

**Extreme Weather Survival Strategies for Agriculturally Based
Organisations: A Case Study of Blinkwater Mills**

By

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DECLARATION

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Signature:

P.Ramgovind

DEDICATION

To my brother

For allowing me to follow my dreams, making sure they come true and for all that you do.

Words cannot express how grateful I am.

To my mum and dad

For your infinite love, support and guidance. Without which, I would not be where I am today.

Mum, Kyunki Tu Dhadkan Main Dil

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To the participants of the study, your time is most appreciated.

ABSTRACT

Extreme weather conditions demand extreme weather survival strategies. In recent months, South Africa has been drastically affected by extreme weather conditions exasperated by the presence of the El Niño Southern Oscillating (ENSO) cycle. Countless farmer's country wide in South Africa were plagued by the drought brought on by ENSO cycle. The long reaching effect of the drought on every day South Africans can still be seen in the ever increasing price of basic foods (National Weather Service, 2016).

Given this current situation, the aim of the study was to understand extreme weather survival strategies for agriculturally based organisations. Organisational supply chains can only absorb a certain amount of costs associated with the cultivation, processing, and distribution of goods before those costs inadvertently get passed on to the consumer (Morrehead, 2009). This coupled with inflation, paints a grim future for those South Africans already on the poverty line.

Qualitative research was carried out utilising the in-depth telephonic interview as a data collection instrument. The data collected was analysed by identifying patterns, themes, categories and regular similarities in order to highlight the impact and extent of the resilience of Blinkwater Mills to the drought and their willingness to adapt practices. Given the small scale of Blinkwater Mills, 10 respondents participated in the study, of which 2 formed part of the pilot study. There was a 100% response rate.

The findings indicated that although South Africa experienced a drought impacting farmers nationwide, Blinkwater Mills averted the full impact of the drought by benefitting from having farmers with irrigated land and numerous suppliers strategically placed throughout the province of Mpumalanga. They were however, not completely exempted from the drought as countless farmers' yield and quality was affected by the low rainfall. It is therefore recommended that survival strategies be successfully crafted and implemented to address the needs of not only farmers and their immediate supply chain stakeholders but also for the consumers who are dependent upon basic food items. Studies have shown that there is a likelihood of recurrence of this phenomenon which demands that it be taken more seriously (National Weather Service, 2016). As a result, it must be brought to the forefront of government intervention policies when addressing the issue of climate change and its by-product, extreme weather conditions. Therefore, more research must be conducted within a South African context in order to not only bring attention to this crisis but also to identify constructive methods organisations industry wide can adapt as a means of dealing with and combatting the effects of extreme weather conditions.

Key words: Blinkwater Mills, Drought, El Niño Southern Oscillating, Supply Chains, Survival Strategies

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LIST OF ACRONYMS

BCI: Better Cotton Initiative

CSA: Climate-Smart Agriculture

ENSO Cycle: El Niño Southern Oscillating Cycle

FAO: Food and Agriculture Organisation

FMCG: Fast Moving Consumer Goods

GDP: Gross Domestic Product

ISO: International Organisation for Standardisation

JFPS: Juan Francisco Paz Silva

JSE: Johannesburg Stock Exchange

MAS: Management Accounting Systems

M&S: Marks & Spencer

NGO: Non-Governmental Organisations

SCM: Supply Chain Management

CHAPTER 1: INTRODUCTION TO STUDY

1.1 Introduction

The drought which plagued countless farmer's country wide in South Africa should never have reached the proportions that it did. The presence of the El Niño Southern Oscillating (ENSO) cycle was brought to the attention of the South African Government (National Weather Service, 2016), yet the seriousness of its' impact and existence was seemingly overlooked, up until its effects were too great to disregard. This phenomenon must be taken more seriously as its impact can no longer be considered a once off event, as studies have shown that there is a likelihood of future reoccurrences (National Weather Service, 2016). As a result, it must be brought to the forefront of South Africa's government intervention policies when addressing the issue of climate change with extreme weather conditions being a by-product.

The effect of the drought that gripped South Africa for much of 2015 and 2016, saw the rise in the cost of basic foods such as maize (Early, 2015). It is for this reason that successfully crafted and implemented survival strategies are paramount not only for farmers affiliated with Blinkwater Mills but also Blinkwater Mills themselves as consumers is rural outlying areas of Mpumalanga and Limpopo are dependent upon the maize meal produced. However, Blinkwater Mills' supply chain could only absorb a certain portion of costs associated with the cultivation, processing and distribution of maize received from affiliated farmers before those costs were passed on to the consumers. This coupled with inflation makes paints a grim future for Blinkwater Mills' consumers who are situated in rural Mpumalanga and Limpopo.

This chapter introduces the concept of climate change and extreme weather conditions with the emphasis being on the effect ENSO cycle had on limiting rainfall; and the resultant impact that it had on Blinkwater Mills farmers. Being prepared for a supply chain disturbance and dealing with the after effects are two approaches that have varying degrees of success. The aim of this chapter is to highlight the problems faced by agriculturally based organisations as a result of drought, brought on and worsened by extreme weather occurrences. In addition to this, survival strategies that are currently in practice to aid in relief efforts to combat the effects of extreme weather conditions will be the main focus.

1.2 Research Background

It has been noted that one of the most overlooked risks, which has now been brought to the forefront to operational activities, is that of climate change. Closely linked to climate change is extreme weather events such as droughts, floods and hurricanes (United States Environmental Protection Agency (EPA), 2016). Recent studies indicated that climate change did not play as vital a role in the decisions that

organisations' took with regard to the operations of the supply chain (Moorehead, 2009). Milling companies such as Blinkwater Mills must therefore ensure that their supply chain is protected against such devastation so as to be protected against production impediments. Hanifan (2014), holds the view that a significant portion of the supply chain is being affected from the risks associated from the drought and precipitation extremes which, in turn impacted upon the respondents' operations.

The change in climate is key in bringing about a change in the agricultural system, if disaster is to be avoided therefore, mitigation attempts only serve to contain the damage caused by climate change, however, if organisations wish to be successful in the long term, better strides need to be taken to ensure their survival (Moorehead, 2009). As a result, much like Blinkwater Mills, organisations are looking toward innovative and cost effective ways to properly address this concern without suffering severe production disruptions and a decreasing profit margin.

1.3 Research Purpose

Given that most organisations are dependent on raw materials either directly or indirectly and the scarcity of raw materials, the resultant price is expected to increase in the event of a drought (Early, 2015). Small farmers can no longer meet their required quota to supply mills, with the desired raw materials, brought about by the drought, exacerbated by the water shortage (Latham, 2016). Milling companies such as Blinkwater Mills, now face the challenge of absorbing the impact of a shortage in yield whilst finding alternatives to compensate for the deficiency in raw material production.

Demand and supply become greatly imbalanced when weather events impact on a specific crop or group of crops, which implies that those organisations along the supply chain that do not have effective strategies in place will incur the most amount of difficulties (Fletcher, 2015). Which prompts the need to better understand and implement survival strategies for farmers cultivating crops as well as those individuals or intermediaries that are directly impacted by an inconsistent point of production.

1.4 Research Problem

The research problem may be stated as:

Survival Strategies needed by Agriculturally based Organisations as a result of Extreme Weather Conditions.

Small to medium farmers in South Africa can no longer meet their required quota and supply mills, with the desired raw materials, brought about by the drought and exasperated by a water shortage (Early, 2015). Milling companies now face the challenge of absorbing the impact of a shortage in yield whilst finding alternatives to compensate for the deficiency in raw material for production (Early, 2015).

Therefore, the purpose of this study is to examine the impact of extreme weather with the emphasis being on viable survival strategies which can be implemented by agriculturally based organisations.

1.5 Aim of the Study

The aim of this study was to investigate survival strategies needed as a result of extreme weather for organisations which are agriculture dependent, much like Blinkwater Mills situated in the province of Mpumalanga in South Africa. The study can be explained by way of the Black Swan Theory as well as the Contingency Theory which seeks to investigate the variables identified in the literature. Primary data will be obtained through conducting in-depth interviews with relevant department managers as well as managers from Blinkwater Mills various depots. From the findings new knowledge will be extrapolated and a greater understanding will be derived with regard to survival strategies in the wake of extreme weather conditions, which would aid in the establishment of remedial action when dealing with extreme weather conditions in an agricultural industry.

1.6 Research Objectives

The research aims to achieve the listed objectives as below:

- To determine the extent of the impact extreme weather conditions had on farmers affiliated with Blinkwater Mills
- To examine if the presence of extreme weather conditions directly affects the upstream supply chain
- To examine if there are any extenuating circumstances that prompt Blinkwater Mills to make adjustments to their forecasted demand schedule
- To determine whether a resilient supply chain would be beneficial to mitigate risk considering the likelihood of the reoccurrence of extreme weather conditions

1.7 Research Questions

The research aims to answer the listed questions as below:

- Did the presence of extreme weather conditions have any impact on the farmers that are affiliated with Blinkwater Mills?
- Was the upstream supply chain of Blinkwater Mills directly affected by extreme weather conditions?

- Are there any risks significant enough to force Blinkwater Mills to make adjustments to their forecasted demand schedule?
- Would a resilient supply chain be beneficial to mitigate risk considering the likelihood of the reoccurrence of extreme weather conditions?

1.8 Research Motivation and Rationale

Sustainability must be viewed as more than a Public Relations activity, according to (Handova, 2016), organisations that do not actively engage in sustainability actions are limiting themselves and foregoing cost saving opportunities. Despite strides being made towards having a resilient supply chain, survival strategies and expertise needed to combat the effects of extreme weather conditions are not as widely known. Consequently, organisations have done little in way of preparing for the effects of extreme weather conditions, choosing rather to absorb the impact rather than prevent it (Maxwell, 2015).

Despite Mpumalanga being one of the worst affected provinces by the drought, Blinkwater Mills – the producer of Super B (a maize-meal product) - continues to work with and purchase maize from farmers in the surrounding areas (Super B, 2016). Supporting local farmers and retailing at more than 300 depots and shops, Blinkwater Mills seeks to sustain and promote the use of local agriculture.

However, the difficulties that arise as a result of extreme weather - is not limited to just the ensuing damage, the affected local residents or the possibility of an economic slowdown – have ramifications which are not as easily recognised by the common person (Maxwell, 2015). Seeing as Blinkwater Mills services the rural community of Mpumalanga and Limpopo, their distribution centres have seen a decrease in regular patrons as rising prices and cheaper substitute goods have forced customers to purchase alternatives.

Therefore, understanding the needs of consumers together with their spending power will assist Blinkwater Mills in developing a survival strategy that is best suited to optimise efficiency, reduce supply chain risk and ensure a consistent profit margin. Through the successful implementation of a survival strategy Blinkwater Mills will place themselves strategically within the agriculture industry differentiating themselves from competitors.

1.9 Literature Review

In order to achieve the identified research objectives, a comprehensive literature review will be conducted. The aim of the literature review would be to highlight and elaborate on the following:

- **Sources of Supply Chain Risk**
The literature will explain risk and then contextualise it in terms of how does it affect an organisational supply chain. The effect of micro and macro risks are also outlined.
- **Climate Change and the Subsequent Effect**
Given the increasing occurrence of extreme weather, the literature will seek to explain the components of the supply chain that is most affected by its presence.
- **Survival Strategies Implemented by Agricultural Organisations**
Considering the limited knowledge of climate change, the literature will outline current organisational practices as a means of dealing with and surviving climate change and extreme weather conditions.
- **Practical Examples**
The likes of Starbucks, Marks and Spencer and the Body Shop will highlight the need and relevance to conduct research in this field. Each of these examples experienced a disruption to the flow of raw material produced by farmers as a result of extreme weather.
- **Theoretical Framework**
The applicability of The Black Swan Theory and The Contingency Theory will be explored as possible theoretical frameworks. After consideration, The Contingency Theory will be utilised to underpin the study.
- **Gap in literature**
Organisations are becoming increasingly more aware of their carbon footprints and greenhouse gas emission, but little is known about the effect that extreme weather conditions has on organisations and what strategies can be implemented as a means to not only survival but be sustainable.

1.10 Research Methodology

The research topic that was investigated took the form of a case. The case comprised of the analysis of primary data that was qualitatively gathered. In order to test the validity of the study, a pilot study was conducted. Descriptive research was used so as to achieve the research objectives through the means of correlation research. The time horizon for which the researcher intends is cross-sectional.

The study made use of in-depth telephonic interviews. From the gathered data, deductions and inferences were made from the research findings. Thereafter, recommendations and possible solutions were proposed.

1.11 Research Delimitations

The research delimitations include:

- The participants responsible for answering the designated questions have first-hand knowledge on the subject matter, be it at the Head-office or in the depots.
- Making use of a larger population size would result in the results not being a true reflection of Blinkwater Mills' operations as individuals who do not possess the required information have the potential to skew the findings.
- The upstream supply chain will be the focus of the research as the availability of raw materials is predominantly a problem faced by the planning and purchasing department.

1.12 Research Limitations

The research limitations include:

- Given the qualitative nature of the study and the distance between the researcher and organisation in question, the researcher will not be able to carry out in-depth face to face interviews, therefore, the researcher will be dependent upon telephonic interviews.
- Considering the small size of Blinkwater Mills, not everyone will have the knowledge to answer the designated questions accurately, as a result, a larger population size was not identified so as to not skew the data findings.
- Another limitation is that the respective findings which have been collected; and the subsequent analysis thereof by the researcher, is restricted and subject to Blinkwater Mills and their respective depots as these have been the only facilities under investigation in this study.

1.13 Research Assumptions

The research assumptions include:

- All participants will be knowledgeable concerning the phenomenon under study.
- All participants will be accurate and open in their answers to the designated questions.
- Blinkwater Mills and their affiliated farmers have been affected by the drought.
- The supply chain of Blinkwater Mills was affected by the presence of extreme weather in Mpumalanga.
- No policies and contingency plans were in place by Blinkwater Mills, to deal with the effects of extreme weather on their upstream supply chain.
- The price of subsequent food goods that are produced by Blinkwater Mills have been affected.
- Importing additional crop would not be an option given the size of the organisation (i.e. the use of local farmers will be consistent).

1.14 Significance of this Research

Through the undertaking of this study, Blinkwater Mills in Mpumalanga has been made aware of the extent to which extreme weather, coupled with other South Africa specific conditions, impacted on the upstream and downstream supply chain. Therefore, by being able to identify possible weaknesses in the supply chain, remedial action was taken. This allowed Blinkwater Mills to be able to compete successfully while maintaining good relationships with local suppliers. Additionally, by Blinkwater Mills seeking to implement survival strategies, the goal was to ensure that the end consumer ultimately benefits through cost savings and proper planning filtering down. However, the end consumer did have to pay more when disruptions to the supply chain occurred which affected consumer loyalty and faithful patronage.

1.15 Structure of Dissertation

- Chapter 1

This chapter introduced the concept of extreme weather in the context of climate change and the impact of it on the survival of agriculturally based organisations. Based on the significance of the study that was put forward, research objectives and the correlating research questions were identified. Along with this, the motivation and rationale behind the study was discussed, a literature review and supporting theories outlined, the research methodology, limitations, assumptions, delimitations were highlighted.

- Chapter 2

This chapter sought to provide an in-depth understanding of extreme weather in the context of supply chain management in relation to agriculturally based organisations. A detailed understanding of the affected aspects in the supply chain due to extreme weather conditions is put forward by way of explaining sources of supply chain risk. From this understanding, the current organisational stance on extreme weather conditionals and climate change, with emphasis on South Africa will be discussed. To give meaning to the practices adopted by organisations, practical examples depicting the consequences of extreme weather conditions highlight the current plight and need for intervention. This gives rise to the gap in South African literature and the lack in current knowledge on the best possible method to handle this risk. Evidence shows that practices adopted to aid international organisations may not fair the same in South Africa. The Black Swan Theory together with The Contingency Theory will be used as a means of theoretically underpinning the literature review. From this, The Contingency Theory will be ultimately put forward as the theory underpinning the study.

- Chapter 3

The research methodology of presented in this chapter was based on the utilisation of a structured in-depth telephonic interview. The population once defined and outlined will give rise to the extrapolation

of the sample derived. The individuals identified as part of the population will all have detailed knowledge of the subject matter at hand, therefore, making use of judgement sampling as the technique of choice. Based on the sample size a pilot study was conducted as a means of testing the validity of the study.

- Chapter 4

This chapter covered the analysis of the data by means of coding and keying in and editing the primary data gathered through the structured in-depth telephonic interview. In order to facilitate the aforementioned, the categorisation of the data is necessary before the data can be keyed. The coded data was then analysed and the findings from the sample population extrapolated and used a generalised consensus for the population.

- Chapter 5

The last chapter put forward the conclusions based on the analysis conducted in the penultimate chapter. Subsequently, recommendations were identified and discussed in detail; together with possible avenues for future research was also be mentioned.

1.16 Conclusion

This chapter aimed to highlight the deficiency of knowledge within agriculturally based with brought about by extreme weather conditions. This has become a prevalent risk that has the potential to impact excessively on a supply chain. Therefore, as indicated in this chapter it is important for organisations to no longer have the attitude of “wait and watch” but rather one which is proactive in dealing with and mitigating the harmful effects of extreme weather conditions. This chapter showed that it is imperative for South African organisations to sit up and take notice as extreme weather conditions combined with other external forces impacting South Africa, culminates to widespread difficulties experienced by both the organisations and consumers. Chapter two presents the literature review, highlighting the risk climate change and extreme weather conditions has on an organisation with survival strategies being discussed as a means of overcoming a supply chain disruption.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The relevance of this chapter is to present current literature on organisational practices with regard to survival strategies implemented by agriculturally based organisations when faced with extreme weather conditions. A comprehensive explanation on the various types of risk is detailed, detailing sources of supply chain risk. Climate change has been brought to the forefront of organisational risk mitigation strategies, thus it is important to understand climate change and the subsequent effect on an organisation. Knowing that there is now more of an effort to stem the effect of climate change on an organisation, the discussion then looks at the common survival strategies that have been implemented by organisations and farmers when faced with extreme weather conditions. This aspect of the discussion will be supplemented by outlining basic decision making frameworks, landscape, diversification of crops, relief funds, sustainable farming techniques, strategically sourcing suppliers, contracts and organisational planning. Subsequently, to give meaning to the theory put forward by several authors, practical examples of extreme weather and their consequential impact on agricultural organisations highlights the plight faced by countless organisations in the current business environment. Lastly, the literature review will look at two theories which has the potential to underpin the study. However, after a careful analysis, the Contingency Theory best and wholly encompasses the situation and effect of organisations experiencing a disruption and formulating survival strategies which are most apt and beneficial to all stakeholders involved.

2.2 Sources of Supply Chain Risk

Risk can be categorised as either being internal or external, with external risk relating to issues that lie outside of the organisations boundaries, for example the national or international political climate in which an organisation operates (Johnson, 2014). Macro-environmental forces have the propensity to impact the economy in its entirety and is predominantly made up of factors such as demographics, economics, natural, technological, political and cultural (Scott, 2013). This has a direct impact on the decision-making ability of the organisation as the political stability or instability of a nation has the ability to affect the financial markets and interest rates of an organisation (Kohli, 2015). The effect of this is that organisations are now forced to optimise existing resources and equipment and forgo the expense of additional investment purchases (KPMG, 2013).

Banks together with other financial institutions are responsible for underwriting the purchase of raw materials and commodities of an organisation (Johnson, 2014). What this implies is that there needs to be absolute transparency in the sourcing and purchasing of raw materials and commodities as any unethical behaviour has the ability to affect the future financing of the organisation as well as exposing the organisation to risk (KPMG, 2013).

An organisation engages in outsourcing through the purchasing of goods or services that was previously manufactured in-house, from an external supplier (Hugo, Badenhorst-Weiss and Biljoen, 2015). An organisations' supplier or other affiliated third party, a person or group independent from the primary situation, has the potential to be a source of risk, if they are not managed properly or if there is poor control over the partnership (Sourcing Innovation, 2017). The risk of poor performance on the part of an organisation also gives way to the reputational risk with an organisation can face given the poor processes which could have been initiated by the designated suppliers (Johnson, 2014).

Organisations must also invest in ways in which risk can be reduced, one way is making use of knowledge (Institute of Risk Management, 2016). Possessing local knowledge, experience and competencies has the ability to reduce risk faced by an organisation given the rise and impact of globalisation (Kohli, 2015). Possessing knowledge in an area of relative unknown has the ability to provide the organisation with a competitive advantage over its competitors.

From the various external risk classifications, climate change and extreme weather affecting Blinkwater Mills farmers is considered to be supplier risk. However, Blinkwater does not only face the possibility of reputational risk but also the precursor of that being a supply disruption. Nevertheless, a means of counteracting this risk is the in-depth knowledge and relationship Blinkwater Mills shares with its suppliers which enables Blinkwater Mills to remain operational in light of disruptions (van den Berg, 2017).

