negatively	* ◄ Corporates and business in general should take more responsibility	South Africa's commitments to international agreements such as the Paris	Climate change policy is meaningfully addressing the issue of	** ► South Africa's Climate Change policy is doing enough to address the	South Africa needs to reassess the structure of its economy and	Man-made climate change is a scientifically proven fact;
** ◄ There is not enough information to reliably say that man-made	South Africa's environment is resilient enough to withstand the	South Africa's climate change response does not matter in a global context	South Africa's climate change response strategy is developing too	There is still time to decide how best to respond to climate change	South Africa has the necessary skills and technical	Climate change represents an immediate threat to the economy, the	Climate change response is afforded sufficient political	South Africa must abide by its international climate change	Climate change legislation and regulation are the most effective	South Africa has a responsibility to reduce its greenhouse gas
	Market forces will naturally regulate responses to climate change	Climate Change can be solved by technological interventions	Climate change mitigation and adaptation response has been poorly	Climate change is too difficult to manage at a country level	Failure to respond to climate change demonstrates lack of	The response aimed at mitigation and adaptation to climate change	South Africa's climate change response strategy sufficiently	In designing and implementing climate change mitigation and	* ► South Africa is complying with its international climate change	
			The findings of the tergovernmental Panel on Climate Change	South Africa does not meaningfully contribute to global climate	South Africa has more important problems to address than	More resources should be invested in technologies aimed at	Government is responsible for determining the national response to			
			South Africa is a developing country and should therefore be	* ◄ South African citizens should be responsible for their own climate change	The South African government should occupy a far greater and	Climate change is afforded sufficient priority at a national	South Africa is particularly vulnerable to climate change and we need to			
					Economic development is of greater importance than climate change					
					It is already too late to prevent the impacts of climate change,					
					Climate change represents the greatest threat to society in the next two					

Table 4.6: Composite Factor Array 2

This perspective strongly identifies with the existence of climate change (13;+5 and 38;-5) and the responsibility of South Africa to reduce its emissions profile (5;+5).

Interestingly, this Factor represents 4 respondents who significantly loaded on this factor of whom 3 are currently or have previously occupied a role in a government department dealing with climate change and energy policy.

The average professional experience in the climate change arena for this perspective is considerable at 19.75 years and so represents a significant level of insight into the perspectives of policy makers and the status of the South African climate change response strategy.

Additionally, these respondents account for 16% of the explained variance, held an Eigenvalue of 2.881 and showed a high composite reliability score of 0.941.

Of equal interest is the data revealed in Table 4.7 below which reveals a strong intra-factor sorts correlation.

Factor 2	Sorts Correlations			
Q-Sort	**P7**	**P20**	**P4**	**P12**
P7	100	60	58	59
P20	60	100	45	51
P4	58	45	100	71
P12	59	51	71	100

Table 4.7: Factor 2 Sorts Correlation

Factor 2 loads strongly on the use of climate change legislation and regulation as the favoured intervention to respond to climate change impact in South Africa (9;+4) and further, that the current policy response is sufficiently addressing the future impact of climate change in South Africa (34;+3).

However, Factor 2 shows strong disagreement (-4) with the trade-off implicit in statement 31, which deals with environmental damage being justifiable in the context of economic growth and development.

Rounding out the gestalt view of Factor 2 is a conflicted sentiment toward the time dimension of South Africa's climate change response strategy with (10;-5) indicating that South Africa cannot wait to see how climate change impacts the country, but neutral ranking of statement 29 (0) and (32;0).

Also clustering around neutral are some other interesting statements relating to the mechanism of climate change response, with statement 35, relating to necessary skills and technical abilities to develop a meaningful climate change response, statement 4 which pertains to the Government's role in climate change adaptation and mitigation and the role of corporates and business and general in statement 37 all receiving a neutral (0) placement in the composite view.

Finally, Factor 2 views the current compliance with international climate change obligations as sufficient (11; +4) which bear out the hallmarks of a formal national response to international climate change commitments as being satisfactory.

Factor 2's distinguishing statements make for interesting analysis since, as is drawn out from the presentation of the results above, the distinguishing statements show strong relative positive loading on statement 11 (+4), which deals with South Africa's compliance with its international climate change obligations and commitments. This is distinguished from Factor 1 which ranked this as moderately disagreeable at -3 and Factors 3 and 6 which placed this statement at 0 and 1 respectively.

Factor 2 was also distinguished by being the only factor to disagree (albeit weakly at -1) with the notion that citizens should accept more responsibility for the national climate change response. This dissonance is further enhanced when one has regard to the attribution of 0 to statement 37 which posits that corporates and business in general should take more responsibility for South Africa's climate change response.

This was the most stark distinguishing statement in the entire research instrument as the other factors ranked this statement as moderate to strongly agreeable (F1;+3), (F3;+4), (F6;+4).

This represents a clearly affirming view on the importance placed on policy and legislative intervention in South Africa's armoury of climate change responses borne out by this factor. It further echoes the sentiment attached to statements 9 (legislation and policy are the most effective means of intervening) and 34 (South Africa's Climate Change policy is doing enough to address the future impact of climate change in South Africa) which are ranked moderately to strongly agreed at (+4) and (+3) respectively.

Factor 2 did, as mentioned above affirm its strong agreement that climate change is real with a strongly negative loading on statement 38(-5), which pertained to there being insufficient information to reliably say the man-made climate change is real. This was distinguished from the other factors which held this statement over as moderately negative, at (-2) each.