Figure 2.1 below serves to outline the links between climate change and risk. The purpose of Figure 2.1 is to show that climate change is not a directly related to organisational risks such as reputation or service reliability, but is however a part of a chain of consequences as illustrated (Department of the Environment and Energy, 2006). The consequences mentioned have the ability to negatively impact on the organisations capability to meet the needs of clients or stakeholders, as a result it is essential that organisations assess the risks of climate change so as to understand the links in the chain.

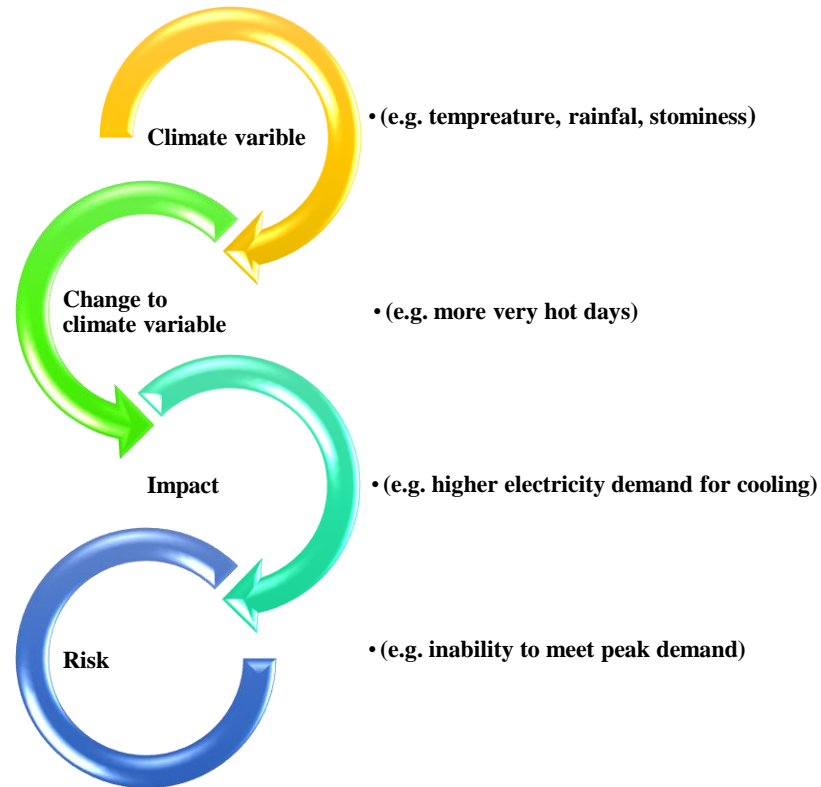


Figure 2.1: The Chain Reaction of Consequences

Source: Department of the Environment and Energy (2006)

Figure 2.1 above is an illustration of the chain reaction of consequences put forth by the Department of the Environment and Energy (2006). For any organisation, the key to success is understanding the operating business environment (KPMG, 2013). This translates to understanding various risk constituents depending upon the industry, for organisations that are agriculturally based, there are specific climatic conditions that are vital to ensure the successful production of crops. As seen in Figure 2.1, these conditions can be atmospheric conditions such as: temperature, wind, clouds and precipitation (Vocabulary.com, 2014). As such, these organisations have a good measure on the climate conditions that are best suited for germination and growth for their crops (duPlessis, 2013). As indicated in Figure 2.1, when there is a change to ideal weather conditions, organisations are impacted. In the case of agriculturally based organisations, it results in demand of crops often exceeding the supply capabilities. The result of which is the risk of not being able to meet expected consumer demands.

Year on year there is an increasing number of climatic events which pose a risk to people and organisations alike (Department of the Environment and Energy, 2006). These risks are a direct result of the daily, seasonal and yearly fluctuations in regional climate change. Therefore, when organisations attempt to put survival strategies in place it would be helpful to make use of the above framework as a

means of understanding the decomposition of the relationship shared between climate change and organisational risk.

It is not enough for an organisation to identify and address concerns relating to external risk, there is also the need to identify, understand and address internal risks. Internally, an organisation faces the risk of not fully understand the supply chain in its entirety and subsequently not making the right decisions at the right time (Johnson, 2014). Senior management have the task of balancing shareholder expectations and expected future growth, with there being a risk in the availability of timeous information and operating processes (KPMG, 2013). Senior management must be mindful that although they may view their operations as being risk free, risks still may occur therefore there is the need to have detailed and insightful planning that takes place (Institute of Risk Management, 2016).

Micro-environmental risks affect a small constituent and is only applicable to the organisation in question and their respective consumers; and these forces are considered to be the organisations itself, suppliers, competitors, intermediaries together with the public consumers (Kokemuller, 2017). The presence of extreme weather and its effect constitutes a micro-environmental risk to Blinkwater Mills as the problems faced by farmers are carried forward to Blinkwater Mills which in turn affects their direct clientele.

Figure 2.2 below illustrates the findings into the origins of supply chain risk. Wilding (2013), states that research into the origins of supply chain risk and vulnerability have identified the following dimensions of risk in the supply chain as being external and internal “drivers”. Wilding (2013) goes on to explain that external drivers are classified as being: demand side, environmental and supply side risks and internal drivers are classified as being: process, control and mitigation/contingency.

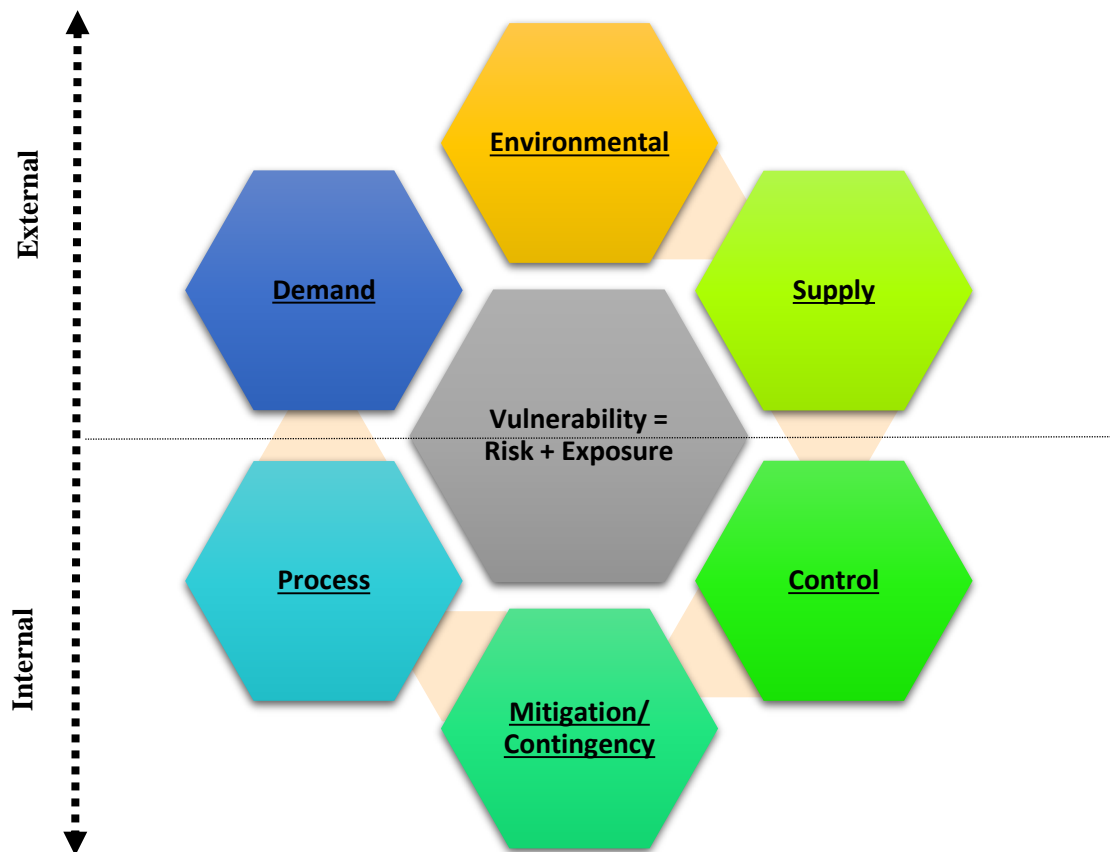


Figure 2.2: Sources of Supply Chain Risk

Source: Adapted from Wilding (2013)

In addition to Johnson (2014: 1), Wilding (2013), puts forward internal risk dimensions, namely: Processes, Controls and Mitigation which are needed as a means of internally dealing with external risks. Wilding (2013), describes processes as the value-adding activities which an organisation engages in, and the risk to the organisation being in disruptions to key processes disabling the organisation to continue with standard operating processes. An organisation must properly identify processes which are vital to its competitive advantage and those which underpin standard activities so as to efficiently recognising where the processes are most susceptible to risk (Kirvan, 2012). Blinkwater Mills ensures that selected suppliers are from surrounding areas as this minimises transportation costs but also ensures that the time between deliveries is reduced (Steenberg, 2017). In order for the successful facilitation of maize from point of production to point of consumption, Blinkwater Mills makes use of forecasting and information technology integration which encourages a balance to be derived between resources and demand (Weber, 2017). This in turn allows Blinkwater to deliver maize meal to consumers in a timely and cost effective manner (van Niekerk, 2017).

Wilding (2013), describes controls as being a set of rules, assumptions, systems and procedures which serves as a means to govern the manner in which an organisation conducts business. When relating this

concept to the supply chain, it makes reference to order quantities, batch size, safety stock as well as the policies and procedures in place which govern assets such as the transportation fleet (Johnson, 2014). Control risk is related to an organisations ability to adequately apply predetermined governing rules. This seeks to enforce the key performance areas of Blinkwater Mills by outline the flow of communication along the distribution channel between all points along the supply chain, from the point of production to consumption. This highlights the manner in which maize is transported from suppliers to factories where it undergoes a transformation process and is packaged for distribution at retail outlets which is in keeping with the business strategy.

Mitigation is a tactic used to hedge against risk which the organisation intentionally incorporated into the operations and hence the lack of a mitigation strategy is a risk in and of itself (Wilding, 2013). The operations of an organisation can experience an increased risk in profit if mitigation strategies are not taken into consideration during the operation design process (Kirvan, 2012). Knowing what risks your organisation is susceptible to, gives rise to contingency planning which serves as a pre-planned aid which is utilised should a risk come to fruition (Institute of Risk Management, 2016). Blinkwater Mills is situated in an area where farmers require little additional water for cultivation and harvesting, however, during periods of extended drought, Blinkwater Mills makes use of additional finances for the procurement of maize from other local farmers as farmers originally contracted faced a shortage in supply. This serves as a backup and safety net which is allotted for in Blinkwater Mills business strategy (Steenberg, 2017).

Wilding (2013), groups Demand, Supply and Environmental risks together as the composites of external organisational risks. Demand risk pertains to the actual and potential interruption to the flow of information, product and cash that is experienced between an organisation and its market (Wilding, 2013). Evidence shows that when an organisation is experiencing cash flow difficulty, it has a direct impact on the operating capability (Kirvan, 2012). This risk is referred to as downstream risk (Wilding, 2013). For Blinkwater Mills there was no interruption to the flow of maize meal from the distribution centre to the consumer or uncertainty in lead time however, in view of the drought, the output quantity was restricted causing the basket of goods bought by local customers to cost more which restricted the profit margins (van Niekerk, 2017).

Supply risk is experienced on the upstream of a supply chain and is seen as the actual or potential interruption to the flow of products or information coming from within the network (Wilding, 2013). In a similar manner to demand risk, supply risk is concerned with the interruption of key raw materials or components into the organisation and the subsequent impact this now has on the performance ability of the organisation (Sourcing Innovation, 2017). The upstream of Blinkwater Mills' supply chain was impacted as contracted farmers affected by the drought faced a decrease in their normal harvested yield which resulted in the non-fulfilment of contracted maize quantities. The effect of which was the milling

turbines were not operating optimally, resulting in there being a reduction in the quantity usually produced. However, through the contracting of alternative farmers to compensate for a decrease in supply, Blinkwater Mills did incur longer lead times as these alternative farmers were situated further away from the factories used for milling (Weber, 2017).

Environmental risk is the combination of external risks and uncontrollable events, where the impact of the risk affects the organisation directly or by means of its suppliers or consumers, this could be through government regulations, custom duties, tariffs or quotas (Wilding, 2013). Environmental risks are risk which are comprised of not just natural events or occurrences such as tsunamis and hurricanes but it also looks at the political climate, amendments to legislation and customs procedures for example (Kohli, 2015: 1).

Nachmany, Frankhauser, Davidova, Kingsmill, Landesman, Roppongi, Schleifer, Setzer, Sharman, Singletom, Sundarsan and Townshend (2015), conducted a Global Climate Legislation Study comprising of 99 countries, South Africa being one, which states that since 1997, climate change laws and policies have doubled every five years. Blandonnet (2015) explains that ISO 14001 is an internationally approved standard that outlines the requirements for an environmental management system. As such, Harris, Roach and Codur (2017), state that through the implementation of pollution taxes and cap-and-trade, organisations can achieve a certain level of pollution reduction. However, the authors go on to state that through the implementation of either of these policies, organisations begin to incur additional costs which will invariably be passed down to the consumer. South Africa understands the need for laws governing climate change, which is evident in the four laws already in practice (Nachmany *et al.*, 2015).

The drought together with the effects of the El Niño can be classified as being an environmental risk to Blinkwater Mills as the organisation was directly affected through their maize suppliers. Given that Blinkwater Mills is raw material dependent, environmental risks pose a significant obstacle to overcome as there is a surety in extreme weather reoccurrences.

In view of supporting literature, Dasaklis and Pappis, (2013) have concluded that while there is evidence of research being conducted regarding climate change and supply chain management (SCM) there still is limited literature correlating the interdependencies between climate change and SCM. Kreie (2013) is of the opinion that the limited knowledge that is available relating to SCM and climate change is due to organisations holding the stand point of managing the after effects and attempting to minimise the damage rather than have preventative measures in place within the supply chain. Although little is known, attempts are being made to better understand the climate change and extreme weather as a real risk and how to deal with it during and affect the disruption.

2.3 Climate Change and the Subsequent Effect on the Organisation

Gilaninia, Ganjina and Mahdikhanmahaleh (2013), believe that first and foremost it is the duty of the organisation to survive and the underlying principle is not to make a profit but to avoid harm. Supply chains are becoming highly susceptible to risk as at least 85% of companies over the past year have been impacted by a disruption in one form or another (Deloitte, 2013). The steady increase in supply chain risk, has left shareholders with lower returns and lower expected future value (Reed and Willis, 2012). Therefore, Vasan (2014) is of the belief that when risks are not anticipated or controlled as the first essential step, the supply chain in its entirety collapses before it has even fully formed.

Organisations can no longer implement the same strategy in the hope that it will still be effective in years to come, this is due to the fact that organisations cannot move forward with the assumption that climate change will be more or less the same as it has been over the last 50 years (Department of the Environment and Energy, 2006). This notion will not be valid in the future as the rise in frequency and severity of climate conditions will render it invalid.

In recent years, a general consensus has been reached by organisations from diverse industries, in that threats and opportunities relating to climate change are being identified and there is a move towards implementing a more robust climate change agenda (Dasaklis and Pappis, 2013). Trescott and Fenwick (2015), put forward the findings from a survey conducted by the United Nations Global Compact which revealed that 750 global business leaders found that although the effects of climate change does pose a direct risk to the production products and rendering of services there is an opportunity for growth and innovation as way to ensure a sustainable competitive advantage in their respective industries.

Climate change risks amplifies or alters existing risk found along the supply chain such as raw material availability and transportation disruptions (Glenhill, Hamza-Goodacre and Low, 2015). Risk can be found along the upstream and downstream of the supply chain; where the upstream is responsible for production process and involves the identification and extraction of raw materials and the downstream is responsible for the actual sale of the good to other businesses, governments and private persons - end consumer (Bass, 2017). In agreement is Intergovernmental Panel on Climate Change (IPCC) (2014), as the authors are of the opinion that climate change will intensify known risks while creating new and different risks for people and their natural environment. Wong and Schuchard (2011), states that climate reporting is in the infant stages, even though there are synthesised standards with regard to reporting topics, there is insufficient guidance on how to report plus there is no uniformity among companies when reporting.

Producers of agricultural commodities affiliated with Blinkwater Mills were able to cope with water restrictions and having access to a limited water supply. However, the effect of the El Niño on a season where there was less rainfall worsened the production of maize. Wandile Sihlobo (2015) as cited in

Donnelly (2015), stated that the effect of the drought is likely to result in a 29% decrease in crops such as maize, sunflower, soya beans, groundnuts, sorghum and dry beans. Which in turn resulted in Blinkwater Mills having to charge consumers more for the same basket of Super B goods. The South African Reserve Bank (SARB) stated that consumers can expect local food price inflation to rise to 11% - the highest it has been in five years with the SARB attributes this rise in basic food prices as a result of the weakening rand together with the effects of the El Niño (Viljoen, 2016). Therefore, putting Blinkwater Mills at a disadvantage as consumers were forced to forgo the higher priced Super B maize meal in favour of a cheaper alternative, ultimately affected both the upstream and downstream supply chain (Stander, 2016)

Sussman and Freed (2008), explain that there are three types of climate change risks that have the propensity to affect the operational activity of an organisation, namely: risks to the value chain, risks to core operations and risks that arise from broader changes in the economy and infrastructure. The three risks previously identified can be classified as regulatory; physical and market (Dasaklis and Pappis, 2013).

Every activity Blinkwater Mills engages in is value adding thus ensuring that consumer needs are satisfied, however effect of extreme weather posed a value chain risk in that the delivered quantities and quality from first preference suppliers were not in accordance to contractual requirements forcing Blinkwater Mills to make use of alternative suppliers (van den Berg, 2016). As a result of increased transportation costs, as alternative suppliers were based further away from the point of production, and the inability of Blinkwater Mills to absorb the higher cost of maize, the end consumer had to pay a higher price for Super B maize meal. In 2015 it was predicted, based on the most recent Gross Domestic Product (GDP) figures that the agricultural sector will shrink by more than 17% quarter on quarter and this can largely be attributed to the effects of the drought with the implications being additional pressure on food prices, which could see hikes in consumables such as maize and grain, to meat, poultry and dairy products (Donnelly, 2015). However, Blinkwater Mills did not face any risks pertaining to core operations as the milling turbines were fully operational with no interruptions. In conjunction with increased upstream costs, Blinkwater Mills also had to factor in a weaker rand and the threat of substitutes when seeking to retain rural consumers.

Given this context it must be noted that one of the options available for organisations that are agriculture dependent would be to source internationally, as a result, South Africa is expected to make use of imports as a means of compensating for lack of gains which again affects small to medium enterprises given the low rand value (Viljoen, 2016).

2.4 Survival Strategies to Overcome Extreme Weather

According to Fontinelle (2010), negative effects of climate change on an organisation are: extensive capital expenditure needed for emission control systems, potential domestic cap and trade legislation and changing prices for goods and services. Therefore, Dasaklis and Pappis (2013), believe that businesses must attempt stem these negative effects of through the formulation of adaptation policies while still taking advantage of opportunities for future growth and development. Emanating from extensive literature reviews, the following have been identified as reoccurring themes and best describe survival strategies for agriculturally based organisations:

2.4.1 Decision Making Frameworks

Willows and Connell (2003), as cited in Dasaklis and Pappis (2013), stated that there are countless decision making frameworks that have been proposed for the purpose of overcoming the effects of climate change which is aimed at providing assistance for local governments and organisations. Basic frameworks can be tailored to be organisation specific which would bring about the development robust unique framework.

The starting point for any organisation wanting to develop a comprehensive and robust adaptation framework is to have an enhanced understanding of: the set of organisational, structural, and financial barriers that are hampering the implementation of adaptation practices, the awareness and perception of the logistics manager to climate change, the actual challenges of adaptation and implementation of practices and the related costs and the scalability of the adaptation approach (Dasaklis and Pappis, 2013). Additionally, in order to establish more robust trade-off frameworks certain performance metrics such as: cost, quality, service level, lead time and carbon must be balanced in a manner that will allow for there to be a maintained level of efficiency and responsiveness throughout the entire supply chain (Dasaklis and Pappis, 2013).

Of a similar opinion are Beever, Bergvinson, Crowley, Denning, Giller, d'Arros Hughes, Jahn, Lynam, Masters, Naylor, Neath, Onyido, Remington, Wright, Zhang, Dobermann and Nelson (2013), who state that Climate-Smart Agriculture (CSA) is not characterised as being one specific technology or practice that can be generically applied to those affected. Rather, it requires a site-specific assessment to be conducted which will allow for the identification of suitable agricultural technologies and practices which is aimed at increasing the productivity in an environmentally and socially sustainable way, strengthen farmers' resilience to climate change and to reduce the contribution made by the agriculturally industry to climate change and greenhouse gas emissions (Food and Agriculture Organisation (FAO), 2013). Beever *et al.*, (2013), list the following as being the typical investment areas for CSA: implementing sustainable land management practices; climate risk management and transforming whole production systems. CSA includes activities that communities, provinces, villages

and higher government levels can implement as a contingency for crop or animal production failures (Beever *et al.*, 2013).

Despite the plight that numerous farmers faced, the South African government has plans in place which will aid farmers and those alike both now and in the future. In order for these plans and steps to work, there needs to be a period of trial and error before a comprehensive full proof plan is developed and implemented with a guaranteed success rate (Department: Environmental Affairs, 2013). The South African government has strategies in place to act as a buffer against problems impacting the Agriculture and Forestry, Fisheries; Human Health; Water; Human settlements (urban, rural, coastal); Biodiversity and Disaster Risk Reduction (Department: Environmental Affairs, 2013).

The first step in this plan is a two pronged approach, is a “top-down” approach the aim of this to extract useful information’s with regard to the potential benefits and plausible mitigation responses as well as identify and quantify “impact channels” with the most importance through which climate change disturbances will affect the economy (Department: Environmental Affairs, 2013). The second prong looks at a “bottom-up” process which is used as a means to downscale relevant climate related information with the purpose of highlighting determinants of impacts to key sectors in the short, medium and long term, as a result of climate change (Department: Environmental Affairs, 2013).

Water and food scarcity and human wellbeing must be taken into consideration when seeking to address the impact and relevant response thereto, all of which is to be synthesised at a national level (Department: Environmental Affairs, 2013). Policy frameworks must be consulted when aiming to provide the appropriate response to impacts in the respective scenarios which would then give rise to adaptation scenarios for the respective sectors. Together with policy frameworks, the development objectives of South Africa must be assessed keeping in mind water and food scarcity; and human wellbeing so as to develop adequate adaptation plans which have the ability to align future adaptation needs with current development aspirations (Department: Environmental Affairs, 2013).

As indicated, each farmer and organisation along the value chain is affected in differing ways, therefore it is important to tailor a specific framework to suit all constituents involved. Considering the relationship Blinkwater Mills has with their affiliated farmers, each needs to have their own respective frameworks to overcome the effects of the drought. Affiliated farmers are affected in respect of production uncertainty, however Blinkwater Mills is affected in respect of non-delivery. Therefore, the approach used by Blinkwater Mills to compensate for a decrease in delivered yield is not the same that can be transferred for farmers to use (van de Merwe, 2017).

From the discussion outlined, it would be most appropriate for farmers that are not only affiliated with Blinkwater Mills, but also those country wide to investigate the transferability of CSA to their operations. The reoccurrence of the ENSO cycle is a surety, the future impact of which is yet to be determined, however, a lesson to be learned is that prevention in the form of adaptation is better than

mitigation. It would prove most beneficial for Blinkwater Mills and those associated to strengthen weak areas that have come to light over the duration of the drought in 2015 and 2016.

2.4.2 Landscape

Weather conditions are considered to be atmospheric conditions that make up the state of the atmosphere in terms of temperature, wind, clouds and precipitation (Vocabulary.com, 2014). From the aforementioned definition, types of weather conditions that can be experienced are: hot, cold, dry, wet, windy, drought, sleet and snow. It is important to understand that because a particular organisation is geographically located in an area where there is no presence of extreme weather, that does not mean it is not affected as a consequence. This is as a result of extreme weather conditions having the ability to impact on global supply chains (Bapna, 2012).

It is vital to address problems such as food insecurity, persistent poverty, climate change, ecosystem ruin and loss of biodiversity and it is equally important to progress beyond a zero-sum strategy which is only aimed at solving one problem but exacerbating others (Beever *et al.*, 2013). “Integrated landscape management” seeks to realise synergies and decrease the trade-off among these multiple objectives (Beever *et al.*, 2013). Land managers together with farmers around the world are crossing conventional sectoral boundaries to create partnerships with conservation organisations, local governments, businesses and others to solve problems that are inter-connected (Beever *et al.*, 2013). In Latin America, more than 107 such initiatives have been documented and over 85 in Africa, however there is still limited support for these efforts (Milder, Hart, Dobie, Minai and Zeleski, 2014). In Lari-Kijabe in Kenya, smallholder farmers are working closely with banks, local governments and conservations groups to grow the agricultural markets as well as protect conservation value forests of high-value; commercial avocado farmers, pastoralists and conservation organisations in the Maasai Steppeland of Tanzania are coming together to increase income and food security while protecting wildlife and in Tigray Ethiopia, through the restoration of ruined watersheds by community-government-NGO partnerships has allowed for irrigation and water access, increased production and has significantly decreased for food aid during periods of drought (Beever *et al.*, 2013).

The “Integrated landscape management” initiative is seeking to create viable pathways for sustainable development in areas where food production, ecosystem health and human wellbeing must be given equal importance (Beever *et al.*, 2013). The most important aspect is to encourage and support current landscape initiatives and to bring more awareness to learnings, increase investments and documentation (Milder *et al.*, 2014).

Having a supply chain that is geographically dispersed as well as continuous production and processing improvements in coffee, allows for Starbucks to be able to withstand the impact of extreme weather

conditions that have the propensity to negatively affect the small-scale producers in Columbia (Thorpe and Fennell, 2012).

EarthEclipse (2017), describes a drought as being extended periods where there is a shortage of precipitation, this period quantified as typically being for a season or more resulting in there being a lack of water for human activities or environmental sustainability. Implementing the same methodology as Starbucks is Blinkwater Mills in that when contracted farmers cannot meet their obligations as a result of extreme weather conditions, alternate farmers are made use of for a period of time that will ensure Blinkwater Mills produces enough maize-meal to be optimally efficient. South Africa's climate typically varies, the south-western corner of the country experiences Mediterranean conditions, the interior plateau experiences temperate conditions and the northeast, where Blinkwater Mills is situated, experiences subtropical conditions (SA-Venues.com, 2017). Thus, it is evident that the area in which farmers are situated, even though they may be within the same province or mere kilometres away from the other, the land has different requirements. No two farmers can implement the same measures to ensure that the land is viable and fertile enough. Farmers read the land conditions and adapt their methodology accordingly. According to Marriam-Webster (2017), cultivation is considered to be the preparation or the preparation and usage for the growth of crops. Despite crops needing specific planting conditions such as: temperature, soil, water consumption and time period requirements, everything leading up to that point is farm land specific (du Plessis, 2003). Each farmers deals with excessive rainfall, or no rainfall at all in their own way. This being a direct culmination of years of experience and knowledge of the land.

2.4.3 Diversification of Crops

Willenbockel (2012), states that as the frequency in extreme weather events increase, it in turn will result in long-term yields being proportionately impacted at specific developmental stages. Willenbockel (2012), goes on to further state that temperature fluctuations have the propensity to impact on flowering, or affecting the timing of field applications therefore decreasing the efficiency of supplier output.

Tirado and Cotter (2010), state that when plants are faced with water scarcity it forces the adaptation and development of natural coping mechanisms when faced in drought situations, thus giving rise to the diversification of crops and varieties as a viable survival strategy that farmers can implement when facing drought. Farmers must be mindful when choosing to cultivate crops of this nature, as it is to be done in an environment which is not well-watered as this would negatively impact on the trait that enables coping with little water (Tirado and Cotter, 2010).

In South Africa, certain crops possess the ability to be more resilient against climate change whereas others are far more sensitive; allowing for some crops to be easily projected for, but not all crops can

be easily projected with certainty (Department: Environmental Affairs, 2013). There is increasing evidence to suggest that the food production and security is at risk both now and in the future as a result of projected water constraints, decline in water quality together with competition from other sectors (Department: Environmental Affairs, 2013).

Beever *et al.*, (2013), explain the importance of farmers having access to affordable seeds that are of a high quality from a diverse range of well-adapted crop varieties or hybrids through private, community or government seed systems. The authors go on to explain that enhanced breeding methods such as marker-assisted precision breeding or genetic engineering can be used to rapidly increase the rate of genetic gain, cut the time it takes to cultivate different varieties, and breed new varieties that is for the purpose of addressing specific environment and market segments, therefore meeting the needs of farmers more effectively. Beever *et al.*, (2013), describe marker-assisted selections as a conventional breeding method where the selection of a desired trait is detected, where genetic modification occurs when there is a transfer of genes from one organism to another, including genes from other species.

Andrade (2016), states that in order to withstand the effects of drought, pests and diseases, it is essential that farmers plant a variety of crops. In 2016, Malawi experienced a drought which saw farmers that grew naturally hardy crops such as chickpea and sweet potato fared better than those farmers that planted maize and bean crops as maize and bean farmers were ruined (Andrade, 2016).

According to Business Media MAGS (2017), the South African government has taken steps in the right directions, however, drought tolerant crop varieties will only be accessible in 2018 or 2019. It must be understood that these drought tolerant varieties can last between ten to fourteen days longer without water, but they cannot survive without water at all (Business Media MAGS, 2017).

Shannon and Motha (2015), state that by alternating the planting dates of crops, farmers can stem the effects of adverse climate conditions. However, according to Marais (1998), the ideal months for maize to be planted in South Africa is October – January, which will allow for farmers to harvest from the middle of February up until the end of May.

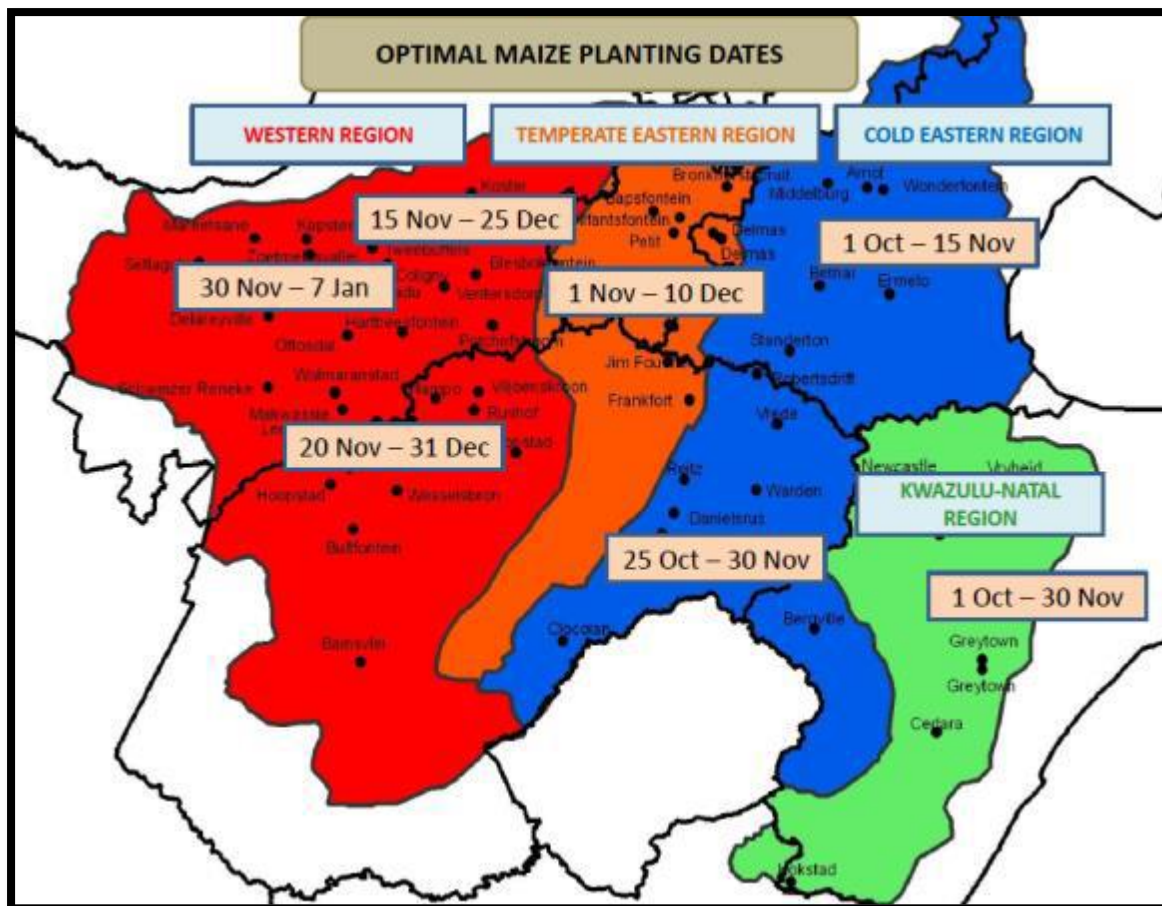


Figure 2.3: Optimal Maize Planting Dates for South Africa

Source: Adapted from EarthEclipses (2017)

The diagram above graphically represents the optimal planting dates for South Africa. Blinkwater Mills falls within the northeast region of South African thus resulting in their optimal planting dates being between early October and mid-November in any given year. Here this time period is graphically represented in blue. According to GrainSA (2011), in order to achieve optimal yields there needs to be optimal planting dates therefore, the timing of the maize production cycle is vitally important.

From the above, it is evident that farmers have the option of diversify their crops through utilising a new strain of crops which have the genetic make up to withstand harsh climatic conditions or they can make use of different varieties of crops that would withstand the effects of unfavourable climatic conditions. The availability and cost of new crops will dictate the level to which farmers are able to implement additional survival measures.

Blinkwater Mills does not share risks with their farmers, however, it would be of interest to Blinkwater Mills if these farmers are able to harvest sooner given the utilisation of a new stain of seeds (van de Merwe, 2017). This could cause Blinkwater Mills to re-evaluate their stance on early supplier

involvement and invest in the seeds procured by farmers, as the early harvest of maize would imply that Blinkwater Mills would be able to get their maize-meal product to consumers before competitors.

2.4.4 Relief Funds

Sihlobo (2016), reports that as per the 2016 budget speech, the agricultural sector in South Africa will be assigning R15-billion, these funds were to be allocated to the Land Bank's concessionary loan facility with the primary purpose being to help farmers recover from the drought. Separate to this amount is R2.8 billion which will serve small-scale farmers to develop agri-parks in rural economies which is geared to aid in particular emerging back farmers (Sihlobo, 2016).

One of South Africa's leading agri-business organisation Senwes, together with organised agriculture has undertaken an initiative that will see the creation of a drought aid fund (Business Media Mags, 2017). Franscois Strydom, the Managing Director of Senwes, explains the purpose of undertaking this initiative is to garner funds from outside of the agricultural sector as an effective means of alleviating the dilemma faced by farmers as well as providing a support structure for the agricultural sector to ensure food security (Business Media MAGS, 2017). Apart from a production standpoint, these funds will also be utilised to aid farmers, their families as well as their workers, with emphasis too being on ensuring bulk feed for livestock, as this too has become a grave concern (Business Media Mags, 2017).

AgriSA is a non-profit organisation in South Africa that is dedicated to the development of agriculture (AgriSA, 2017). Bateman (2016), states that AgriSA has launched several initiatives that are intended to help desperate farmers with drought relief. However, due to a shortage of funds, AgriSA has been unable to provide continuing support to farmers in need (Bateman, 2016). The president of AgriSA, Johannes Moller is of the opinion that this is time for the private sector to step up and contribute in furthering the drought relief funds (Bateman, 2016). Some of the major corporations already invested in the initiatives driven by AgriSA are: PicknPay, Sanlam, Pannar, Standard Bank and Pioneer (AgriSA, 2017). One of the standout initiative undertaken by AgriSA was the "Wimpy Drought Relief Funky Cappuccino Promo", which brought to the plight of farmers to the attention of South Africans (AgriSA, 2017).

The South African government has various grants, funding and incentives for agriculture (Agri Portal, 2015). Some of which is the Sector Specific Assistance Scheme which is a reimbursable cost-sharing government grant which can be applied by the agricultural sector which allows for financial support to be provided to businesses that are supporting the development of industry sectors as well as business that are contributing to the growth of South Africa's exports (AgriSA, 2017). Another is the Isivande Woman's Fund which is geared towards funding woman's economic empowerment in the agricultural sector, the Strategic Business Unit: Agri-business and agriculture is aimed at developing competitive processed food, beverages, fibre, and forestry and derivative industries, where there is specific use and

development of local and regional resources that supply domestic demand (Department: Trade and Industries, 2017). Additionally, the Land Bank serves to provide financial services to the commercial farming sector with the specific purpose of financing agri-businesses together with financial products that would promote new comers into the agricultural sector (Land Bank, 2015).

Economic growth in South Africa has slowed and this together with the drought implies that there are financial constraints on the funding available from the South African national government (Sihlobo, 2016). Therefore, a key to ensuring that farmers are not hindered and left with no means of continuing their production operations, the investment from the private sector in the agricultural sector will see farmers benefitting. The stabilisation of operations will in turn see the socio-economic conditions facing the households and workers of these farmers improving (Sihlobo, 2016).

The role of the private sector is considered to be a vital one, this alone cannot be the only way forward. Smaller initiative aimed at everyday consumers will also aid in generating much needed funds to add to available resources. Generating awareness is important in ensuring that this is an ongoing effort and not a once off initiative that would not be sustainable for farmers in the years to come.

Relief funding will see small substance farmers benefitting as there evidently is not enough national funds available to allow for the continuous aid of these farmers given the capital required to bounce back from the drought, pay off loans and outstanding debts and still prepare their land for the upcoming season (Bateman, 2016). Partnerships established with the private sector for the funding of relief aid should not be to satisfy the needs of the immediate future (AgriSA, 2017). The funding generated external to the agricultural sector in South Africa must be set up to allow for there to be a continuous flow of relief aid even after the effects of the drought have been righted (Sihlobo, 2016).

2.4.5 Sustainable Farming Techniques

Tirado and Cotter (2010), state that in order to establish a resilient food system – a system where it is able to withstand disturbances and rebuild thereafter – a food system which is built on the foundation of biodiversity on multiple scales, from the breeding technology through to the farming landscape.

Beever *et al.*, (2013), state that irrigation is key for farmers wanting to double and triple crop yields which in turn will allow for the diversification of cropping systems. The authors go on to explain that large-scale irrigation systems require a large capital investment and are restricted for those in lowland areas and who experience favourable conditions, however solar-powered drip or micro-irrigation technologies can be customised to meet the needs of small farmers that operate in a diverse environment and with a limited budget. This method has been tried and tested with results indicating: increased income, decrease in poverty, increased food security and nutrition and new local business opportunities (Burney and Naylor: 2012).

- **Storing Crops on Site**

Small farmers are often unable to dry, store and process their commodities which often leads to the being contamination of food (Beever *et al.*, 2013). There are numerous postharvest methods that farmers can make use of that will allow for a superior quality to be delivered to consumers at the point of sale (Beever *et al.*, 2013). Thanh, Acedo and Weinbeger (2008), state that farmers must harvest at the optimum maturity and when the temperature is cooler; agricultural commodities are to be kept in shaded areas as this will reduce moisture loss; proper tools and storage containers must be used to prevent these commodities from being damaged; perform a grading on the commodities as this activity will reduce the defects and diseases passed on and minimise spoilage and the cleaning and packaging of these commodities in an attractive manner will in turn will garner higher prices. The purpose of undertaking these activities will decrease the postharvest loss faced by countless farmers thus increasing the income of the farmer (Beever *et al.*, 2013).

- **Skills and Education of Farmers**

Farmers in developing and least developing countries are considered to be the most vulnerable when faced with extreme weather and climate events, this together with the limited external assistance provided in these countries, it is vital that farmers in these areas have the proper tools such as knowledge, data and equipment so as to manage the risk themselves (Shannon and Motha, 2015).

A farmers' capabilities to manage extreme weather and climate change risks and uncertainties is in educating them on the benefits of practicing basic risk management strategies (Shannon and Motha, 2015). Training in respect to the underlying science that governs weather and climate impacts on agriculture and the use of appropriate agrometeorological tools will benefit farmers in improving productivity and sustainability (Shannon and Motha, 2015).

Farmers need to ensure that the commodities produced are of the best standard and meet the needs not only of the millers but also the consumer. Hence, it is not only the responsibility of Blinkwater Mills to generate a product of high value but the responsibility also rests on the farmer to produce an input that conforms and aligns with the needs of all value chain constituents (Stander, 2017). Therefore, adding value to an agricultural commodity can vary depending on the farmers, environmental conditions and financial capabilities (Shannon and Motha, 2015). Investments made towards combatting the future effects of extreme weather must be done so with careful consideration given to the capability of repayments. Overextending oneself in the hopes that the future will bring better agricultural conditions is dangerous given the unpredictability of weather.