The statements which drew consensus in Factor 2 were statements 24, 29 and 36. Statement 24, as mentioned above, appears in Factor 1 and is equally neutrally located in factor 2.

Statement 29 which contemplates the time dimension of the climate change issue is, interestingly neutrally located at 0. This is to be contrasted with the ranking of Statement 10 (-5), which as intimated above posits that there is no time to delay and wait to see how climate change impacts the country.

This inconsistency would be an interesting area to probe in subsequent research and highlights one of this methodology's key limitations in that subsequent

probing of such an inconsistency is not possible without an entirely new research effort.

Statement 36 (South Africa must abide by its international climate change commitments) is strongly agreed with at (+3) and is also a consensus statement, indicating that it is likely a shared view across multiple factors that South Africa should be abiding by its climate change commitments made on the international stage.

4.5.3 Factor 3: "Act now, save the economy, but don't rely on policy"

Factor 3 presented a challenging analysis given the existence of polarising loadings- all three respondents who make up the composite factor ranked statement 1 at +5, indicating strong agreement that South Africa should not prejudice itself economically in designing and implementing climate change policy but also expressed strong disagreement with statements which sought to characterise a preference of policies prioritising economic growth and development over protecting the environment (31;-4) and (43;-3). The mechanism of intervention was thus revealed to be contrarian in that policy interventions consistently clustered around the neutral ranking (24;1); (14:1); (9;0); (22;0) and (34;0). This presented interesting fodder for further analysis as contemplated below.

4.5.3.1 Crib Sheet Analysis

	Highest Ranked Statements	**F 3**
1	In designing and implementing climate change mitigation and adaptation responses, South Africa should ensure that it does not prejudice itself economically	5
28	Climate change represents an immediate threat to the economy, the country and its people	5

	Positive Statements Ranked Higher in Factor 3 Array than in Other Factor Arrays	
32	Climate change represents the greatest threat to society in the next two decades	4
37	Corporates and business in general should take more responsibility for South Africa's climate change response	4
21	South Africa is particularly vulnerable to climate change and we need to find an urgent and effective solution to climate change, at all costs	3
12	South Africa's climate change response strategy sufficiently considers all aspects of the climate change problem	3
16	Climate change response is afforded sufficient political attention in South Africa	3
8	Climate change is afforded sufficient priority at a national response level	2
25	More resources should be invested in technologies aimed at mitigating and adapting to climate change	2
24	The response aimed at mitigation and adaptation to climate change has been well formulated in South Africa	1

2	South Africa does not meaningfully contribute to global climate change	1
44	There is still time to decide how best to respond to climate change in South Africa	0
15	South Africa only contributes a small percentage of global greenhouse emissions and it is, therefore, not our responsibility to fix the problem	0
	Negative Statements Ranked Lower in Factor 3 Array than in Other Factor Arrays	
13	Man-made climate change is a scientifically proven fact;	0
36	South Africa must abide by its international climate change commitments	0
9	Climate change legislation and regulation are the most effective methods of driving a climate change response	0
4	The South African government should occupy a far greater and more active role in climate change adaptation and mitigation	0
40	South Africa's commitments to international agreements such as the Paris Agreement are a sufficient response to climate change	-1

18	Failure to respond to climate change demonstrates lack of political will	-1
6	Climate change mitigation and adaptation response has been poorly formulated in South Africa	-3
20	Managing climate change mitigation and adaptation will negatively impact the South African economy	-3
43	Economic development is of greater importance than climate change	-4
39	The harm anticipated to be caused by climate change is too far away to impact today's decisions about climate change	-4
	Lowest Ranked Statements	
10	If we wait and see how climate change impacts the country we will be better placed to respond to such impacts	-5
19	South Africa's environment is resilient enough to withstand the impact of climate change	-5

Table 4.8: Factor 3 Crib Sheet Analysis

-5	-4	-3	-2	-1	0	1	2	3	4	5
If we wait and see how climate change impacts the country we will be better	Economic development is of greater importance than climate change	Climate change mitigation and adaptation response has been poorly	Climate change is too difficult to manage at a country level	South Africa's climate change response strategy is developing too	South Africa is complying with its international climate change	* South Africa is a developing country and should therefore be	Government is responsible for determining the national response to	South Africa is particularly vulnerable to climate change and we need to	Climate change represents the greatest threat to society in the next two	* ► In designing and implementing climate change mitigation and
South Africa's environment is resilient enough to withstand the	The harm anticipated to be caused by climate change is too far away	Climate Change can be solved by technological interventions	South Africa has more important problems to address than	South Africa's commitments to international agreements such as the Paris	** ◄ Man-made climate change is a scientifically proven fact;	The response aimed at mitigation and adaptation to climate change	* ◄ South Africa needs to reassess the structure of its economy and	South Africa's climate change response strategy sufficiently	South Africa has a responsibility to reduce its greenhouse gas	Climate change represents an immediate threat to the economy, the
	Environmental damage is justifiable if it leads to economic growth	* ◄ Managing climate change mitigation and adaptation will negatively	The findings of the tergovernmental Panel on Climate Change	South Africa's climate change response does not matter in a global context	South Africa must abide by its international climate change	Climate change policy is meaningfully addressing the issue of	South Africa has the necessary skills and technical	Climate change response is afforded sufficient political	Corporates and business in general should take more responsibility	
			Market forces will naturally regulate responses to climate change	It is already too late to prevent the impacts of climate change,	Climate change legislation and regulation are the most effective	South Africa does not meaningfully contribute to global climate	Climate change is afforded sufficient priority at a national			
			There is not enough information to reliably say that man-made	Failure to respond to climate change demonstrates lack of	The South African government should occupy a far greater and	South African citizens should be responsible for their own climate change	More resources should be invested in technologies aimed at			
					There is still time to decide how best to respond to climate change					
					South Africa only contributes a small percentage of					
					South Africa's Climate Change policy is doing enough to address the					

Table 4.9: Composite Factor Array 3

Factor 3's composite accounted for 3 respondents and represented 11% of the explained variance and carried an Eigenvalue of 1.364.

The demographic profile of the respondent set comprising Factor 3 bears out an average professional experience in the climate change environment of 15.6 years and is comprised of respondents who are or have been operant in State Owned Enterprises, DFI's and DEFF.

In the post sort responses, each of the respondents identified their professional experiences as being the reason for their selection of the statements that they most strongly agreed and disagreed with. This is significant as is gives some definitive richness to the profile of Factor 3's persona, when one has regard to those statements as per the crib sheet: (1;+5); (28;+5) and (10;-5);(16;-5).

These statements speak to the time dimension of the climate change dilemma and to the immediacy with which action is required (39;-4), but also speak to the important balancing act that has to be undertaken in ensuring that a policy step does not prejudice South Africa's economy.

Climate change Policy has not been poorly formulated (6;-3) and sufficiently considers all aspects of the climate change problem (12;3), which begs the question, why do these respondents feel so non-committal to the South African climate change response?

Part of the answer may lie in this factor's placement of statement 20, which contemplates the negative impact on the economy of dealing with climate change adaptation and mitigation, which was ranked at -3, which was noteworthy as the other factors showed some neutrality about this statement, choosing (0) in the case of factor 1 and (-1) in the case of factors 2 and 6.

Factor 3 found consensus statements in statement 39, which dealt with the time dimension of climate change and strongly loaded on these statements at -4

4.5.4 Factor 6: “It takes a village”

Factor 6 tries to draw all stakeholders out to take action, showing strong views on statements acknowledging climate change as a reality, and the need to move away from the mineral energy complex, but is characterised by the lack of a clear solution, rather, the composite seeks to allocate responsibility across technology, the private sector and government to draw out a cohesive response.

4.5.4.1 Crib Sheet Analysis

	Highest Ranked Statements	**F 6**
7	South Africa needs to reassess the structure of its economy and move away from fossil fuel powered electricity generation	+5
13	Man-made climate change is a scientifically proven fact;	+5
	Positive Statements Ranked Higher in Factor 6 Array than in Other Factor Arrays	
3	South Africa is a developing country and should therefore be allowed to continue to increase its greenhouse gas emissions while developed countries should be required to stop their own emissions	+4
37	Corporates and business in general should take more responsibility for South Africa's climate change response	+4
23	South Africa has more important problems to address than climate change;	+3

4	The South African government should occupy a far greater and more active role in climate change adaptation and mitigation	+3
26	Government is responsible for determining the national response to climate change	+3
30	South African citizens should be responsible for their own climate change responses	+2
25	More resources should be invested in technologies aimed at mitigating and adapting to climate change	+2
43	Economic development is of greater importance than climate change	+1
31	Environmental damage is justifiable if it leads to economic growth and social development	0
	Negative Statements Ranked Lower in Factor 6 Array than in Other Factor Arrays	
28	Climate change represents an immediate threat to the economy, the country and its people	0
32	Climate change represents the greatest threat to society in the next two decades	0
24	The response aimed at mitigation and adaptation to climate change has been well formulated in South Africa	0

12	South Africa's climate change response strategy sufficiently considers all aspects of the climate change problem	-1
29	It is already too late to prevent the impacts of climate change, as anything South Africa does will take too long to make any real difference	-2
14	Climate change policy is meaningfully addressing the issue of climate change in South Africa	-2
27	The findings of the Intergovernmental Panel on Climate Change do not hold validity in South Africa	-3
44	There is still time to decide how best to respond to climate change in South Africa	-3
33	South Africa's climate change response does not matter in a global context	-4
42	Climate Change can be solved by technological interventions alone	-4
17	Climate change is too difficult to manage at a country level	-4
41	Market forces will naturally regulate responses to climate change over time and no formal climate change response is required	-5
10	If we wait and see how climate change impacts the country we will be better placed to respond to such impacts	-5