2.4.6 Co-operatives

According to the Department: Agriculture, Forestry and Fisheries (2013), a co-operative is seen as the independent association of individual that come together voluntarily to united in addressing mutual economic, social and cultural requirements and objectives by jointly owning and democratically controlling an organisation that functions based on co-operative principles. Department: Agriculture, Forestry and Fisheries (2013), explain that an agricultural co-operative that develops processes or markets agricultural commodities as well as supply these commodities as inputs and services to the co-operatives respective members. Macaskill (2016), outlines the following as ways in which agricultural co-operatives serve their members: improving bargaining power as the combination of multiples members advances their position when working with other businesses; reducing purchasing costs by purchasing commodities in volume; obtaining market access or broadening market opportunities as co-operatives ensures that buyers not only receive value but also can procure larger quantities; improving the quality of products and services as this will allow for co-operative members to derive satisfaction through the improvement of facilities, equipment and services; obtaining products and services that would otherwise not be available given the ability of co-operatives to provide goods or services to the private sector that they otherwise would not have been privy to and reducing the operating costs which in turn will see the rise in earnings that is available for distribution amongst members.

The Juan Francisco Paz Silva (JFPS) co-operative in Nicaragua aids small agricultural producers to move up the value chain through the development of processing facilities (Thorpe and Fennell, 2012). The agricultural commodity's produced by small producers are exported through Del Campo an umbrella co-operative to which JFPS belongs as well as to Europe via a they established called The Ethical Trading and Investment Company (ETICO).

According to the Directorate: Cooperatives and Enterprise Development (2015), South Africa has a total of 1 703 co-operatives in the agricultural sector, of this 377 and 209 belong to the Limpopo and Mpumalanga areas respectively. Further to the 377 and 209 agricultural co-operative, 97 and 38 make up crop co-operatives in the provinces of Limpopo and Mpumalanga respectively (Department: Agriculture, Forestry and Fisheries, 2015). Creese and Marks (2009), defines market access as being the technical and non-technical measures for the entry of goods into a market. Smallholder farmers can benefit from co-operatives as it is a means of participating in a market they otherwise would not have had access to (Department: Agriculture, Forestry and Fisheries, 2015). Through this, farmers will be able to not only earn a living but support their families and increase productivity (Department: Agriculture, Forestry and Fisheries, 2015).

The presence of co-operatives does play a major role not only for the affiliated members but also for the organisations that align themselves with specific co-operatives. The benefit of co-operatives is mutual in that organisations are ensured delivery of quality products that are on time and at the right

quantity and affiliated members in turn are provided with the opportunity to grow and prosper (Department: Agriculture, Forestry and Fisheries, 2015), much like those in Nicaragua.

The substance farmers affiliated with Blinkwater Mills can gain from establishing a co-operative that is designed to uplift not only their operations but the community as well. However, careful consideration must be given to the product quality, pricing and market knowledge and skills (Department: Agriculture, Forestry and Fisheries, 2015).

2.4.7 Strategically Sourcing Suppliers

Outsourcing occurs when an organisation actively engages in the transferal of business activity, including relevant assets, to a relevant third party (Hugo, Badenhorst-Weiss and Biljoen, 2015). Lysons and Farrington (2012), state that organisations should outsource activities that: require a high labour or capital costs; relatively discrete; require specialist competence; characterised by changing work patterns in loading and throughput; subject to rapid changes in markets and those that a subject to rapidly changing technology requiring expensive equipment.

Kushmaul, (A Director of Supply Chain Solutions at IDV Solutions), as cited in Handova (2015), is of the opinion that companies must seek to strategically source their suppliers as a means of reducing the risk brought about by climate change. Kushmaul (2015), goes on to state that organisations should not be short sighted in their approach in selecting suppliers. On one hand they may want to decrease transportation costs by a certain percentage so they keep all suppliers within a short distance of one another, however should a major storm hit that area they stand to lose millions in revenue. From this, it can be deduced that having multiple sources as a means of ensuring that should one supplier be affected, the entire production is not held up and ultimately cost the organisation is crucial.

Marks and Spencer (M&S) is aiming to be the “world’s most sustainable major retailer” and has made a commitment from a corporate level to make climate change a priority with the focus being on mitigation rather than adaptation (Thorpe and Fennell, 2012). M&S acknowledges that there needs to be a shift in their business models in order to address diverse risks but without compromising the relationship shared with suppliers (Thorpe and Fennell, 2012). M&S Head of Food Technology states that their stance on suppliers is to engage for the long-term, and the responsibility of M&S would be to aid farmers in decreasing their dependence on one crop which in turn will increase farmers’ resilience even though this would have a direct impact on the quantity supplied to M&S (Thorpe and Fennell, 2012). A resilient supply chain is a supply chain that is able to withstand a disturbance and either return back to normal operations or be in a better position than before the occurrence of the disruption (Christopher and Helen, 2004).

Structural reform in urban and rural areas are rapidly increasing the effect of which will see the supplement of traditional smallholder farming or the replacement of these farmers with outsourced

farming operations, the establishment of small and medium-size farmer cooperative or agribusiness enterprises, and contract farming (Reardon, Timmer and Minten, 2012). The demand consumers and processor place on information and control over food production will see a tighter integration of the value chain for major agriculturally commodities, especially with the important role supermarkets play (Beever *et al.*, 2013). This in turn will allow for farmers to benefit from competitive food systems as they will be able to connect with growing domestic and export markets (Beever *et al.*, 2013). The food industry has an invested interest in the direct sourcing of agricultural commodities from small farmers worldwide (Beever *et al.*, 2013). Market-orientated small-holder farming is a leading trend which serves to link supermarkets and food processing chains, which in turn will result in significant income gains for the farmers involved and provide them with better access to inputs, services and new technologies (Reardon, Timmer and Minten, 2012). The key to improving the income status of small famers, job creation in rural areas, and providing affordable, safe, nutritious food is the structural and value chain transformations (Beever *et al.*, 2013).

In relation to a product or service, quality is defined as being that characteristic which impacts on the ability to satisfy consumer needs, this is viewed as value perspective (Bozarth and Handfield: 2013). Sourcing internationally, is an option available to organisations that possess the financial means to do so. According to Onyango (2017), the world's top ten maize producing countries are: United States of America, China, Brazil, India and Argentina respectively, with South Africa being placed tenth.

Producers are the backbone to any milling company, therefore, Blinkwater Mills saw the merits in sourcing producers that are located closest to their factories which ensures a quicker cycle time and a decrease in transportation costs. However, these are not the sole reasons for Blinkwater Mills contract these maize producers. These farmers have shown their ability to add value to Blinkwater Mills operations over the years, through consistency, reliability, conformance and performance. Sourcing must be based on an assessment criteria and should be upheld even in times of crisis such as the drought (Swanepoel, 2017). Using inputs that are of a high quality will in turn ensure that this value is transferred to the end consumer.

2.4.8 Contracts

Therefore, Shannon and Motha (2015), suggest another strategy, one where farmers have the ability to pass on a portion of risk to other third party organisations. USDA Risk Management Agency (1997), cited in Shannon and Motha (2015), explain that farmers are inclined to make use of this strategy as it deals with contracting and insuring against the effects of extreme weather and climate events. This survival strategy must be done so in a manner that benefits and protects the farmer not only when the risk occurs but also in the years to come. As it would be futile to aid a farmer for the current period in time and they are then left with little or no resources to build forth for the future.

Production contracting refers to predetermined prices and markets for desired commodities, however this requires farmers to forego a certain amount of control as production contracting is facilitated through farmers following prescribed processes (Shannon and Motha, 2015). The other option is to utilise crop yield insurance which essentially shields farmers from potential financial loss. The losses that farmers could potentially incur if they do not have any cover against the effects of extreme weather and climate events significantly outweigh the premium they would pay on a crop yield insurance policy. Therefore, it is important to have knowledgeable farmers, with that being said however, according to Shannon and Motha (2015), the ability to take out a crop yield policy is typically reserved for farmers that are in developed countries.

Producers of agricultural commodities can also make use of micro-insurance to protect themselves against weather-related crop failure (Thorpe and Fennell, 2012). In Brazil, the Fairtrade Insurance Initiative is piloting an insurance scheme for soya oil farmers, which will see them receiving vouchers in the form of farm inputs and resources when they are faced with massive crop losses (Thorpe and Fennell, 2012). The JFPS co-operative in Nicaragua has insurance experience as they offer life insurance, this in turn can be used as a platform for building crop insurance schemes (Thorpe and Fennell, 2012).

2.4.9 Organisational Strategy

Instead of waiting for an external influence to interrupt daily operations, organisations must be proactive about planning and preparing in the event climate change and extreme weather conditions impact a supply chain (Donnelly, 2015). All factors affecting an organisation's supply chain must be taken into consideration when designing a resilient supply chain, not only for the short term but for the long term as well. Given that the effect of the drought in South Africa will not diminish in the near future.

Dasaklis and Pappis (2013), state that climate change not only affects the operations of the supply chain but as an overall implication for supply chain management in that both the strategic and operational level of an organisation is directly affected by climate change risks. At the strategic level, organisations can expect to be faced with challenges such as the re-configuration of supply chain networks, adoption of carbon labelling practices, low energy intensive assets, improvements in energy efficiency and potentially investing in the selection of new third party logistics carriers (Dasaklis and Pappis, 2013). At the operational level, Dasaklis and Pappis (2013), say that organisations can expect to be faced with production planning, disruptions, high insurance costs, inventory planning and control issues.

M&S, a clothing retailer, does not directly source raw material from cotton farmers in Pakistan, however, the organisation places a great deal of importance on cotton which has led to the development of a sourcing strategy that is more sustainable in nature, through the "Better Cotton Initiative" (BCI) (Thorpe and Fennell, 2012). The BCI forms part of the "Better Cotton Fast Track Programme" which

is made up of retailers who drive the need to place more emphasis on sustainable cotton and encourage good farming practices which in turn will promote supply (Thorpe and Fennell, 2012).

Consideration must be given to areas where there is an overlap between cross linkages, adaptation needs and current development objectives, as these areas would be marked as being “red flags” (Department: Environmental Affairs, 2013). The costs to implement adaptation plans together with the cost/benefit of mitigating and avoiding damage must be properly analysed as far as possible, given the information on hand (Department: Environmental Affairs, 2013).

In order to address the issue of climate change risks, the Department of the Environment and Energy (2006), promotes the incorporation of climate change in organisational planning through the use of climate change scenario which is aimed at providing useful information which would serve as an indicator to the direction in which climate variables are moving, over a time period of 25 years. The climate change scenario seeks to quantify the feasibility as well as the magnitude of the change in relevant climate variables.

In order to derive the maximum benefit when implementing climate change scenarios, organisations must make use of a combination of raw factual data from the scenario and a “word picture” which provides a detailed explanation on the outcomes of each scenario identified (Department of the Environment and Energy, 2006). Organisation must be mindful when identifying scenarios as it is only the two with the most plausibility that must garner the most attention and resource allocation.

Farmers have the ability to decide which of the aforementioned strategies put forward by Hess *et al.*, (2002), is the most applicable to them based on the current situation and climate which they are faced with. Farmers have the choice of either implementing one or more of the mentioned strategies depending on the relevance, however with this being said, the success of these strategies is also dependent upon the skill and education of the farmers in question (Shannon and Motha, 2015).

Hanifan (2014) found that while climate change is indeed true and real, the drive it brings about in organisations to change the way in which their supply chain looks at sustainability will allow for the identification for new revenue generating innovations. Wong and Schuchard (2011), are of the same opinion believing that while climate change does pose numerous disadvantages to the unprepared organisation, a greater understanding towards climate-related risk is emerging. Wong & Schuchard (2011), go on to further elaborate that due to there being marginal inroads being made towards an adaptive practice, there is no limit to the innovation, exploration and collaboration that surround climate-related risk.

According to Ehrbar (2017), the law of demand states that: when the price of a good increases, the quantity of the good demanded decreases; whereas the law of supply states that when the quantity of a good supplied increases the prices increases and falls as the price falls. This shows that if organisations

are unable to stem costs from increasing as a result of the effects of extreme weather conditions, these costs are going to be transferred down to the consumer, who in turn will demand less for the goods. Therefore, Blinkwater Mills looks to the South African Futures Exchange (SAFEX) which is a facet of the Johannesburg Stock Exchange (JSE) and is responsible for electronic futures and options (Johannesburg Stock Exchange, 2017). The function of SAFEX is to allow for organisations that exchange in commodities to make use of a price determination mechanism and a price risk management facility as a means of managing their exposure to opposing price fluctuations in the fundamental physical market where the performance by counterparties are guaranteed (Karuihe, 2012).

Bottlenecking is also considered to be a constraint facing an organisational supply chain whereby that part of the supply chain that is no longer able to optimally operate as a result of an external influence, thus resulting in a backlog of production and causing the entire supply chain to now operate less than efficiently (Castaldi, 2014). Even though the trend internationally has indicated that steps are being taken towards implementing a resilient supply chain and one that can withstand bottle necking when faced with a disturbance, carrying out risk assessments and implementing strategies to counter weakness found within an organisation is a costly undertaking. Therefore, for organisations operating on a larger scale and have the funding to engage in these activities will reap the benefits. However, for small scale farmers in South Africa, implementing these changes in a time when finances are not easily available will prove to be difficult even though the intention and willingness to improve for the betterment is there.

2.5 Practical Examples

Thorpe and Fennell (2012), conducted three studies with the aim of showing how extreme weather conditions affected agricultural commodities from developing regions. The conclusion reached was an increase in costs, the threat of inferior quantity as well as the quality of production and the decision relating to planting and harvesting has become increasingly difficult (Thorpe and Fennell, 2012).

The following three studies are relevant and pertinent in relation to this study and Blinkwater Mills in particular as the authors, Thorpe and Fennell (2012), sought to find answers to the following questions: are organisations aware of their agricultural supply chain being affected by climate events? Are they taking steps to help producers build their capabilities to react in the wake of such events? What more can organisations be doing?

The first study looked at Starbucks and Arabica coffee. Starbucks procures nearly two-thirds of its coffee from small-scale producers in Latin America (Thorpe and Fennell, 2012). Coffee is a crop that is generally produced by small-scale producers and are at a higher risk of climate-related disruptions (Fairtrade Foundation, 2017). Excessive rainfall tends to occur at the wrong time during the coffee-

growing cycle which impacts on the growth pattern on coffee trees resulting in inferior fruit growth and beans (Thorpe and Fennell, 2012).

If there are no substantial changes to varieties or plant husbandry, this sector will experience degeneration in yields, higher production costs and lower-quality berries (Thorpe and Fennell, 2012). The impact of this on small-scale Columbian coffee farmers forces the need to diversify income as well as implementing “rust” (a coffee fungus) resistant plant varieties beans (Schumann, 2017). Yet, there is resistance from farmers to implement a new variety of crops as it goes against longstanding agricultural practices, however, these producers cannot go without income for three years (while new trees mature) without there being external support (Thorpe and Fennell, 2012). Intervention plans put in place by the Columbian Coffee Grower Federation saw an improvement in the credit programmes as well as investing one third of the total coffee-growing area for rust-resistant varieties (Thorpe and Fennell, 2012).

From this example parallels can be drawn as the small-scale producers in Columbia faced excessive rainfall as an extreme weather condition, the converse holds true for South African farmers for much of 2015 and 2016. Small-scale producers are being forced to relook at the manner in which operations are done and to identify ways in which to diversify themselves to become less vulnerable to threats in order to be able to produce in the years to come. For the small-scale producers affiliated with Blinkwater Mills there is a tendency to read each season as it comes and then only make adjustments to compensate for water shortages. However, it is evident that this is not a viable strategy in the long run, with there also being implications and disruptions to Blinkwater Mills.

The second study looked at Marks & Spencer (M&S) and cotton. M&S is a United Kingdom based clothing and food retailer which utilises imported fibre which in turn accounts for 50% of materials used (Marks and Spencer, 2017). Pakistan is the world’s fourth largest cotton producer and faced with weather-related chaos after floods destroyed significant portions of productive land in 2010 and again in 2011 (Thorpe and Fennell, 2012). Pakistani cotton farmers suffered a loss in crops as much of their production was washed away severely affecting the livelihoods of small-scale farmers.

Countless small-scale farmers were unable to make repayments on loans taken out for seeds, fertilizers and other necessary inputs, while others with available credit went further into debt (Thorpe and Fennell, 2012). However, some farmers chose to forgo cotton farming in favour of more resistant crops such as sugar cane which are strong against floods and high temperatures (Thorpe and Fennell, 2012). Many small-scale farmers are tenants on the lands that they cultivate and were required to not only pay rent on their allotted land but were also expected to clear the land of water, many of these farmers are without legal tenure resulting in them not being able to benefit from government assistance packages (Thorpe and Fennell, 2012).

From this example, Pakistani small-scale farmers have borne all the risks and costs relating to the floods despite them not having the resources and ability to do so, as well as very little to no intervention access. However, according to Sihlobo (2016), R2.8 billion has been allocated for small-scale farming in South Africa which will also be used to aid in the development of agri-parks in rural economies. Given the current economic climate, difficulties are faced by government to allot more funds towards relief efforts, with GrainSA stating that black farmers (small-scale farmers) will require assistance to the value of R1 billion in order to be able to overcome the drought (Sihlobo, 2016). It is in circumstances like these that external funding would prove useful to compensate for the shortcomings in government funding.

The last study looked at the Body Shop and sesame oil. Sesame producers are made up primarily of small-scale farmers located in tropical regions (Ray, 2016). Part of the 5 000 sesame producers in Nicaragua are 275 members of the Juan Francisco Paz Silva (JFPS) co-operative that produce maize, beans and other local food crops including sesame and also receives a fair trade premium which is utilised amongst the community (Thorpe and Fennell, 2012). Due to the erratic occurrence of hurricanes, storms floods and droughts in Nicaragua, crops are weakened, vulnerable to diseases resulting in crop loss and high prices impacting on the income of families (Thorpe and Fennell, 2012).

The co-operative is helping small-scale farmers to fight back against the effects of extreme weather through the diversification of crops, planting crops that have a higher tolerance to wet weather and others more tolerant to drought, development of technologies to combat pests and illnesses, technical support and providing workshops, forums to raise environmental awareness and training, which in turn helps them to move up the value chain (Thorpe and Fennell, 2012). The Body Shop sourcing strategy is aimed at community-based producers who are committed to fair trade principles, while The Body Shop does not purchase the raw material, they do purchase sesame oil once it has been processed (Thorpe and Fennell, 2012). When one community faces a shortage of seeds, other co-operatives step in and aid making The Body Shop sure of a constant supply.

Jeffery Ndumo (2012) as cited by the Department: Agriculture, Forestry and Fisheries (2012), states that in South Africa, agricultural co-operatives originated and is closely linked to the Afrikaner nationalist movement where the Land Act of 1912 saw a rise in the development of white commercial farmer co-operatives which allowed for these co-operatives to benefit through state support in the form of subsidiaries. Department: Agriculture, Forestry and Fisheries (2012), despite the formation of black co-operatives in 1970 and 1980, the support and aid provided to white co-operatives was not reciprocated for black co-operatives, however, according to the Department: Agriculture Forestry and Fisheries, there is a growth plan for smallholder co-operatives which will see land distribution and restitution as a means of reducing poverty and unemployment and increasing incentive schemes.

A major risk facing smallholder co-operatives is the lack of demand for their products due to the lack of market access or the inaccessibility to viable national and international markets (Department:

Agriculture, Fisheries and Forestry, 2012). Based on the example of The Body shop, it has proven that the presence of co-operatives does benefit those associated, however, much in the case of South Africa, that does not always translate to success, as historically disadvantaged individuals formulate their own co-operative and without proper intervention to build towards sustainability, these co-operatives are not always a viable option, as organisations requiring agricultural commodities would rather engage with a co-operative that is reliable and been in the industry for a longer period of time.

It brings about the notion of shared resourcing and sharing the risk and responsibilities. If local agricultural farmers are able to combine resources, knowledge, and expertise it will allow for more stability to be brought to the upstream supply chain, as organisations spread their risk among the various suppliers that have formed a strategic alliance. From the two case studies conducted it is evident that no matter the scale of the operation or organisation, those who are agriculture dependent such as Blinkwater Mills are highly susceptible to risks brought about by extreme weather condition.

2.6 Theoretical Framework

The Black Swan Theory as well as The Contingency Theory can be used as a means of explaining the disturbances and risks which affect the supply chain. According to Taleb (2007) The Black Swan Theory seeks to explain that it is possible for organisations to anticipate the impossible. The key underlying features of distinction are that: after the event has occurred, plausible explanations are formulated as means of prediction and explanation; the nature and effects of the event have to be extreme; and the event is seen as erratic, unpredictable and unlikely (Taleb, 2007).

Correa (2012), summarises the findings of Taleb and states that once an extreme event occurs, experts and those who are knowledgeable in the field immediately seek to find a means of explanation for the observed occurrence. It is only once an unlikely event takes place that an ex-post examination of the precursor information takes place as a means of providing a suitable and definite set of boundaries from which future patterns can be discerned (Taleb, 2007).