Table 4.9: Crib Sheet Analysis Factor 6

-5	-4	-3	-2	-1	0	1	2	3	4	5
Market forces will naturally regulate responses to climate change	South Africa's climate change response does not matter in a global context	South Africa's environment is resilient enough to withstand the	South Africa only contributes a small percentage of	Managing climate change mitigation and adaptation will negatively	South Africa does not meaningfully contribute to global climate	Failure to respond to climate change demonstrates lack of	South African citizens should be responsible for their own climate change	** ► South Africa has more important problems to address than	* ► South Africa is a developing country and should therefore be	South Africa needs to reassess the structure of its economy and
If we wait and see how climate change impacts the country we will be better	Climate Change can be solved by technological interventions	The findings of the tergovernmental Panel on Climate Change	It is already too late to prevent the impacts of climate change,	South Africa's climate change response strategy is developing too	Climate change represents an immediate threat to the economy, the	Economic development is of greater importance than climate change	South Africa has the necessary skills and technical	The South African government should occupy a far greater and	Corporates and business in general should take more responsibility	Man-made climate change is a scientifically proven fact;
	* ◄ Climate change is too difficult to manage at a country level	There is still time to decide how best to respond to climate change	There is not enough information to reliably say that man-made	South Africa's Climate Change policy is doing enough to address the	Climate change represents the greatest threat to society in the next two	South Africa is particularly vulnerable to climate change and we need to	South Africa has a responsibility to reduce its greenhouse gas	Government is responsible for determining the national response to	In designing and implementing climate change mitigation and	
			The harm anticipated to be caused by climate change is too far away	Climate change is afforded sufficient priority at a national	South Africa's commitments to international agreements such as the Paris	Climate change legislation and regulation are the most effective	More resources should be invested in technologies aimed at			
			Climate change policy is meaningfully addressing the issue of	South Africa's climate change response strategy sufficiently	The response aimed at mitigation and adaptation to climate change	South Africa is complying with its international climate change	South Africa must abide by its international climate change			
					Climate change mitigation and adaptation response has been poorly					
					Environmental damage is justifiable if it leads to economic growth					
					* Climate change response is afforded sufficient political					

Table 4.10: Composite Factor Array 6

Factor 6 was composed of two respondents, the minimum acceptable to be deemed statistically significant (Watts & Stenner, 2012).

It represents an average professional climate change experience of 16 years and gives voice to a finance professional and a distinguished academic and demonstrates a composite reliability score of 0.889, the lowest composite reliability of the factors distilled for analysis.

An Eigenvalue of 1.02 and an explained variance of 9% meant that this factor may represent a boundary condition and only just met the minimum criteria to warrant inclusion in this analysis.

Factor 6 also showed moderate to strong correlations with other factors, ranging from 0.56 (Factor 1 and Factor 2) - 0.57 (Factor 3), potentially reaffirming its role as augmenting factor, rather than a genuine composite worthy of individual analysis.

Nonetheless, the factor does show that composite views the climate change dilemma as soluble at a national level (17;-4) and ranks South Africa's developing nation status as grounds for continuing to increase GHG emissions, which at +4 represents an interesting distinguishing statement for this factor (z score 1, 71).

The factor showed strong sensitivity to the climate change time dimension statements (10;-5); (44;-3) but was polarised by climate change not being the greatest threat to South Africa in the next two decades, (32;0); (28;0) and (29;-2) but disagreed that this was the most pressing issue to be solved at a national level (23;3).

This neutral clustering of statements presents interesting opportunities for analysis as this reveals some dissonance around the time dimension of climate change and may warrant further interrogation.

The factor attributes responsibility for the climate change response to corporates (37;+4) and citizens (30;+2) and technology interventions (25;2). It is for this reason that the factor is labelled "it takes a village" as this factor gives expression to the need for the burden to be shared across all stakeholders.

The factor reveals that South Africa's response in a global context is significant (42;-4), but that this could not be left to market forces alone to regulate (41;-5).

Upon interrogating the distinguishing statements of this factor, it was clear that the greatest distinction between this factor and the others lay in the placement of statement 3.

Statement 3 deals with South Africa's statement as a developing country and its consequential entitlement to continue its greenhouse gas emissions, which was located at strongly agreed (+4) in factor 6, but at (-4) in the case of factor 1, (-2) in the case of factor 2 and weakly positive (+1) in factor 3.

In addition, factor 6's location of statement 23 at (+3), which speaks to the time dimension of climate change as a problem in South Africa was distinct from factor 1(-3) and factor 3(-2), indicating that this composite viewed other problems as potentially requiring more immediate attention than climate change.

4.6 Conclusion

Chapter 4 has sought to present and describe the results of the 4 factors distilled from the raw data and analysed by KADE. This has established a platform for meaningful discussion of the results in Chapter 5.

Chapter 5: DISCUSSION OF RESULTS

5.1 Introduction

This chapter seeks to discuss the results which have been presented in Chapter 4 above. The intention of this chapter is expand upon each of the composite views by comparing them to the positions articulated in the international and domestic climate change response frameworks presented in Chapter 2, the literature review.

The output distilled 4 statistically distinct perspectives on South Africa's climate change response strategy.

The first perspective saw a high level of criticism around the current response strategy and offered up some interesting insights as to where improvements could be made and responsibility reallocated.

The second perspective drew out the deeply experienced policy makers' composite perspectives and offered up some interesting notions of interface between policy and its sufficiency.

The third factor elicited spoke to the need to embrace climate action and that there was a defined need to act, but the mechanism of intervention was not climate change policy, but rather a delegation of at least a portion of this responsibility to the private sector.

The final factor, factor 6, developed a view through which some level of responsibility was allocated across the stakeholder spectrum with some responsibility being attributed to the private sector, government and to the use of technological interventions.

Importantly, the statements which have loaded strongly around climate change being a reality are consensus statements and are thus not defining of the perspective of any of the factors.

This discussion is, however, intended to assist in identifying areas of coherence and dissonance with the policy steps which have been taken and which are in the process of being taken.