According to AgriSa (2017) was the driest year in over a century in South Africa, in view of this abnormality and researchers sought to understand the reasons behind the drought conditions. Climatologists have been able to directly pinpoint the causes of the drought after the severity thereof was too dire to ignore any longer; and therefore provide a plausible explanation, the El Niño, for the impact, felt by organisations and South African consumers alike. The nature and effect of the drought can be seen in the aftermath which was characterised by: the death of livestock, taking livestock to the gallows early, poor quality of agricultural commodities, lack of agricultural yield, loss to household income for commodity producers, the value of livestock decreasing, the inability to feed livestock and for maize farmers the inability to plant crops (Bandile and Eybers, 2015). The precursor for the extreme

drought would be the insufficient rainfall prior to 2015 which compounded the presence of the El Niño on South African farmers.

The term “Black Swan” is used to describe all events that, when past information was utilised, were considered to be unthinkable (Taleb, 2007). These events and their consequences have left a lasting impact on human life, both for the advancement and regression. Examples of these significant events are the invention of the internet, an economic crisis, the invention of the mobile telephone and natural disasters (Correa, 2012). Over the years, significant events have occurred which had the propensity to change the course of mankind (Correa, 2012).

The drought is considered to be an extreme weather event which adversely affected agricultural commodity producers and those directly along their supply chain. Although the drought did not change the course of mankind in South Africa, there was definitely strong implications thereof. Even with sparse rainfall, maize farmers could not come back from the crippling effects, while others simply had to shut down their operations as they did not have money to continue their operations (Bendile and Eybers, 2015). This shows that while only a certain population of South African were directly affected by the drought through their agricultural activities, the majority of South African were affected by way of increased consumer goods, as maize meal is considered to be staple.

The impact of an unpredictable event can be classified as either being positive or negative. The negative consequence is where there is a dis-favourable and possibly catastrophic impact as a result of the black swan for example, the resultant fallout from an economic crisis (Correa, 2012).

The impact of the drought will have long reaching effects felt by consumers the country over. In South Africa, organisations such as Blinkwater Mills which are dependent on local farmers and their agricultural commodities have been especially hard hit, by adverse weather as farmers were unable to meet the yield requirements of these organisations. This fact is then worsened by farmers not having access to enough relief aid in time to see a percentage of their yield saved (Bandile and Eybers, 2015). Additionally, farmers were not prepared for the level of destruction the drought cause coupled with a water shortage crisis (Sihlobo, 2016). This all culminated to an increase in the food prices on basic consumer goods. The impact of which is most prominent on the middle to lower income South Africans. In addition to the rise in basic food costs, the drought has also seen the demise of livestock which are dependent on agricultural feed. Not all farmers were able to continue operating with some stopping production for the season and other exiting the industry altogether (Bandile and Eybers, 2015).

The positive consequence being that there is favourable development for those directly impacted, for example the discovery of a new vaccine or the Internet (Correa, 2012). Despite there being numerous negative connotations associated with the drought and its effects, there are upsides to it. Trescott and Fenwick (2015), explain that the consensus reached by 750 global business leaders is a greater commitment towards to creating substantial capacity within organisations to understand the effects of

climate change and to establish a comprehensive business strategy aimed at minimising risk and identifying opportunities. This notion, even at its most basic level, is practical for all organisations and not only those along the value chain of an agricultural commodity. It was evident, through higher food prices, that organisations were not able to absorb input costs, however, with proper planning and contingencies in place to compensate for supply chain risks, new and innovative ideas can be brought to the forefront of operations which in turn could lead to establishing a sustainable competitive advantage.

Taleb (2007) proposes that individuals deal with knowledge in two ways: Mediocristan – where things are predictable and conventional statistical analysis is viable and Extremistan – where things are not amenable to conventional statistical analysis. Even though societies are moving towards a more Extremistan position as a means of explanation, the drought that was experienced was explained by way of the ENSO cycle, as such this is considered to be a Mediocristan analysis, as there is a surety of a reoccurrence which can be planned for as well as the duration thereof.

Taleb (2007) as cited in Harris (2007) is of the opinion that despite having empirical evidence, individuals persist on forecasting into the future utilising tools and methods which exclude rare events. Therefore, to ensure that all events are taken into consideration and rare events are not excluded, proper planning needed to be done by way of identifying and understanding all risks that have the propensity to affect the supply chain of an organisation be it both internal and external (Johnson, 2014). This way accurate and feasible strategies can be devised to aid in the organisation's ability to survive and be successful.

Figure 2.4 graphically represents the Black Swan Theory as proposed by Taleb in his 2007 book. The diagram above serves to streamline the theory and provide a simplistic cause and effect relationship between phenomenon and those variables directly affected, be it positively or negatively. The Black Swan Theory can be viewed as being extremely relevant and current in society today given the rapidly changing business environment and the constant evolution in the technological sphere, pushing organisations to re-evaluate and become innovative in their approach to business and achieving a competitive advantage.

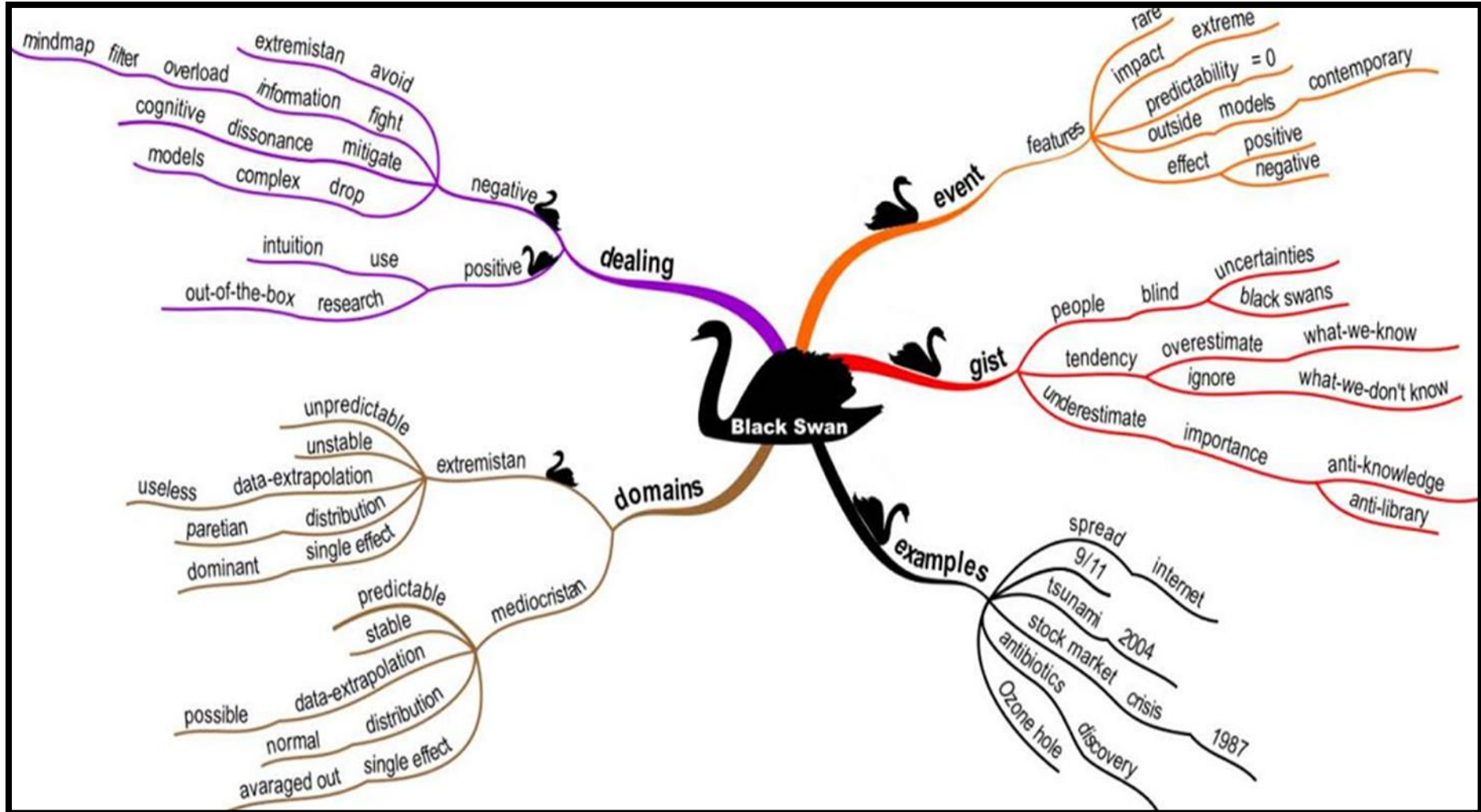


Figure 2.4: Mind Map of Black Swan Theory

Source: Taleb (2007)

With this being said, although the Black Swan Theory does provide a degree of explanation, it is not entirely sufficient to serve as a means of underpinning the survival strategies of agriculturally based organisations. As a result, the Contingency Theory is better suited at providing a more well-rounded structure for survival strategies in agriculturally based organisations.

The Contingency Theory can be used as a method of studying the behaviour within an organisation to provide meaning to the manner in which variables such as technology, culture and external conditions impact the design and operation of an organisation (Islam and Hui, 2012). The underlying assumption of the contingency theory is that organisational structures differ and are therefore not collectively applicable (Islam and Hui, 2012).

From this definition, organisations that are affected by external disturbances ultimately have to adjust for this by changing the manner in which internal operations are conducted (Trescott and Fenwick, 2015). Therefore, no two organisations, especially those that are agriculturally based, can work from a set framework from which to overcome disturbances. Given the presence of extreme weather, some agriculturally based organisations were affected more than others according to Bandile and Eybers, (2015), who go on to explain that although there was sparse rainfall, farmers in the Free State province were worse affected than those in the Mpumalanga province, where Blinkwater Mills is situated. Therefore, even though both farmers and affiliated mills faced the drought, both were not impacted to the same extent.

Schoech (2006), states that the essence of the Contingency Theory is that in order for organisations to establish best practice; processes and operations, they need to fully comprehend the contingencies upon which they are dependent. The Contingency Theory is often referred to as the “it all depends on” theory, however it is often not as simplistic as made out to be (Schoech, 2006), this is as a result of assessing contingencies upon which a decision is based can be incredibly difficult.

Agriculturally based organisations such as Blinkwater Mills, need to have a holistic approach when looking to identify a contingency plan given the environment in South Africa, there are multiple factors one must take into consideration in conjunction with extreme weather conditions. For example; the water shortage faced in South Africa, and for Blinkwater Mills situated in the province of Mpumalanga, this had a direct bearing on those farmers who are dependent on dams and bore holes for their crops (Bandile and Eybers, 2015). Another factor which is of importance is the political instability which directly affects the Rand value, this in turn is a determinant as to whether or not organisations, not just those that are agriculturally based, can source internationally, or will be forced to shut down for the season (Silhlobo, 2016).

In practice, the term contingency is used in the literal sense, with the aim of contingency theorists being to be able to properly identify and measure the conditions under which a situation will occur (Schoech, 2006). Organisations which attempt to establish a contingency plan must be mindful that a contingency

is the relationship between two phenomena, meaning that if one phenomena exists, then inferences can be drawn regarding another phenomenon (Schoech, 2006).

It is a given that the ENSO cycle will occur again, and as such, South African organisations must take cognisance not only those that are agriculturally dependent. The impact of the ENSO cycle can be either occur via a drought or heavy rainfall. Either way, given that ENSO cycle phenomena exists, organisations must be prepared for either impact.

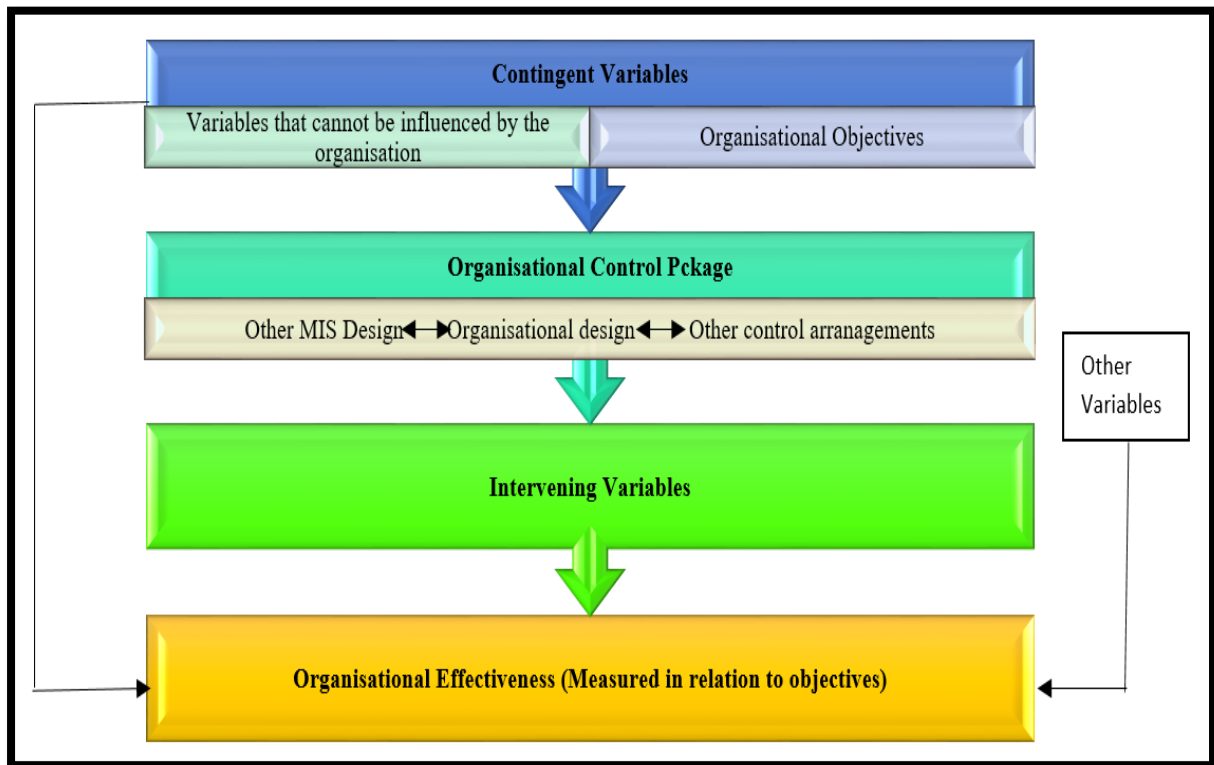


Figure 2.5: Contingency Theory Framework

Source: Adapted from Macy and Arunachalam’s Figure 3 (1995)

The figure above outlines the contingency theory framework where contingent variables are broken down into macro factors (influences which are external to the organisation) and micro factors (influences which are internal to the organisation) (Reed, 2002). Each having its own unique impact on the organisation. It has been established that extreme weather is considered to be an external influence to the operations of Blinkwater Mills. Once these factors have been identified, their impact on the organisation system needs to be taken into consideration (Macy and Aunchalam, 1995). It is vital to get ahead of the problem, so as to identify where in the organisation will disruptions occur. The upstream and downstream of Blinkwater Mills was affected through a yield shortage and a decrease in the consumption of Super B. An organisations’ Management Information System (MIS) together with the overall organisational design needs to re-evaluate processes so as to mitigate or limit the effect these factors will have on the overall organisations operations (Reed, 2002).

Once these factors have been identified, the effect on operational and organisational design understood and intervening methods put in place to overcome the disruption, the organisation must look to evaluate the process of intervention to gain an understanding of whether or not this process was successful or not and to what degree – should the process now be improved or should the process be redesigned.

Macy and Arunachalam (1995), put forward an updated Contingency Framework which is built upon a collaboration of Gordon and Miller's framework and Franz and Robey's distinction between factor and process research. Gordon and Miller's framework is based on an applied-survey research and in this research there are four key variables, namely: organisational structure, technology, organisation environment and human resources (Gordon and Miller, 1976). When designing an accounting system, these variables are considered to be predetermined contingency variables (Gordon and Miller, 1976). Franz and Robey's highlight the following distinction between factor research and process research: factor research "empirically examines user and situational attributes to see how they relate to the outcome of system implementation", process research "emphasises managing the organisational change that takes place during the development of the system" (Franz and Robey, 1987). It is important to understand that factors and processes work together in expanding the value of research in the design of Management Accounting Systems (MAS)

The new framework, as seen in Figure 2.6 differs from the original one in that the updated framework taking into account systems change (adaptability) and organisational decision making as processes instead of factors. Figure 2.6 outlines all of the various relationships which have been studied in prior research. This Figure seeks to identify individual contributing factors which have a direct impact on the systems effectiveness which culminates in the overall organisational effectiveness, which in turn is evaluated against MAS, effectiveness, profitability and quality. MAS is taken into consideration in the updated framework, as this was the basis upon which prior research was built and developed.

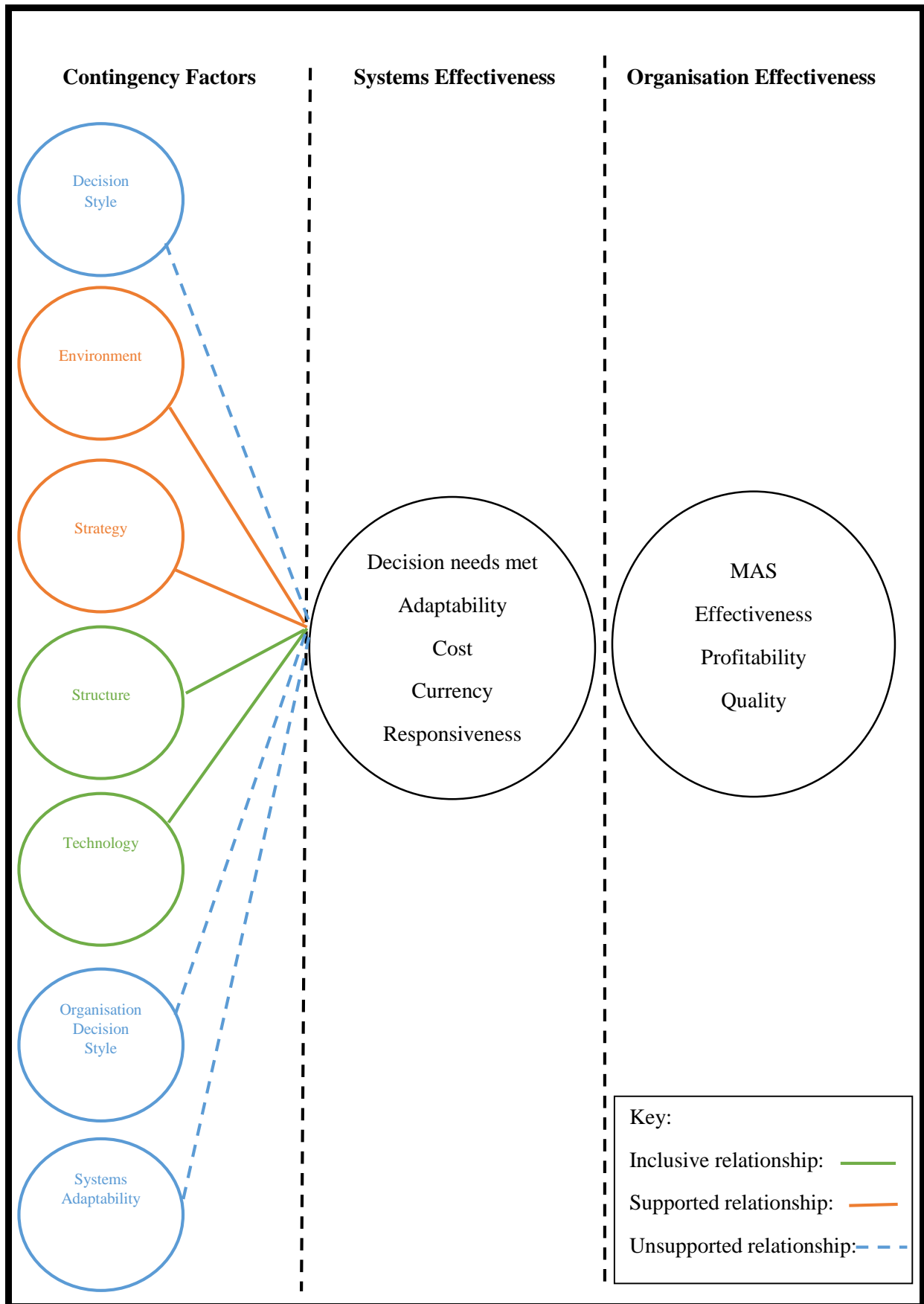


Figure 2.6: Updated Contingency Theory Framework

Source: Adapted from Macy and Arunachalam's Figure 3 (1995)

Contingencies when looked at in a broader sense can be considered to be conditions or boundaries which seek to govern the operations of an organisation (Schoech, 2006). This allows organisations to have a better understand the impact of a particular situation as well as the severity of it. It provides a benchmark and or limitation for that which is the acceptable and unacceptable when addressing the concern in question.