5.2 Factor 1: "Climate Change Response Critics"

The factor 1 composite seeks to lay its foundation at the sentiment expressed by Climate Action Tracker in evaluating the governance efforts taken by South Africa in respect of climate change as 'critically insufficient'.

The factor clearly resonates with the immediacy of the steps that need to be taken by the Republic of South Africa, and the time dimension element of the composite reflects the tipping point alluded to by the IPCC and places strong emphasis on this item in the factor.

Using the international climate change commitments as a lens of analysis reveals that this factor strongly correlates with a preference for taking strong environment first steps, and decries the preference of economy over environment. The factor strongly emphasises a commitment to upholding the international undertakings to take action against climate change and should provide a basis for renewed engagement with the various stakeholders in reassessing the nationally determined contributions under the Paris Climate Agreement, for instance. The timing of this is important, given that South Africa is yet to provide its updated nationally determined contributions.

This factor strongly identifies with the thrust of the WP-CCR but is likely extremely frustrated at the time that has elapsed to implement meaningful legislative intervention. The introduction of a carbon tax under the Carbon Tax Act is likely to have been well received, but once again this persona would have been frustrated by the phased in introduction of the carbon price and questioned the price point attached to carbon given the sense of urgency characterising this factor.

This factor, while acknowledging the inherent trade-offs implicit in economic development in an era of climate change, is likely to favour the implementation of

more drastic policy and legislative intervention, aimed at prioritising compliance with international commitments and mitigating the eventual impact on the economy.

Adherents of factor 1 weigh heavily on the importance of policy, consequently, these respondents are likely to have experienced the lack of coherent action in the WP-CCR and then translated into the slow roll-out and implementation of the Climate Change Bill and the Carbon Tax Act as significantly frustrating.

This is important, since, as the most statistically strong factor, this ought to carry significant weight and could provide a platform for concerted action across multiple currently tangential fronts to enable South Africa to develop and implement a Paris-Climate-Agreement-compatible decarbonisation policy suite.

The views of this factor may well be useful in modifying the current policy discourse since the coherence displayed by the loading on this factor represents a unifying voice with which to convey a meaningful response to policy makers and overcome those areas of dissonance which have been acknowledged as a roadblock to inter-departmental co-operation at a national government level.

Critically, this is needed in order to ensure that a Just Transition takes place with a view to affording a platform for all stakeholders to have their needs addressed, which has currently not taken place- conversely, the large commercial organisations which characterise the carbon intense economy have been permitted to progress their individual agendas with little check (Climate Action Tracker, 2020)

By this, it is intended that the actors, comprising the composite, handed these findings may commence with a reframed basis upon which to cooperate and leverage the areas of consonance across their areas of expertise, responsibility and better understand or even reframe the areas where coherence has not characterised their interactions.

Critically, an interrogation of what these respondents consider to be “justifiable” in the context of S24 of the Constitution would be worthy of further analysis, given

that this remains an area where little clarity exists and this composite may yield useful insights.

5.3 Factor 2: "climate change is real, but our policies are sufficient"

Factor 2's composite speaks with the voice of experience and long days in the policy trenches. It understands the need for intervention on the basis of climate change being acknowledged as a reality and a move to lower South Africa's greenhouse gas emissions profile, but believes in the power of policy intervention.

The twin levers of climate change legislation and regulation and the perceived compliance by South Africa with its international climate change obligations are testament to the view espoused by this composite that the policies currently in place are sufficient.

This factor, while accounting for 16% of the explained variance, is amplified by the average experience of the respondents comprising this factor of nearly 20 (twenty) years - these are the voices of the experienced policy makers, designers and implementers in the P set and the perspective that the current policies are sufficient triggers an area of dissonance across the P Set, since this is not a view shared by factor 1. Interestingly, little faith is placed in the use of technological interventions as being sufficient to deal with climate change impacts

These perspectives would likely benefit from further analysis and interrogation in post research follow ups to determine if this perspective resonates with the individuals comprising the composite.

Exemplars of Factor 2 are quite possibly the precise targets of the concerns highlighted by Barry and Proops (1999) in Chapter 2 above, where potentially efficient policies are being presented at a national level, but the absence of the necessary social and political capital to see these policies through to implementation is perhaps lacking. This is further supported by the findings of Climate Action Tracker Report (2020) which highlights the need for political commitment to be enhanced in order to prioritise climate change interventions.

5.4 Factor 3: “Act now, save the economy, but don’t rely on policy”

The factor 3 composite placed significant emphasis on the need to act urgently against climate change and the potential of climate change to be negatively impacted by climate change, but conveyed the need to avoid compromising the economy at the same time. This bears out the complex interface between these two variables in the climate change policy design environment.

It has plagued the climate negotiators since the inception of attempts at internationally concerted climate change action, not least of all in the framing of the commitments under the Paris Climate Accord and the findings of the IPCC.

Indeed, one of factor 3’s distinguishing statements related to the particular vulnerability of South Africa, which is borne out by the IPCC report identifying Southern Africa as a climate change ‘hotspot’ (IPCC, 2018). Despite this finding, South Africa has continued to roll out climate change legislation and policy intervention at a glacial pace and even then, with slowly phased in approaches, as seen in the case of the Carbon Tax Act and the Climate Change Bill, which has yet to be tabled before Parliament.

This speaks to the complexity of the problem that the country is facing, but equally to the process failure that has characterised the policy and legislation implementation. As Barry and Proops (1999) posit, policy makers often struggle to sufficiently rally the necessary political and social capital to have tough policies such as the climate change legislation interventions rolled out and fully implemented.

In South Africa, this is borne out by the influence of the extractive and energy intensive users who have compromised, through the use of their considerable commercial and political influence, the implementation of key climate change interventions (Makegetla, 2017).

From a domestic perspective, this has played out in the tensions between individual governmental departments and prevented effective coordination of policy at a national level and is acknowledged in the LEDS submission to the UNFCCC (Republic of South Africa, 2020b).

This situation has likely been exacerbated by the CoViD-19 Pandemic as the "Economic Reconstruction and Recovery Plan" does not appear to place significant emphasis on reducing the carbon intensity of the economy, and rather appears to entrench the mineral energy complex characterising the South African energy landscape (Boulle, 2020).

Clear evidence of this is the Risk Mitigation Independent Power Producer Programme, which has announced preferred bidder status to several carbon intense electricity generation sources, which further entrench the systemic inertia of carbon intensity, rather than transitioning to a low carbon economy as contemplated in the LEDS (Republic of South Africa, 2021).

This is markedly at odds with many other countries using the CoViD -19 Pandemic as an opportunity to decarbonise and move away from carbon intense energy generation (Boulle, 2020).

Interestingly, however, the clusters of neutrality within this composite reveal some dissonance in the factor- the response required is immediate, but the mechanism is unclear. As referenced in Chapter 4's presentation of the results, the ambivalence in embracing legislation and regulation (9;0) and the sentiment around Government's role in climate change mitigation and adaptation policy (4;0) create an inconsistency in this factor, potentially worthy of further interrogation in subsequent research.

5.5 Factor 6: "It takes a village to raise a climate change policy"

The perspective exemplified by Factor 6 is located within much of South Africa's current climate change response strategy - it emphasises the need to move toward lower carbon intensity as a country, which is aligned to the LEDS and the National Development Plan.

Where, however, the perspective diverges materially from both the undertakings under the Paris Agreement and the LEDS submission is on the axis of South Africa's status as a developing country and the factor's sentiment entitling it to increase its greenhouse gas emissions as a result thereof. This line of reasoning

is reminiscent of the original climate accord struck under the Kyoto Protocol which also recognised the distinction between developed and developing nations and their emissions profiles.

However, what this perspective does not sufficiently appreciate is the systemic nature of climate change and its impact. The system is agnostic of the source of the emissions, it matters only that the emissions exist and therefore, create the climate step change(s) that we are in the early stages of experiencing.

In addition, it also translates to a viewpoint which emphasises nationalism and a prioritisation of nation-state over global coherence and systemic feedback loops. This factor, more than any other, represents the perspective of policy makers who are comfortable prioritising the national interests over global coordinated climate action.

This is affirmed by the weight given to distinguishing statement 3 (South Africa is a developing country and should therefore be allowed to continue to increase its greenhouse gas emissions while developed countries should be required to stop their own emissions), which this factor allocates moderate agreement to at (+3), as compared to the weak agreement from Factor 3(+1) and the strong disagreement by Factors 1(-4) and 4 (-2).

This nationalist view is also hallmarked by the final distinguishing statement of this factor, statement 17 which examines whether climate change is too difficult to deal with at a national level which is ranked at -4, which justifies a deduction that South Africa is capable of formulating its own developing its own climate change response strategy in isolation.

This perspective is progressive in the sense that it allocates a significant amount of responsibility to other stakeholders in the system, including corporates and business, the South African government and investments into technologies aimed at mitigating and adapting to climate change. It is this blended allocation of responsibility and the implicit trade-off attached thereto that makes this perspective bear the hallmarks of a strategy which requires national, if not supra-national coordination.

Such an approach is likely to be endorsed by the climate change community, since it is only through coordinated stakeholder engagement that the correct balancing of interests can be struck (Boulle, 2020).

Factor 6 has a strong appreciation for the immediacy of the climate change issue and posits that it is necessary to act without delay as the environment is not resilient enough to withstand the impact of climate change.

The exemplars of factor 6 however, do not place sufficient emphasis on South Africa's regional and global contributions to climate change, with the statement located neutrally, which belies the nations status as a top 20 global emitter.

5.6 Implications of the Results

Senior decision makers placed in possession of this research would likely benefit from the perspectives elucidated herein. It emphasises the need to act swiftly, but to act from an informed, discrete foundation of coherence.

A useful implication of this research could be its submission to the Presidential Climate Change Coordination Commission to enable the consideration of the various perspectives which act as variables in the complex system of climate change policy intervention.

Because the research objective of this research was not to objectively evaluate the climate change response strategy but to explore perspectives about the climate change response strategy, this research uncovers different layers of thinking about the climate change debate, which may be useful in restructuring the climate change discourse in South Africa.

5.7 Limitations of the Study

Given the primary challenge faced in coordinating this research, the report would not be complete without remarking on the fact that the analysis contained herein represents a 'point in time' analysis, which may change significantly as the perspectives of the people constituting the P set, dynamic as they are, shift.

Further, the four factor array cannot be reduced to be exhaustive of all perspectives on the South African climate change response; rather, what can be said is that it is strongly statistically representative of the P set who participated in this research.

It is also worth noting that Q methodology is relatively novel in its application to issues such as the present. This naturally raises questions as to generalisability given that the perspectives are not generalizable to other populations and in fact only apply to the population which constitutes the P set, however, this is mitigated by the fact that there exist only a finite number of perspectives on a given domain as dealt with hereunder.