In the case of the drought which has considerably impacted on the operations of many organisations that are agriculturally dependent, organisations need not only take into account the ENSO cycle but also the external factors that worsened the effects. The compounding factors that South Africa experienced were: rainfall shortage, water restrictions, political instability which lead to a weakening Rand – making it harder for organisations to make use of imports as a means of supplementing their shortfall in yield, shortage in drought relief funds and knowledge to act pre-emptively. And how this has then impacted on the implementation of survival strategies of farmers and those alike whom are agriculturally sensitive to erratic climatic changes.

The contingency theory will elaborate on the concept of contingent circumstances and contends that both internal and external conditions will influence the management of a company and its supply chain and subsequently; this will also have an impact on the assets and capabilities that is necessary to perform under various conditions (Islam and Hui, 2012). Contingency theory puts forward the notion that it is important for organisations to adapt to their operations to their environment (Brandon-Jones, Squire, Autry and Peterson, 2014).

Being classified as an external factor, extreme weather compounded by the weakening rand and the water crisis has a direct impact on the management and ultimately supply chain of an organisation. The extent of this impact will be compounded if internal controls are not adequately equipped to handle these external conditions efficiently enough. Organisations that are raw material dependent would especially be affected if proper contingency planning is not in place so as to absorb the impact of these external influences (Dun and Bradstreet Limited, 2011).

In view of external conditions compounding already problematic internal operations, additional resources would be required in order to diminish the resultant impact on the organisation. The additional resources can come in terms of funding, additional raw materials sourced from another supplier or even additional equipment to help smooth internal operations (Woodward, 2014). These resources will seek to prevent the problem from filtering down any further along the supply chain and ultimately the consumer (BSI American Professional Services, 2014).

One can simply address this problem at the end of its occurrence, or an organisation can put forward strategies that will bring about overall change not just for the present but future as well. Putting forward policy changes should not only come from the organisation but government as well, as these structures

can provide farmers with necessary funding in times or initially help in setting them up with sustainable technology to help in the irrigation of land (Moorehead: 2009).

Organisations and governments alike are faced with the dilemma of incurring the repetitive additional costs associated with climate change, such as taxes sanctioned on pollution levels (Jira and Toffel, 2013), or take the initiative and put survival strategies into place that will be beneficial in the long run. This is in view of climate change being a phenomenon which is likely to no longer be a threat anymore. But the manner in which the effects are handles are in the hands of organisations and governments to set right.

As discussed, both The Black Swan Theory and The Contingency Theory show their relevance, suitability as well as applicability in their explanation of risks and their consequential disturbance along the supply chain. However, for the purpose of this case, The Contingency Theory will be used as the theory that underpins this study moving forward as it comprehensively addresses the aspects relating to the impact of extreme weather conditions on the supply chain.

By understanding the manner in which an organisation handles a crisis, it will dictate the manner in which resources will be utilised to stem the after effects. It will also help in gaging the degree and extent of the impact. This will seek to provide an understanding as to which resources and how much of the resources will be required so as to combat the effects.

2.7 Conclusion

Although a collective blueprint can be deduced as a means of solving the consequential effects of extreme weather, the manner in which these plans are implemented will be directly influenced by the structure and composition of the organisation in question. Organisations that operate on a larger scale may not have as much difficulty in finding alternative solutions and implementing the necessary changes. However, organisations that operate on a smaller scale could have their entire enterprise crippled if precautions were not accounted for. In order to better understand how extreme weather affects organisations of different sizes the following previously conducted studies will highlight and outline the similarities and differences with regard to the manner in which the risk was dealt with.

A literature review revealed little information as to extreme weather survival strategies for agriculturally based organisations. Literature on climate change and its relevance and consequential impact on organisations were used as to substitute the findings of this research. Extreme weather conditions are brought about and exasperated by the presence of climate change. The two concepts are not mutually exclusive but rather complementarily proportionate. Chapter three presents the research methodology of the study which outlines the manner in which the research objectives were achieved and the steps taken to ensure the validity of the research.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter puts forward the research design and methodology which aimed to address the research questions and objectives. The chapter outlines the research approach and process, outlining the chosen method. Thereafter, a detailed discussion highlights the various forms of qualitative data and then outlines the advantages and disadvantages of in-depth telephone interviews. The nature of the study, took the form of a case, which comprised of the analysis of primary data that was be qualitatively gathered. In order to test the validity of the study and the reliability of the collection instrument, a pilot study was conducted. The manner in which the telephonic interviews was administered are detailed. Descriptive research was used so as to achieve the research objectives through the means of correlation research. The time horizon for the researcher is cross-sectional. Cross-sectional data can be described as data which is collected once, it could occur over a period of days, or weeks, or months (Sekaran and Bougie, 2010: 119). The data was analysed and findings extrapolated and discussed in the chapter four.

3.2 Research Approach

According to (Clarke and Braun, 2013), there are four main approaches to research, namely: quantitative, qualitative, pragmatic approach (mixed methods) and advocacy/participatory (emancipatory). The following will put forward and explain the two most popular research approaches together with identifying the most suitable research method for the study.

3.2.1 Quantitative Research

Bryman, Bell, Hirschohn, Dos Santos, Du Toit, Masenge, Van Aardt and Wagner (2011), describes quantitative research as being distinctive and involves the collection of numerical data, considers the relationship between theory and research as deductive, generally leans heavily towards a natural science methodology and undertakes an objectivist view when looking at the reality of society. Quantitative methods can best be described as emphasising testing and verification, it is considered to be logical and critical in its approach, a controlled measure and focuses on the facts and/or reasons behind social events, utilises a logical and critical approach; result orientated; particularistic and analytic and can make generalisations based on population membership (Ghauri and Gronhaug, 2010).

Sekaran and Bougie (2011), identify structured questions as the general manner in which quantitative data is collected. Quantitative methods are to be used when the objective of the study requires there to be in-depth insight provided to explain a phenomenon (Ghauri and Gronhaug, 2010). Bryman *et al.*, (2011), summaries the characteristics of quantitative research as: the quantification in the collection and analysis of data; implementing a deductive approach when highlighting the relationship between

research and theory, with the emphasis on testing of theories; inclusion of practices and norms of the model of the natural sciences and of positivism and viewing social reality as an external, objective reality.

3.2.2 Qualitative Research

Qualitative research refers to information which is collected through conducting interviews or from observations (Sekaran and Bougie, 2011). One of the main benefits to qualitative research is to provide an understanding and to gain insights regarding phenomenon where there easy previously little to no scrutiny (Ghauri and Gronhaug, 2010). Qualitative data looks at data in the form of words (Sekaran & Bougie, 2011), and refers to data which can either be primary or secondary, collected from individuals, organisational records, government publications, or the internet (Sekaran and Bougie, 2011).

According to Bell *et al.*, (2011), the qualitative research approach: generally, makes use of words rather than quantification when analysing data with the focus is primarily on an inductive approach when looking at the relationship between theory and research, where the emphasis is on formulating theories rather than proving them; reject the practices and norms of the natural scientific model and of positivism with importance being in the manner in which individual interpret their social world and social reality is viewed as constantly changing and emergent, as understood by individuals. Ghauri and Gronhaug (2010), states that qualitative data can be characterised as: stressing the importance of understanding, focusing on the understanding from the respondent or informants point of view, process orientated, holistic perspective and making generalisations through comparing properties and context of individual organisms.

3.2.3 Pragmatic Approach (Mixed Methods)

Creswell and Plano Clark (2007), describe mixed methods research being based on philosophical assumptions as well as methods of inquiry. The authors go on to explain that it is a methodology that involves philosophical assumptions which guide the direction of the collection together with the analysis of data and the mixture of qualitative and quantitative data in a singular study or series of studies. According to Bell *et al.*, (2011), mixed methods is a term used to describe research that makes use of both qualitative and quantitative research methods within a single project.

Tashakkori and Teddie (2010), describe the mixed methods methodology as a comprehensive inquiry logic which guides the selection of specific methods and is guided by conceptual positions that are common to mixed methods practitioners. Bell *et al.*, (2011), go on to explain that using both qualitative and quantitative research should involve a mixing of research methods as oppose to using them in tandem. Bryman (2006), is of the opinion that by utilising a mix of qualitative and quantitative methods it will be mutually illuminating, as such allowing the researcher to capitalised on strengths and offset the weaknesses of each method.

3.2.4 Advocacy/Participatory (Emancipatory)

Research who undertake the advocacy/participatory approach are of the opinion that the approaches described thus far do not adequately meet the needs or situation of people from marginalised or vulnerable groups. According to Creswell (2009), this approach requires that the research inquiry be intertwined with politics and a political agenda. The author goes on to explain that this approach focuses on important social issues such as: empowerment, inequality, oppression, domination, suppression and alienation. As such this approach is best described as providing a voice to participants which will enable them to form an agenda for reform.

Kimmis and Wilkinson (1998), offer the following four essential features of the advocacy/participatory approach: participatory actions are focus on bringing about change, and at the end of this type of study, researchers create an action agenda for change; it is focused on freeing individuals from societal constraints, which is why the study begins with an important issue currently in society; it aims to create a political debate so that change will occur and since advocacy/participatory researchers engage participants as active contributors to the research, it is a collaborative experience.

3.2.5 Most Applicable Approach

Ghuri and Gronhaug (2010), put forward a comparison between quantitative and qualitative research in that quantitative research tends to be focused on descriptions and testing for the validity of hypothesis, while qualitative research on the other hand looks at research with is best described as being unstructured and explorative where there is a greater need to provide an understand to a particular scenario.

Given the definitions and explanations provided above as well as the nature of the study, the approach that was utilised was the qualitative approach. The effect of extreme weather on organisations differ, therefore, in order to fully understand the extent to which Blinkwater Mills was affected and the manner in which this was overcome, qualitative research was used to obtain all relevant necessary information that constituted the study from respective respondents.

3.3 Research Process

Sekaran and Bougie (2011), list the following as viable processes when engaging in research. A Discussion explaining the importance of each process will follow together with stating the most appropriate research process for the study.

3.3.1 Exploratory Study

Ghuri and Gronhaug (2010), state that an exploratory study is undertaken when a research problem is not understood well enough by those conducting and collecting the research. Zainal (2007), the purpose

of exploratory case studies is to explore a phenomenon that is considered by the researcher as being a source of interest. According to Sekaran and Bougie (2011), the reason for researchers undertaking an exploratory study is because not much is known regarding a specific situation or there is limited or no information on how problems of a similar nature were solved by past researchers. As a result, it is vital that enough groundwork is conducted that is thorough so as to ensure that nature of the study adds value to that particular field of study as few studies have been conducted in the past (Sekaran and Bougie, 2011).

Some qualitative studies are seen exploratory in nature, this is because that data collected from these studies often reveal patterns relating to the phenomenon from which theories are developed and hypothesis are subsequently formulated (Sekaran and Bougie, 2011). Examples of these qualitative studies are: observations or interviews. Yin (1984), states that a pilot study is an example of an exploratory case study. A pilot study can be seen as a smaller version of a larger study that is carried out so as to prepare for that study (Polit, Beck and Hungler, 2001).

3.3.2 Descriptive Study

Descriptive studies are undertaken so as to determine and understand the key features of factors that are of importance in a given circumstance (Sekaran and Bougie, 2011). The aim of descriptive case studies is to describe the data received as it occurs (Zainal, 2007). As suggested by McDonough and McDonough (1997), descriptive case studies can be presented in a narrative form. Ghauri and Gronhaug (2010), state that with regards to descriptive research, the problem at hand is well known and understood. A descriptive study seeks to provide the researcher with an outline or a description of the important aspects of the phenomenon, this could be from the point of view of person, organisation or industry (Sekaran and Bougie, 2011). It can be seen that the main goal of descriptive research is to derive a profile or aptly describe relevant aspects of a phenomenon from an individual, organisational or industry perspective (Sekaran and Bougie, 2011). This allows for information to be gleaned so as to bring forth useful information which can be taken into consideration before corrective action is taken. Ghauri and Gronhaug (2010), go on to state that descriptive research is best characterised by: structure, precise rules and procedures.

3.3.3 Explanatory Study

This form of research seeks an understanding not only at an intermediary level but at an in-depth level (Zainal, 2007). Based on the data received, the researcher can then formulate theories and set to test theories (by McDonough and McDonough, 1997). Explanatory case studies can also be used in causal studies where pattern-matching is utilised to understand specific phenomenon in complex and multivariate cases (Zainal, 2007). According to Yin and Moore (1987), there are three competing theories which can be used to describe these complex and multivariate cases: knowledge-driven theory,

problem-solving theory - and social-interaction theory. Where knowledge-driven theory stipulates that eventual commercial products are the results of ideas and discoveries from basic research, similar notations can be used to describe problem-solving theory while the social-interaction theory suggests that overlapping professional network results in researchers and users communicating frequently with each other (Yin and Moore, 1987). However, with the explanatory theory, products are derived from external sources as opposed to the researcher (Zainal, 2007).

3.3.4 Hypothesis Testing

Sekaran and Bougie (2011), the purpose of hypothesis testing is to establish the nature of certain relationships, or identify the differences among groups, or the independence of two or more factors in a situation. According to Ghauri and Gronhaug (2010), the aim of hypothesis testing is to establish whether a presumed relationship or covariation between variables is proved.

3.3.5 Case Study Analysis

Case studies are made up of an in-depth contextual analysis of parallel matters found within an organisation (Sekaran and Bougie, 2011). Bryman *et al.*, (2011), explains that the distinction between a case study and other designs is the focus on understanding a bounded situation or system. Case studies that are qualitative in nature, are best applied in circumstances where current difficulties are based on past problem-solving experiences (Sekaran and Bougie, 2011). Exponents of the case study design lean more towards qualitative methods, such as the researcher's observations and semi-structured questionnaires as these methods are most ideal to produce a thorough and comprehensive examination of a case (Bryman *et al.*, 2011).

Sekaran and Bougie (2011), state that case studies are useful when there is a need to understand certain phenomenon as well as to generate further theories for empirical testing. According to Yin (1994) as cited in Ghauri and Gronhaug (2010), case studies are linked to descriptive or exploratory research, without being strictly bound to either area. Knights and McCabe (1997) cited in Bryman *et al.*, (2011), states that case studies allow for several qualitative methods to be combined, which eliminates the restriction of only having to make use of one. A case method collects data through primary data sources such as personal interviews and observations (Ghauri and Gronhaug, 2010). Zainal (2007), states that a case study method is utilised when a small geographical area is under investigation or there is a very limited number of individuals as the subjects of the research.

Depending on what the researchers' objectives are, will determine whether a single-case or multiple case is needed. Single-case studies are used when there are no other cases available for replication, where events are restricted to a single occurrence (Zainal, 2007). The draw back to a single-case design is the inability to make generalisations especially when the events are rare (Zainal, 2007). Multiple-

case design can be suited for real-life events that depict a number of different sources of evidence through replication instead of sampling logic (Zainal, 2007).

3.3.6 Most Applicable Process

As discussed, five research processes were highlighted, however for the purpose of this study, the general format of a case study was not strictly adhered to but rather the study made use of relevant aspects of its format as guide. The study made use of an adapted single-case design and not a case study where the events are limited to a single occurrence (Zainal, 2007). The drawback of this method is the inability to provide a generalised conclusion, however this was overcome this by way of triangulating the study with other methods in order to confirm the validity of the process (Zainal, 2007). The study made use of a pilot study as a means of validating the research instrument which leads to the study being described as being both exploratory and descriptive in nature.

3.4 Data Collection

Ghuri and Gronhaug (2010), state that data collection is the gathering of measurable information relating to variables of interest, establishing a systematic fashion that enables ones to adequately answer specific research questions, test hypothesis and evaluate the outcomes. The following discussion will highlight the two main sources of data as well as explain the various types of data collection methods. With the one that is most suited for the study being identified.

3.4.1 Sources of Data

The following describes the two types of data sources:

3.4.1.1 Secondary Data

Secondary data can not only be used to aid in the understanding of a researchers' research problem but it also serves as a tool for identifying useful information (Ghuri and Gronhaug, 2010). Data which is already in existence and does not have to be collected and analysed by the researcher is referred to as secondary data (Sekaran and Bougie, 2010). Bryman *et al.*, (2011), go on to state that the main research for utilising secondary data is that the data is already available and as a result, does not require the researcher to go out and conduct research and analyse the findings. Researchers make use of secondary data when there are circumstances in which primary data cannot be attained (Miller and Brewer, 2003).

Sekaran and Bougie (2010), go on to identify sources of secondary data as being: statistical bulletins, government publications, published or unpublished information, data made available from previous studies, case studies and libraries, online data, company websites, and the Internet in general. Ghauri and Gronhaug (2010), states that researchers must identify these sources first and evaluate the

usefulness seeing that through the utilisation of secondary sources, research questions can be answered without the need to collect additional data.

Given the appropriateness of secondary data to research, researchers cannot solely depend on secondary data to answer research questions and objectives as secondary data may not be available or not fail to answer specific research questions, as a result the researcher must collect that data themselves (Ghauri and Gronhaug, 2010). This data is known as primary data.

3.4.1.2 Primary Data

Information can also be ascertained through the observation of events, people or objects, or through the administration of questionnaires to individuals of relevance (Sekaran and Bougie, 2010). These authors go on to state that when data is gathered in such a manner for research, it is known as primary data.

The information ascertained from primary data is dependent upon the nature of the research problem and design (Ghauri and Gronhaug, 2010). Ghauri and Gronhaug (2010), go on to mention that primary data can be collected through: observations, experiments, surveys (questionnaires) and interviews.

Given the above definitions and explanations regarding the two types of data collection methods, the researcher made use of primary data for the sole purpose of the intended study, as the researcher collected information through in-depth telephone interviews. The reasons for this was that the information collected is crafted to explain the research questions and objectives. Additionally, the research made use of primary data because the information that is required is based on events that only certain individuals belonging to Blinkwater Mills had the knowledge to answer.

3.4.2 Data Collection Methods

The following explains the various qualitative data collection methods:

3.4.2.1 Interviews

Interviews serve as a method of collecting information through garnering respondents takes on issues of interest, this is especially useful during the exploratory stages of a study (Sekaran and Bougie, 2011). Bryman *et al.*, (2011), states that interviews are considered to be the best source of data collection. Interviews can be conducted one of two ways: structured or unstructured, and can either be face-to-face, over the telephone or online via emails (Sekaran and Bougie, 2011).

Structured interviews are facilitated in a manner which would allow the interviewer to gather information which has already be predetermined (Sekaran and Bougie, 2011). Therefore, the interviewer must compile questions which as designed to provide them with the exact information which they require (Sekaran and Bougie, 2011). These precise questions can be derived from information gathered during the unstructured interview session (Sekaran and Bougie, 2011).

A structured interview is considered to be one of the major types of interview methods, it comprises of a standard interview which is scheduled by the interviewer so as to ensure that all interviewees receive the exact same questions (Bryman *et al.*, 2011). The interviewer is required to read out the exact same question and in the exact same order, the purpose of which is to ensure that the respondents answers can be aggregated (Bryman *et al.*, 2011). Structured interviews, much like self-completed questionnaires comprise of questions which are variously considered to be closed, closed ended, pre-coded or fixed choice (Bryman *et al.*, 2011).

An unstructured interview is not considered to be as formal and planned as structured interviews, here the interviewer does not have a predetermined set of questions for respondents (Sekaran and Bougie, 2011). An interviewer will engage in unstructured interviews so as to establish preliminary issues, which would be further explored when structured in-depth interviews are being conducted (Sekaran and Bougie, 2011).

3.4.2.2 Questionnaires

Ghuri and Gronhaug (2010), state that questionnaires are one of the most used data collection instruments in business studies, with the major types of questionnaires being descriptive and analytical. (Sekaran and Bougie, 2011), describe questionnaires as being a predetermined written set of questions, the answers to which are recorded and are within closely defined alternatives. The authors go on to explain that researchers make use of this research method when the researcher is confident in what is required and how to measure the respective variables (Sekaran and Bougie, 2011). Questionnaires can be administered: personally, mailed or electronically distributed to the respective respondents (Sekaran and Bougie, 2011).

Bryman *et al.*, (2011), states that questionnaires can be self-completed which implies that the respondent completes the questionnaire themselves, with the most common self-completion form being mail or postal questionnaire, where the respondent receives the questionnaire via post. Once completed, respondents are asked to post the questionnaire back or to drop it off at a specific location (Bryman *et al.*, 2011). The internet and emailed surveys are fast becoming the preferred method of administering a questionnaire (Bryman *et al.*, 2011).