Finally, Q Methodology is not resolutive of the research question, but is exploratory in the sense that it contributes to a more informed analysis of the discourse and provides structure to a typically unstructured, messy problem (Ackoff, 1974; Ramlo & Newman, 2011). This is a limitation because the time for additional analysis of the problem is limited, given the emergent and continually evolving nature of the climate change problem.

5.8 Conclusion

This chapter has discussed the four factors elicited from the Q Methodology research and placed those perspectives within the framework of the national and international responses to climate change adopted by South Africa.

Specific focus has been placed on the perspectives and their interaction with the time dimension of climate change and its broader implications for future policy intervention and regulation.

The chapter concludes with an examination of the implications of the results discussed in the chapter, together with a review of potential limitations of the study.

CHAPTER 6: RECOMMENDATIONS and GENERAL CONCLUSION

6.1 Recommendations for Future Studies

Based on the limitations of the study outlined above, there would be value in repeating the exercise with other senior decision makers, or even more preferable, as part of an exploratory process across national and sub-national stakeholders to serve as a rallying point around which further climate change interventions may be staged.

This research, if repeated at a national level with a broader stakeholder population and championed by the Inter-ministerial Committee on Climate Change, given authority by a promulgated and effective Climate Change Act, could be an extremely useful framework against which to develop a suite of standard frameworks to address the influence of corporate and special interest lobby groups who drive agendas in extractive and carbon intense which run contrary to national climate change policy interventions and further provide the foundation for the development of a policy intervention to address the impact of these stakeholders.

6.2 General Conclusion

The current research has sought to interrogate the perspectives of senior decision makers in respect of South Africa's climate change response strategy.

It has revealed that, within the P set of the respondents there are 4 statistically significant perspectives which exemplify these perspectives. These perspectives have been located within the current climate change response strategy of the Republic of South Africa.

Factor 1 represents the broadest statistically aligned factor and holds a critical view of South Africa's ability to respond to climate change through policy.

Factor 2 consists of a strong contingent of experienced policy professionals whose central characterisation of the situation is the policy and legislative intervention are the correct modes of intervention and that the current response strategy is sufficient.

Factor 3, conversely, focuses on the economic dimensions of the climate change problem and largely argues that the policy interventions are not the solution the climate change response dilemma in South Africa.

Factor 6, finally, looks to apply and amalgam of interventions which are to be used to prioritise the South African nation state and ensure that economic prejudice is minimised, while looking across the spectrum for these solutions.

It argues that the interdependence of the actors who are responsible for driving the climate change response strategy require a coordinated and structured approach to achieve a coherent response which sufficiently balances the trade-offs implicit in balancing a complex system such as climate change, most specifically when set against the unique background of South Africa's demographics, structural and economic inequality and natural environment.

All the factors and the literature is aligned, though, that climate change is real and it is an urgent problem, if not in all cases the most urgent problem facing our society, our economy and our nation today.

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Appendix A

The Q Statements contained in this Appendix A were presented to the P Set as part of the online research instrument.

1	In designing and implementing climate change mitigation and adaptation responses, South Africa should ensure that it does not prejudice itself economically
2	South Africa does not meaningfully contribute to global climate change
3	South Africa is a developing country and should therefore be allowed to continue to increase its greenhouse gas emissions while developed countries should be required to reduce their own emissions
4	The South African government should occupy a far greater and more active role in climate change adaptation and mitigation
5	South Africa has a responsibility to reduce its greenhouse gas emissions profile
6	Climate change mitigation and adaptation response has been poorly formulated in South Africa
7	South Africa needs to reassess the structure of its economy and move away from fossil fuel powered electricity generation
8	Climate change is afforded sufficient priority at a national response level

9	Climate change legislation and regulation are the most effective methods of driving a climate change response
10	If we wait and see how climate change impacts the country we will be better placed to respond to such impacts
11	South Africa is complying with its international climate change obligations and commitments
12	South Africa's climate change response strategy sufficiently considers all aspects of the climate change problem
13	Man-made climate change is a scientifically proven fact;
14	Climate change policy is meaningfully addressing the issue of climate change in South Africa
15	South Africa only contributes a small percentage of global greenhouse emissions, and it is, therefore, not our responsibility to fix the problem
16	Climate change response is afforded sufficient political attention in South Africa
17	Climate change is too difficult to manage at a country level
18	Failure to respond to climate change demonstrates lack of political will
19	South Africa's environment is resilient enough to withstand the impact of climate change

20	Managing climate change mitigation and adaptation will negatively impact the South African economy
21	South Africa is particularly vulnerable to climate change, and we need to find an urgent and effective solution to climate change, at all costs
22	South Africa's climate change response strategy is developing too slowly to have any meaningful impact
23	South Africa has more important problems to address than climate change;
24	The response aimed at mitigation and adaptation to climate change has been well formulated in South Africa
25	More resources should be invested in technologies aimed at mitigating and adapting to climate change
26	Government is responsible for determining the national response to climate change
27	The findings of the Intergovernmental Panel on Climate Change do not hold validity in South Africa
28	Climate change represents an immediate threat to the economy, the country and its people
29	It is already too late to prevent the impacts of climate change, as anything South Africa does will take too long to make any real difference

30	South African citizens should be responsible for their own climate change responses
31	Environmental damage is justifiable if it leads to economic growth and social development
32	Climate change represents the greatest threat to society in the next two decades
33	South Africa's climate change response does not matter in a global context
34	South Africa’s Climate Change policy is doing enough to address the future impact of climate change in South Africa
35	South Africa has the necessary skills and technical abilities to develop a meaningful climate change response
36	South Africa must abide by its international climate change commitments
37	Corporates and business in general should take more responsibility for South Africa's climate change response
38	There is not enough information to reliably say that man-made climate change is real
39	The harm anticipated to be caused by climate change is too far away to impact today's decisions about climate change
40	South Africa's commitments to international agreements such as the Paris Agreement are a sufficient response to climate change

41	Market forces will naturally regulate responses to climate change over time and no formal climate change response is required
42	Climate Change can be solved by technological interventions alone
43	Economic development is of greater importance than climate change
44	There is still time to decide how best to respond to climate change in South Africa

Appendix B

Dear Sir/Madam,

Thank you for agreeing to participate in my research. As discussed, I am a Masters Candidate student at the University of the Witwatersrand's Business School, in the Faculty of Commerce, Law and Economics and I am enrolled in the Masters of Management (Energy Leadership).

My research entitled "**Senior Decision Makers' Perspectives on South Africa's Climate Change Response Strategy**" explores the subjective views and opinions of key stakeholders around South Africa's policy and legislative response to climate change. The aim of the study is to develop the body of knowledge informing climate change policy and to gain insight into areas of coherence and dissonance across climate change policy in South Africa.

You have been selected as a research participant because you are a senior decision maker in your sector and thus have or are perceived to have influence on the form, substance and implementation of South Africa's climate change response strategy or interact closely therewith.

Your participation is voluntary and you can withdraw at any time without penalty. Throughout the survey your privacy will be protected and your participation will remain confidential. I do not wish to analyse data individually and all the data will be anonymously aggregated. There will be no mention of your name and organisation.

Raw data will be stored in an online platform QSortware and the personal computer of the researcher for the duration of the masters, and two years after the final adjudication of the research report, permanently deleted. Both storage locations are password protected. As part of the study raw data will be aggregated in a manner that ensures no linkage to individual research participants. The aggregated data will be used for academic purposes only.

If you agree to participate, please complete the survey that follows this cover letter. By completing the survey, you indicate that you wish to voluntarily

participate in this research. The survey should take approximately 30-45 minutes of your time. If you have any concerns, please contact me on the details provided below and I will happily administer the survey in an online meeting.

By following the link below and continuing with the survey you indicate that:

* You have read and understand the information provided above.

* You give your consent to participate in the study on a voluntary basis for the purposes outlined above.

I understand that your time is valuable and wish to thank you for your time and participation.

Researcher name: Andrew Taylor | Email: andrewtaylorrsa@gmail.com | Phone: +2781 8115247| MMEL supervisors: Distinguished Professor Robert J Scholes.

Please click on the link above to start the survey and please click on “Save Results” at the end of the instrument.

Regards,

Andrew Taylor

Appendix C

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

SCHOOL OF GRADUATE SCHOOL OF BUSINESS ADMINISTRATION ETHICS COMMITTEE
CONSTITUTED UNDER THE UNIVERSITY HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: WBS/BA1007766/755**
PROJECT TITLE Change Response Strategy	Senior Decision Maker's Perspectives on South Africa's Climate
INVESTIGATOR	Mr Andrew Taylor
SCHOOL/DEPARTMENT OF INVESTIGATOR	MM (Energy Leadership)
DATE CONSIDERED	18 August 2020
DECISION OF THE COMMITTEE	Approved unconditionally
RISK LEVEL	MINIMAL RISK
EXPIRY DATE	30 JUNE 2021

ISSUE DATE OF CERTIFICATE 31 August 2020

CHAIRPERSON _____
(Dr MDJ Matshabaphala)

cc: Supervisor: Professor Scholes

DECLARATION OF INVESTIGATOR

To be completed in duplicate and **ONE COPY** returned to the Chairperson of the School/Department ethics committee.

I fully understand the conditions under which I am are authorized to carry out the abovementioned research and I guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee.

_____ 03 / 09 / 2020

Signature **Date**

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

Appendix D

CONSENT TO PARTICIPATE IN RESEARCH STUDY FORM

Senior Decision Makers' Perspectives on South Africa's Climate Change Response Strategy

- **A research report by Andrew Taylor**

I, ……., agree to participate in this research project. The research has been explained to me and I understand what my participation will involve. I agree to the following:

(Please circle the relevant options below).

I agree that my participation will remain anonymous	YES NO
I agree that the researcher may use anonymous quotes in his research report	YES NO
I agree that the interview may be audio recorded	YES NO
I agree that the interview may be video recorded	YES NO
I agree that the information I provide may be used anonymously after this project has ended, for academic purposes by other researchers, subject	YES NO

to their own ethics clearance being obtained.	
I agree that the researcher may take a picture of me whilst I am completing the interview – however provided that it is not published in the study, the media or any public place whatsoever. This picture is simply for record purposes only.	YES NO

I confirm that I am aware that I may withdraw from, or refuse to participate in, the research at any point and acknowledge that there is no penalty or benefit attached to my decision to participate in the research study or not.

…… (signature)

…… (name of participant)

…… (date)