3.4.2.3 Observations

Observation entails listening and watching the behaviour of individuals in a manner that will allow for learning and interpretation (Ghuri and Gronhaug, 2010). The advantage of utilising observations as a data collection technique is the collection of first-hand information, the interpretation and understanding of observed behaviour, attitude and situation is more accurate and capturing this dynamic is not possible through interviews and questionnaires Ghuri and Gronhaug (Ghuri and Gronhaug, 2010). The major disadvantage of utilising observations is observations are made by individuals that systematically

observe and record a phenomenon and it is problematic to explain these into scientific information (Ghauri and Gronhaug, 2010).

According to Bryman *et al.*, (2011), the major types of observation are: participant observation which is linked to qualitative research and involves an extended period of time where the observer is immersed in a social setting; non- participant observation describes a situation where the observer watches but does not engage in what is going on in the social setting; structured observation is used when the researcher has a specific rules which guides the observers about what they should look for and how behaviour is to be recorded in a particular way; unstructured observation is aimed at recording as much behaviour as possible and in comprehensive detail about the behaviour of participants with the intention of formulating a narrative account and simple observation and contrived observation is where the observer has no influence over the social setting being observed; whereas contrived observation there is deliberate intervention from the observer to manipulate the situation and observe the affects.

3.4.2.4 Action Research

Bryman *et al.*, (2011), describes action research as being an approach whereby a client and action research work together to analyse a problem of shared concern and to formulate a resolution. The shared problem goes through a process of identification, planning, action and evaluation where the action researcher works in conjunction with their respective client to identify new courses of action which is the precursor to the re-education of changing thinking patterns and actions (Bryman *et al.*, 2011). Action research should be mutually beneficial to the participants as well as the practitioner (Bryman *et al.*, 2011).

Alternatively, action research is often undertaken by consultants when there is a need for organisational processes to change (Sekaran and Bougie, 2011). This is when a researcher already has identified a problem, and is working towards collecting information to determine the best possible solution (Sekaran and Bougie, 2011). The solution once implemented has consequences which may be unbeknown to the organisation which then requires there to be an evaluation, definition and diagnosis of the consequence (Sekaran and Bougie, 2011).

3.4.3 Most Applicable Collection Method

While there are countless other research methods, Sekaran and Bougie (2011), list them as being: focus groups, panels, projective techniques and interactive media. The authors describe a focus group as consisting as of eight to ten members with a moderator leading the discussion for about two hours on a particular concept, topic or product; panels are much like a focus group however panels meet on more than one occasion as pose to focus groups that meet once off; projective techniques are indirect and unstructured in their approach which uses the projection of respondents to make inferences relating to

underlying motive urges or intentions and interactive media is a method of communication where the output of a program is dependent upon the input of the user (Sekaran and Bougie, 2011).

For the purpose of this research, interviews will be used. Due to the limitations of the study, the best research method that will allow for data to be collected comprehensively and correctly will be interviews. The discussion that follows will highlight the different types of interviews and state the preferred chosen method.

3.5 Qualitative Interviews

The following will identify the types of qualitative interviews with an explanation on the types best suited for the study.

3.5.1 Types of Interviews

Sekaran and Bougie (2011), state that interviews can either be conducted face-to-face or over the telephone, with computer-assistance being utilised should it required. Unstructured interviews often make use of face-to-face interviews whereas structured interviews make use of both face-to-face and telephonic interviews (Sekaran and Bougie, 2011).

Given that the researcher is based in a different province to the respondents, the study made use of telephonic interviews as the preferred method of collecting primary data which will further be analysed. The discussion that follows will highlight the manner in which telephonic interviews were utilised through which in-depth data was collected.

3.5.2 Strengths and Limitations of In-depth Telephonic Interviews

Bryman *et al.*, (2011), states that telephonic interviews are extremely successful in marketing research, and less so in other forms of business research, with this being said, the authors go on to highlight the various advantages of personal telephonic interviews:

- On a like-for-like basis, it is considered cheaper and quicker to administer, especially when the sample is geographically dispersed.
- It is easier to supervise than a personal interview.
- The respondents are less likely to be unduly influenced by the personal characteristics of the interviewer (i.e., age, race, class). Thus removing the potential for a bias response. Bryman *et al.*, (2011), also go on to highlight the limitations of telephonic interviews over personal interviews.
- Respondents who do not own or who are not contactable by telephone are excluded. Lower-income households are more likely not to own a land line telephone, resulting in the potential for sampling bias to exist.

- An interviewer will find it difficult to engage with a respondent for longer than 20 – 25 minutes, however, personal interviews can tend to go longer than this.
- Telephonic interviews have the propensity to achieve slightly lower response rates than personal interviews.
- When the study seeks to address sensitive issues, such as workplace bullying or drug and alcohol abuse, personal interviews are preferred to telephonic interviews.
- As telephone interviewers cannot observe the interviewee, they have little or no way to gaging the respondent's unease or confusion.
- Telephonic interviews cannot easily make use of visual aids; such as diagrams or photographs to prompt respondents to answer.
- The data received from face-to-face interviews are considered to be superior in quality than the data received from telephonic interviews this is as respondents may be dissatisfied with the length of time taken and therefore and may be less engaged.

3.5.2 The In-depth Interview Design

Given the outline of descriptive studies previously discussed, the researcher ensured that the questions posed to the interviewees were based off of structured problems (Ghuri and Gronhaug, 2010). The researcher made use of both close ended and open ended questions. The close ended questions were posed first, so as to ascertain a general straightforward answer. It also allowed the researcher to identify the direction and thought processes of the interviewee. Thereafter, the interviewee was asked to explain or justify the reason for the answer provided to the close ended question. Having the interviewees elaborate on their answers allowed for the researcher to gain rich data so as to better explain a phenomenon that is not yet fully understood.

The research instrument was designed as follows:

Section 1: looked at identifying the impact that extreme weather conditions had on the farmers closely affiliated with the operations of Blinkwater Mills. It also aimed to identify the type of relationship Blinkwater Mills has with its farmers, so as to gage the level of involvement and integration between the two. It also seeks to gage the level of impact that the drought had on the quality and quantity of the raw materials produced by Blinkwater Mills farmers.

Section 2: was aimed at investigating the impact extreme weather conditions had on the operations of Blinkwater Mills. This was not limited to only the upstream supply chain, where the sourcing and procurement of raw materials are planned for but it also sought to understand if the drought went so far as to impact on the downstream of Blinkwater Mills. Also, identifying if Blinkwater Mills has any survival strategies in place.

Section 3: aimed at examining if there are any extenuating circumstances which prompted Blinkwater Mills to make any adjustments to their forecasted demand schedule. This was done so as to gain a holistic understanding of the true impact of the drought. Additionally, this section sought to identify and understand if Blinkwater Mills had any sustainability initiatives in place, and not just for extreme weather disruptions.

Section 4: sought to determine whether having a resilient supply chain would be beneficial to mitigating risk considering the likelihood of the reoccurrence of extreme weather conditions, much like the drought. It is also worth exploring various alternatives should the sourcing of raw materials locally no longer be an option, however, this option must not be done so lightly, as there are various other contributing factors as to whether or not sourcing internationally to fill the void is viable or not.

3.5.3 In-depth Interview Administration

Before the in-depth telephone interviews can take place, the researcher together with the General Manager (Gatekeeper) devised a schedule for when the telephone interviews were to take place. This way the interviewing will be less stressful for the respondents (Bryman *et al.*, 2011). The researcher ensured that each respondent received a uniform and formal introduction outlining the identity of the researcher, aspects under which the research is being conducted, topics of the research, why the respondent has been selected, offer reassurances regarding the confidentiality and provide the respondent with an opportunity to pose any questions should they have any (Bryman *et al.*, 2011).

Conducting in-depth telephonic interviews will allow respondents to answer the questions at their own convenience (Sekaran and Bougie, 2010). Due to respondents being notified of the interview well in advance, the chances of the interview being correctly and adequately answered are highly likely (Sekaran and Bougie, 2010). It also encouraged the respondents to provide truthful and insightful responses that was most beneficial to the researcher. The study displayed an in-depth understanding of the topic at hand and thus provide knowledgeable and informed questions that will garner the desired responses.

When the telephonic interviews were conducted, the respondent's answers were noted and at the end of each telephonic interview, all responses from the respective respondent were transcribed in a uniform organised manner. Through the standardisation of the questions that are asked, ensured that there is little to no variation in the replies of the respondents that are not due to "true" or "real" variation (Bryman *et al.*, 2011).

A structured interview was utilised as the researcher is knowledgeable regarding what is required and how to measure the factors that are of importance. For the purpose of the study, a telephonic interview was conducted due to geographic constraints, the researcher (interviewer) was not be able to conduct a face-to-face interview. This is due to the researcher (interviewer) being based in Durban and the organisation's head office and depot's being based in Mpumalanga.

Refer to Appendix C for the survey questionnaire.

3.5.4 Pilot Study

Kothari (2004) states that when dealing with a social case, it is advisable to conduct field observation which could allow the researcher to undertake a preliminary survey. Bryman *et al.*, (2011), also believe that before the administration of an interview or questionnaire, a pilot study, if possible, should be conducted. The purpose of which is not only to determine the validity of the survey questions but piloting ensures the holistic functionality of the study (Bryman *et al.*, 2011). Ghauri and Gronhaug (2010), state that conducting a pilot study serves as a test to check the depth of understanding of the interviewee regarding the research problem together with the questions at hand.

A pilot study can be seen as a smaller version of a larger study that is carried out so as to prepare for that study (Polit, Beck and Hungler, 2001). Pilot studies are used as a feasibility study that will validate the ideas or methods behind a research idea, it will also allow for problems in the study to be worked out before launching a larger study (Polit, Beck and Hungler, 2001). Once the relevant individuals that possess the knowledge and the expertise to rely supply chain information on Blinkwater Mills was identified, a pilot study was conducted.

A pilot study consisted of between 10% - 20% of the sample population (Polit, Beck and Hungler, 2001). Based on the study sample size of 10, the pilot study consisted of 2 individuals, one from management and one from a depot respectively.

A pilot study was conducted a week before the sample population was interviewed, as a means of validating the research. A research limitation, as stated in Chapter 1 is the distance between the researcher (interviewer) and respondents (interviewee), as a result it was is a contributing factor for telephonic interviews to be made use of. At the beginning of the interview, the researcher introduced the study and the purpose of conducting a pilot study before the sample was interviewed. The respondents of the pilot study did not require any of the questions to be rephrased nor were the questions found to be ambiguous. As a result, no changes or amendments were made to the questions, and the same questions that were posed to the pilot study respondents were posed to the sample population, as seen in Appendix C. The structure of the questions remained the same, with there still being four sections, each with its own objective and subsequent questions. The interviewer ensured that the responses from both the senior manager and depot controller were written down. The purpose of doing so was to allow the researcher to be able to review the responses so as to validate that the responses do correlate and comprehensively answer the posed question. Even though the data received from the pilot study was not used for the purpose of the research, the responses were transcribed and catalogued. The telephonic interview with one senior manager and one depot controller each lasted for 40 minutes in duration.

3.6 Sampling Methodology

Sampling is more frequently associated with quantitative research as opposed to qualitative research seeing as quantitative research emphasises the estimation of various parameters, test hypothesis and so on (Bryman *et al.*, 2011). With regards to quantitative empirical research, the purpose is to ensure that statistically valid conclusions can be derived (Bryman *et al.*, 2011). However, in qualitative research the main and most important purpose is to understand and gain insight rather than derive statistically valid conclusions (Bryman *et al.*, 2011).

Sampling procedures can be divided into two main categories: probability and non-probability (Bryman *et al.*, 2011). Probability samples have a known, non-zero chance of being a part of the sample, which allows for inferences to be derived (Bryman *et al.*, 2011). Non-probability sampling on the other hand does not make it possible for valid interferences to be made regarding the population, in that the sample is valid – within certain limits – for the population (Bryman *et al.*, 2011).

Given the nature of the study, non-probability sampling was made use of. Within the context of non-probability sampling there are 2 broad areas namely: convenience sampling and purposive sampling, with purposive sampling being further broken down into judgement, quota samples (Sekaran and Bougie, 2011).

With respect to judgement sampling, subjects possess a level of expertise and knowledge that would not be widely or commonly known by everyone throughout the organisation (Sekaran and Bougie, 2011). With judgement sampling, the researcher makes a judgement on gathering the sample so as to ensure that the population is best represented (Bryman *et al.*, 2011). Simply put, it is to ensure that the researcher selects the units which are best representative of the population.

Research Methodology (2017), state the following as advantages to judgement sampling: cost-effective and time-effective; the only available option to be used if there is only a limited number of primary data source that can contribute to the study and this technique can be effective in exploring anthropological situations where the uncovering of meaning can benefit from an intuitive approach. Research Methodology (2017), also go on to highlight the following as disadvantages: susceptibility to mistakes in judgement by researcher; low level of dependability and high levels of bias and the failure to generalise findings. These disadvantages are due to there being no randomisation during the sampling process as the members of the population did not have an equal chance of being selected.

For the purpose of this study, judgement sampling was utilised as a means of sampling method. Judgement sampling was the chosen method due to the fact that the researcher was in the position to choose subjects that were strategically placed within the organisation and had the propensity to gain the required information.

3.7 Population and Sample Size

Blinkwater Mills' history goes back to the early fifties when a maize mill was erected in Stoffberg in what was then known as the Eastern Transvaal - today Mpumalanga (Super B, 2016). The bounds of this study will therefore be in the Mpumalanga province despite Blinkwater Mills having depots in the rural areas of Mpumalanga, Limpopo and the Highveld (Super B, 2016). According to Sekaran and Bougie (2011), the population is an entire group of people, events or things of interest that the researcher wants to study.

All operations are conducted from Blinkwater Mills Head office, the target population comprised of the General Manager (Gatekeeper) as well as other senior level managers, totalling 10 employees. In addition to this, employees that man the depots in the rural areas of Mpumalanga, Limpopo and the Highveld were utilised as they possess first-hand knowledge relating to the changes in inventory output and consumer needs. A total number of 4 employees were identified from each depot, therefore, the total number of the target population was 22.

Given the nature of this case it was of importance to gather information that is relevance and use, it is for that reason only employees that possess knowledge and expertise relating to the supply chain operations were utilised.

3.7.1 Sample Size

Kothari (2004), states the sample size can be seen as the total amount of items that is to be selected from the universe, the sample size needs to be representative of the population and need not be too large or too small. Sekaran and Bougie (2011), states that a sample is considered to be a subset of the population, with the members of a sample coming from the population. In essence, some but not all of the population will make up the sample. Additionally, the sample size must be optimum in that it fulfils the requirements of efficiency, reliability and flexibility (Kothari, 2004).

For the purpose of this study the sample size constituted 5 senior level managers at Blinkwater Mills – Finance Manager, Managing Director, General Manager, Operations Manager and Administrative Manager; 3 employees from the Highveld depot – a Depot Manager and two Depot Controllers; a Depot Manager and Depot Controller from the Limpopo Depot and a Depot Manager and Depot Controller from Mpumalanga Depot. Therefore, the sample size that was used was 12 individuals.

As indicated, the pilot study consisted of 2 respondents, one from management – the Administrative Manager and one Depot Controller from the Highveld depot. From this, respondents were contacted and in-depth telephonic interviews conducted with all of the respective respondents, which is a response rate of 100%.

Table 3.1: Research Study Respondents

Group \ Administration	Pilot Study	Study
Senior Management	1 respondent from Blinkwater Mills Head-office	4 respondents from Blinkwater Mills Head-office
Depot	1 respondent from Highveld depot	2 respondents from Mpumalanga depot 2 respondents from Limpopo depot 2 respondent from Highveld depot
Total number of interviewees	2	10
	12	
Response Rate: 100%		

3.8 Data Analysis

Cohen, Manion and Morrison (2007), explain that the purpose of analysing qualitative data is to make sense of the views and opinions expressed by participants, identify corresponding patterns, themes, categories and regular similarities. Marshall and Rossman (2011), simplify the definition of qualitative analysis by stating that it is the identification of general statements regarding relationships among categories of data.

Given the nature of this study, the researcher will engage in the following 5 steps put forward by O'Connor and Gibson (2003), as a means of analysing data gathered through conducting structured interviews.

The first step in the analysis of data is to ensure that the data is organised in a manner in which prioritises and reduces the data (O'Connor and Gibson, 2003). The data once organised must allow for easy reading by the researcher.

The second step is finding organised ideas and concepts (O'Connor and Gibson, 2003), what this implies is that the researcher must look for words/phrases which are frequently used by respondents. However, due to the researcher making use of telephonic interviews, the researcher was not able to make use of interpreting body language, perceptions, attitudes and facial expressions as an additional means of finding meaning in unspoken language. At this stage the interviewer must be mindful of picking up for unexpected information and also additional information which can be transmitted through respondent relaying stories (O'Connor and Gibson, 2003). It is from all of this that the researcher will begin to code and categorise ideas and concepts (O'Connor and Gibson, 2003).

Once coding and categorisation of data is completed, the researcher can begin step three which looks at building over-arching themes in the data (O'Connor and Gibson, 2003). This is where if one category has more than one theme, categories can be collapsed into one main over-arching theme (O'Connor and Gibson, 2003).

The fourth step is ensuring the reliability and validity of the data analysis and the findings (O'Connor and Gibson, 2003). Once this has been conducted the fifth and final step is where the researcher seeks to identify all possible and acceptable justifications of the findings (O'Connor and Gibson, 2003). This relates to identifying what are the implications of the finds, who they will be communicated to and organise the information into a formal report

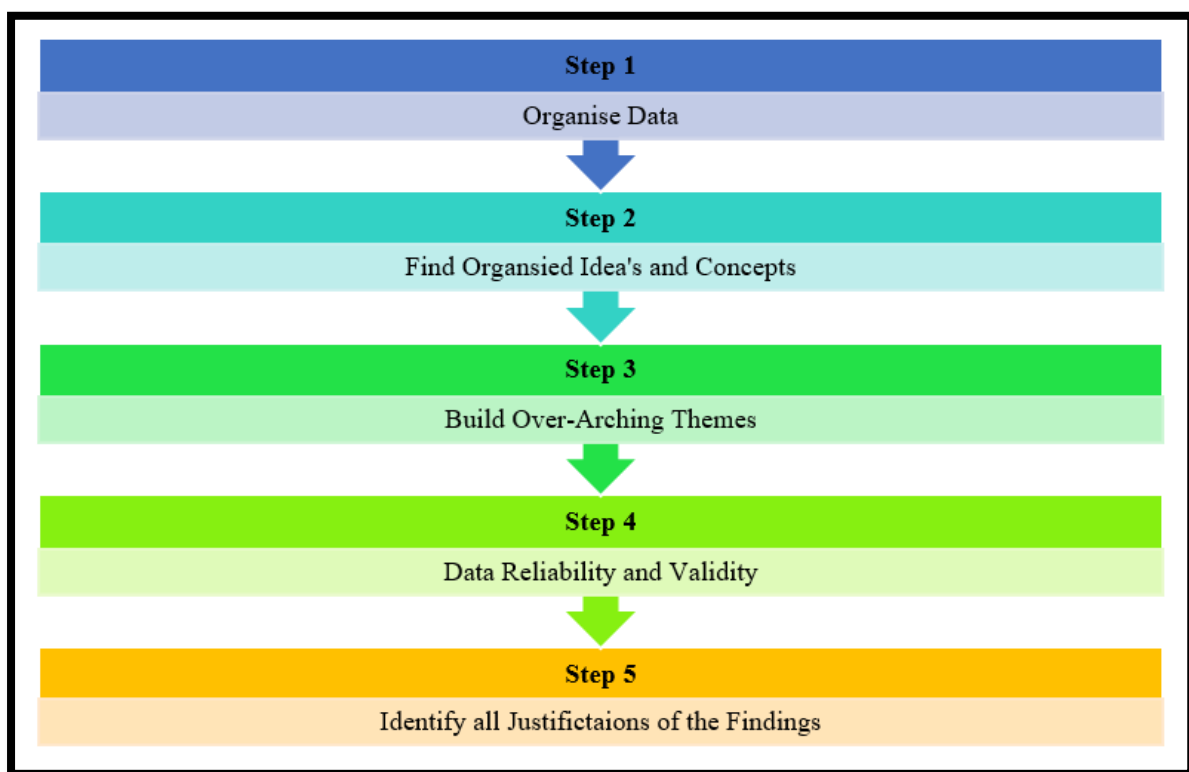


Figure 3.1: Data Analysis Process

Source: Own Source (2017)

3.9 Evaluating Qualitative Research

Based on the method used, the criteria for evaluating the quality and rigor of qualitative studies differs, the discussion that follows will put forward the following criteria against which qualitative research should be evaluated against:

3.9.1 Reliability and Validity for Qualitative Research

Mason, (1996) states that reliability, validity together with generalisability are seen as vital components in measuring the quality, rigour and broader probability of research, all of which can be realised if “certain methodological and disciplinary conventions and principles” are followed. LeCompte and Goetz (1982), put forward the ensuing findings relating to reliability and validity in qualitative research:

- External reliability: makes reference to the extent a study can be replicated. This criterion proves to be extremely problematic to meet in qualitative research. Seeing the near improbability to identically replicate the social environment in the original study, with that being said, it is suggested that a qualitative researcher replicating ethnographic research should lean more towards adopting a similar social setting as the original study. With ethnographic research relating to the scientific description of people and culture with their customs, habits and mutual differences.

The research looked at the effect the ENSO cycle had on Blinkwater Mills and what survival strategies could be implemented. Therefore, for future studies, although difficult to replicate given that lessons would have been learned and contingencies put in place, it would be plausible to look into the effects of floods or other extreme natural events and the consequential impact on agriculturally based organisations.

- Internal reliability: implies that whether or not, when the research team is made up of more than one member, all members are in agreement on what they see and hear. This is similar to inter-observer consistency.

There was only one member that made up the research team, therefore, there were no disagreements regarding the information received and the manner in which it was transcribed to be later analysed. Thus ensuring consistency in decision making.

- Internal validity: looks at whether or not there is a good enough link between that what the researcher observed and the findings which they put forward. It is argued that internal validity is a strong point of qualitative research, particularly ethnographic research, this is as a result of the researcher ensuring that there is a great degree of correlation amongst the concepts and observations through their prolonged participation in the social life setting.

Although the researcher did not carry out observations, the manner in which the interviews were conducted and the phrasing of questions ensured that rich information was obtained. The

discussion put forward in Chapter 4 will highlight the correlation between the research objectives and findings through a thematic analysis.

- External validity: discusses the extent to which the discoveries of the researcher can be generalised across various social environments. However, the authors also go on to state that the problem with external validity is that it has the propensity to use case studies and small samples.

Given the sampling methodology and the small population size, generalisations would be difficult to make as it is a drawback for judgement sampling. The survival strategies unique to Blinkwater Mills cannot be easily translated give the size, structure and operational makeup of the organisation.

3.9.2 Alternative Criteria for Evaluating Qualitative Research

Various writers maintain that quantitative research and qualitative research should be judged differently and evaluated according to a different criterion. By allowing reliability and validity to govern qualitative research the same way in which it governs quantitative research it implies that a single account enough to reveal absolute truths about the social world (Bryman *et al.*, 2011).

It has been noted that there can be multiple interpretations of social certainty (Bryman *et al.*, 2011). Lincoln and Guba (1985) and Guba and Lincoln (1994), state that there are two possible criteria for assessing a qualitative study: trustworthiness and authenticity.

3.9.2.1 Trustworthiness

Guba and Lincoln (1994), state that trustworthiness can be broken down into four vital constituents, each of which has an equivalent criterion in qualitative research, namely:

- Credibility: parallels internal validity

Guba and Lincoln (1994), stressed the need to include more than one account of social reality as a means of adding value to the trustworthiness criterion of credibility. When there are more than one accounts of social reality, it is left to the credibility or feasibility of the researcher's account to validate the accounts of the others (Bryman *et al.*, 2011). According to Guba and Lincoln (1994), the establishment of the credibility of the findings involves the following aspects:

- Make sure that the research is conducted in align with good practices.
- Provide the research to individuals who were the object of the study, so as to ensure that the researcher has correctly understood their social environment.

The latter of the two mentioned techniques is often referred to as respondent validation or member validation (Guba and Lincoln, 1994). The authors also go on to state that another technique of merit is triangulation (Guba and Lincoln, 1994).

To ensure that there is more than once account of social reality, not only was a conducted pilot study but the sample population was also interviewed which included senior manners and depot controller. The purpose of this was to gain a well-rounded perspective of the operations of Blinkwater Mills so as to ascertain what would be a viable survival strategy when faced with extreme weather conditions.

- Transferability: parallels external validity

Qualitative research can best be described as research involving an intense, in-depth study of a small population or group of individuals who all have a particular characteristic in common (Bryman *et al.*, 2011). From this, qualitative research leans heavily on contextual uniqueness and the importance of the social environment being studied (Bryman *et al.*, 2011). Greertz (1973a) as cited in Bryman *et al.*, (2011), puts forward a consolidated description of the above as “thick description” – implying that there is sufficient rich information pertaining to the social environment in question. However, Guba and Lincoln (1994), argues that thick descriptions allows for other users to make inferences and possible transferability of findings to other contexts or social settings as it serves as a database of information from which information can be drawn upon.

Even though the research did involve a small population size, the social environment round which the study took place cannot be described as “thick description”, as the survival strategies or agriculturally based organisations is a concept that is still relatively new and not a lot of strides have been made towards organisations being climate change ready. As such, although farmers throughout South Africa were affected by the drought, not all were affected to the same degree.

- Dependability: parallels reliability

Dependability is the qualitative parallel to reliability in quantitative research, authors Guba and Lincoln (1985), put forward the idea of dependability. The authors are of the opinion that researchers should implement an “audit” phase in their analyse so as to justify and verify merit of the study in respect of trustworthiness. It is essential that throughout the research process complete and proper records be kept in an accessible manner (Bryman *et al.*, 2011). The purpose of ensure that all records are kept and maintained in an orderly fashion, is to allow for peers to perform an “audit” on the findings of the process, thus establishing whether or not good practice as followed or not (Guba and Lincoln, 1985). This also is applicable to the extent to which theoretical inferences can be justified by the research (Guba and Lincoln, 1985). Although there are merits to performing “audits” on qualitative research, it is seldom done as qualitative research produces a large dataset of information and performing an “audit” on this volume of work is often very time consuming and strenuous (Guba and Lincoln, 1985).

It was ensured that only the responses from the pilot study as well as the sample population, were properly and thoroughly transcribed after the interview process. The respondent's responses were electronically transcribed, saved and sorted should there be a need to verify or scrutinise the findings.

- Confirmability: parallels objectivity

According to Bryman *et al.*, (2011), the aim of confirmability is to ensure that the personal values of the researcher is not knowingly or unknowingly influencing the research. The purpose of this is to allow for complete objectivity to be brought to the study.

The research reflects only the findings stated by the respondents, the interviewer only facilitated the posing of question, answering and transcribing of it.

3.9.2.2 Authenticity

Authenticity is viewed as being multilayer thought provoking, however it shows little to no influence and its impact on the broader aspects of research is highly controversial (Bryman *et al.*, 2011).

3.10 Ethical Clearance

The University of KwaZulu-Natal's ethics committee together with the gate keeper of Blinkwater Mills, are required to permit consent by means of a letter, for the purpose of ethical clearance. The aim of this is to ensure the privacy and confidentiality of all individuals within the study as well as to protect all those involved in the study.

3.11 Conclusion

This chapter gainfully addressed the manner in which and the design of the research so as to ensure that the aims and objectives of the study are achieved. The chapter also highlighted the process of research methodology, while highlighting the benefits to conducting a pilot study given the validity it provides to the study. A comprehensive breakdown of the sample population was provided together with the justification for making use of judgement sampling. Thereafter, the chapter went on to outline the various ways in which qualitative research can be evaluated so as to provide justification to the research findings. Lastly, the chapter looked at the manner in which primary data once transcribed was analysed. Chapter four presents the findings of the research which will be explained by way of thematic analysis.

CHAPTER 4: DISPLAY AND ANALYSIS OF RESEARCH RESULTS

4.1 Introduction

Extreme weather is fast becoming less of a phenomenon and more of a regular occurrence. With this being said, the impact of such can no longer be avoided or dealt with on a case by case basis, but rather efficient and prompt methods to contain and minimise the effect thereof is vital to the continuation and success of agriculturally based organisations. As a result, the study looked at survival strategies that are viable possibilities within the South African context. No two organisations will share the same success rates when faced with the same problem, which gives rise to the need to develop and implement sustainable survival strategies.

This chapter will begin by outlining the relevance and application of thematic analysis with respect to qualitative data. The chapter will then go on to graphically represent the data findings through a thematic map, highlighting the codes, categories and themes which are broadly labelled as “Land Readiness” and “Third Party” respectively. Thereafter, each theme will be discussed in detail and its impact on Blinkwater Mills examined. Each theme will be broken down into correlating categories which will further be analysed through expanding on identified predetermined codes.

4.2 Thematic Analysis of Qualitative Data

Through the analysis of qualitative data, the search for reoccurring themes is prevalent (Bryman *et al.*, 2011). Thematic analysis is considered to be the identification and analysis of patterns found in qualitative data (Clarke and Braun, 2013). Thematic analysis is considered to be flexible in its approach as it is not driven by a philosophical orientation (Bryman *et al.*, 2011). Clarke and Braun (2013), go on to describe the theoretical flexibility, as identified by Bryman *et al.*, (2011) as a result of patterns across languages not needing to conform to any specific theory of language, or explanatory meaning framework for individuals, experiences or practices. From this the authors put forward the notion that thematic analysis is applicable to a broad spectrum of theoretical frameworks (Clarke and Braun, 2013).

Braun and Clarke (2006), as cited in Clarke and Braun (2013), state that there are six phases of thematic analysis, the authors emphasise that this model should not be viewed as linear but rather one where the analysis occurs recursively. The steps, according to Braun and Clarke (2006), as cited in Clarke and Braun (2013), are:

Phase 1: Familiarisation with the data

All forms of qualitative analysis, require the researcher to immerse them self in the data, so as to become intimately familiar with it. This will entail, reading, rereading or listening to audio recordings – if relevant – and scribing any initial observations.

Post telephonic interviews, the responses of each respondent was read through and individually transcribed. The purpose of electronically transcribing the data after the interviews took place was to ensure that all of the information that was written down during the interview, especially side notes and notes in short-hand, properly captured the response of the respondent and adequately added to the rich data obtained. Both the questions and answers to each section was electronically transcribed.

Phase 2: Coding

Coding is considered to be a common element in numerous qualitative analysis approaches. Coding involves generating labels for all aspects of data which the researcher deems to be important and is of relevance to the research question. Coding is considered to be an analytic process whereby it encompasses the semantic and conceptual reading of the data. It is more than simply a method of reducing and consolidating data. This phase is complete when the researcher collates all codes and relevant data extracts.

Once the responses had been transcribed, it was then that each section within the interview questions were looked at respectively. Section 1 for all 8 respondents were looked at, the same for Section 2, Section 3 and Section 4. The reason for doing this, was for common words and ideas that were being repeated to be identified. From this, the ideas and words were grouped together and a collective adjective was assigned. Careful consideration was given to the words or ideas that were identified to ensure that it best represented and sought to explain the objective that was assigned to each section.

Phase 3: Searching for Themes

Themes are considered to be clear and meaningful patterns in data, relevant to the research question at hand. Formulating themes is similar to coding your codes so as to highlight similarities in the data. The researcher is responsible for formulating and constructing relevant themes from the gathered data, themes are not present in the data set waiting to be interpreted or found. This phase is completed when the researcher collates all the coded data to the respective theme.

Once again, each of the sections within the interview questions were separated and addressed each of them singly. The purpose of this was to ensure that all of the codes that were identified are properly represented as it include the respondent's answers. From this was the construction of over-arching themes that best described the codes. The themes that were identified were relevant to the research and collectively captured the essence of the codes. The themes are unique to Blinkwater Mills and their response to extreme weather conditions.

Phase 4: Reviewing Themes

The researcher needs to ensure that the themes correlate to the codes that were earlier identified together with the over-all data set. The themes must comprehensively reflect the data set, and narrate the

information found within the data set. The themes must be individually discussed as well as in relation to the other themes which the researcher may have identified. It is at the discretion of the researcher to either combine theme if they overlap, slip them into two or more theme so as to properly provide meaning to the codes identified or reject them altogether.

The themes that were identified were scrutinised to ensure that it not only is applicable but speaks for the data set. All of the themes were viewed in conjunction with the codes and original data to guarantee that there is a link between what is being said and what it is being interpreted into. Throughout the process, there was continuous cross checking between the original data as a validation.

Phase 5: Defining and Naming Themes

The researcher is now required to scribe a detailed analysis of each of the themes identified. The research must ask question such as “what story does this theme tell?” and “how does this theme fit into the overall story about the data?”. The researcher must bring forth the essence of the theme and derive a concise, punchy and informative name for each theme.

Once the responses were transcribed, codes identified and themes established, the researcher looked at how the information was suited to Blinkwater Mills. Blinkwater Mills operations and response to extreme weather was unique given the circumstances faced by affiliated farmers. Farmers had a significant impact on the operations of Blinkwater Mills therefore the circumstances leading up to consumers paying a higher price for Super B products required a detailed look into the contributing factors leading up to Blinkwater Mills receiving maize.

Phase 6: Write Up

The write up is seen as the most vital aspect of the thematic analysis process. The write up involves bringing together the analytical narrative and data extracts in a matter that allow the reader to understand the story as represented by the data together with putting it into context in relation to the literature review.

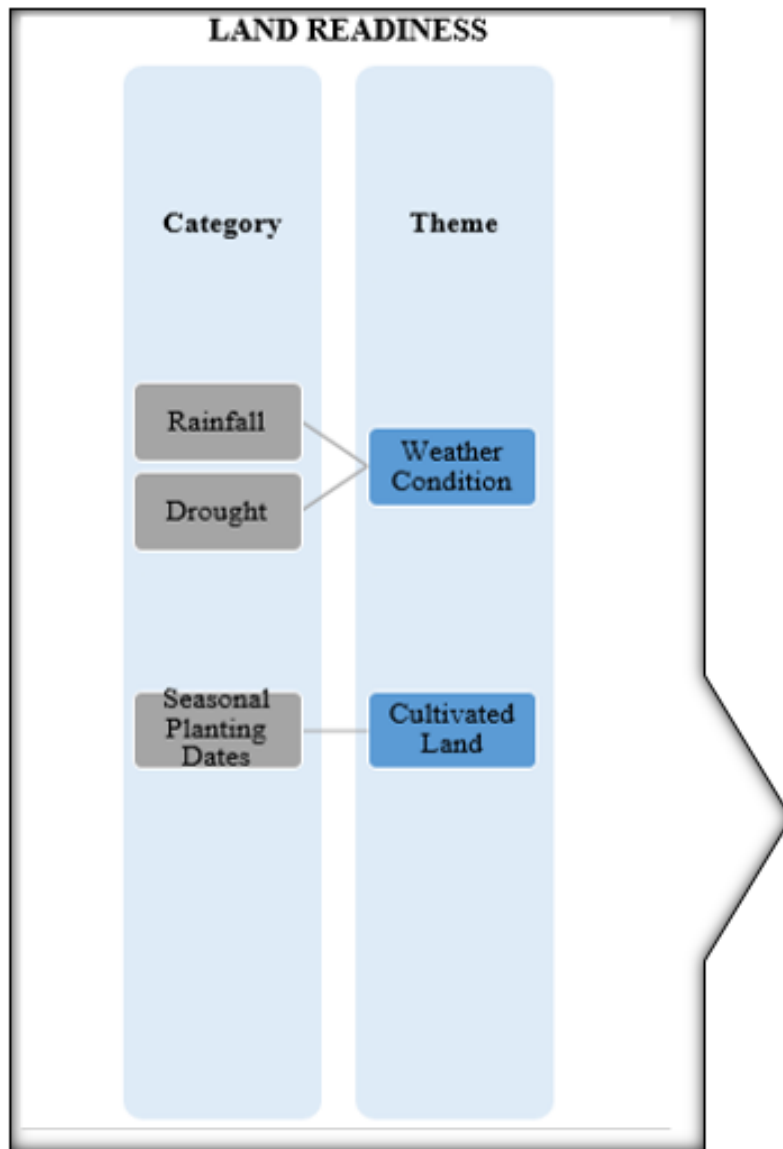
After defining and naming the themes, a thematic map was constructed which outlines all of the identified codes, which in turn speaks to the respondent’s responses. A detailed write-up highlighting all relevant responses will follow in this chapter.

4.3 Overview of Methodology

In order to ensure the validity of the research instrument, a pilot study was used to ensure that the findings of the study are aligned to the research objective. From the sample population of 10, 2 respondents were identified to part take in the pilot study. The 2 individual who made up the pilot study was the General Manager and a Depot Controller. Each respondent in the pilot study was a representative from management level and depot controllers. The remaining 8 respondents formed part of the study which was conducted thereafter. All of the respondents were chosen on the basis of their ability to relay operational specific information regarding the impact drought had on affiliated suppliers and Blinkwater Mills.

Table 4.1: Summary of Key Respondents That Were Interviewed

Group	Number of interviewees	Designation
Senior Management	1 respondent from Blinkwater Mills Head-office	Finance Manager
	1 respondent from Blinkwater Mills Head-office	Managing Director
	1 respondent from Blinkwater Mills Head-office	General Manager
	1 respondent from Blinkwater Mills Head-office	Operations Manager
Depot Controllers	2 respondents from Mpumalanga depot	Depot Manager
		Deport Controller
	2 respondents from Limpopo depot	Depot Manager
		Deport Controller
	2 respondents from Highveld depot	Depot Manager
		Deport Controller
Total number of interviewees 10		
Response rate 100%		



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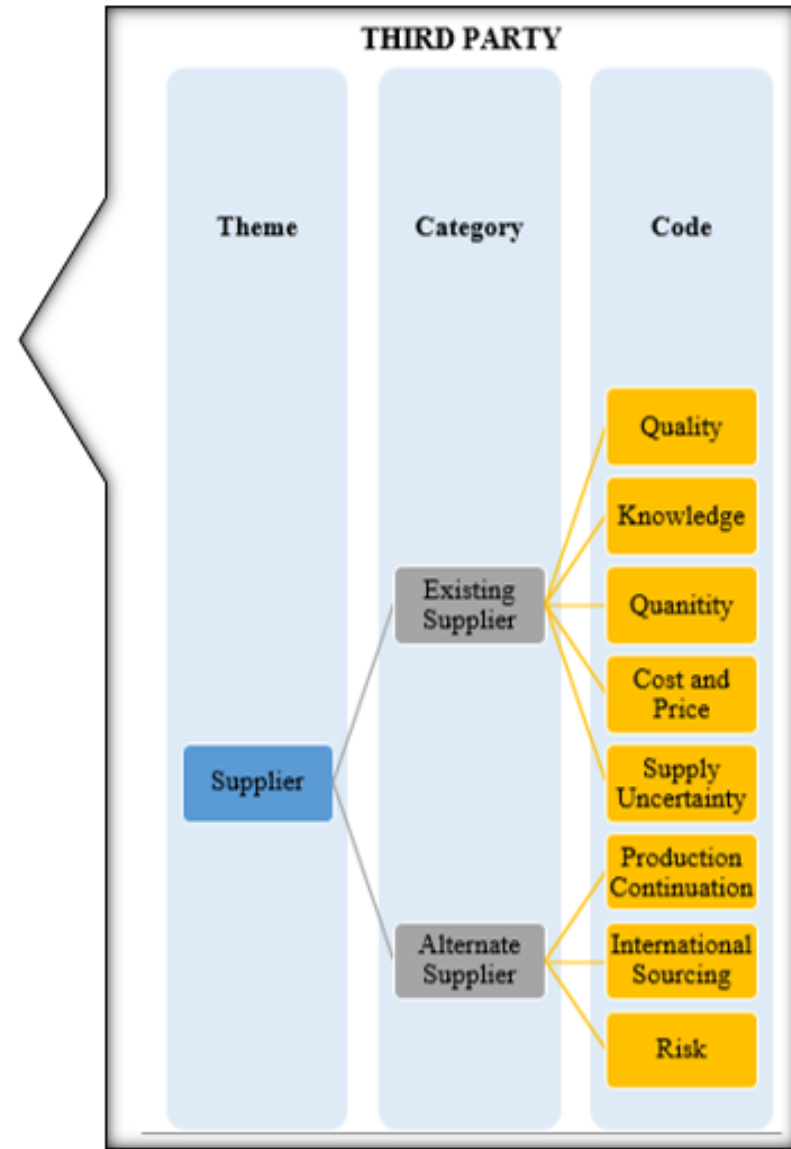


Figure 4.1: Thematic Map

4.3 Land Readiness

All farmers need to ensure that specific land area that has been demarcated for yield cultivation is up to standard and in keeping with the requirements of the crop being produced for that specific area (du Plessis, 2003). Ensuring that the land is ready, is a process which requires time and dedication, being successful in one season does not automatically imply that farmers are going to always be successful for the seasons to come (Sihlobo, 2015). Land readiness is a culmination of years of knowledge in understanding the needs of the land, having the correct irrigation methods, knowing when to plant certain crops given the propensity for success and the need of the surround community (Bandile and Eybers, 2015).

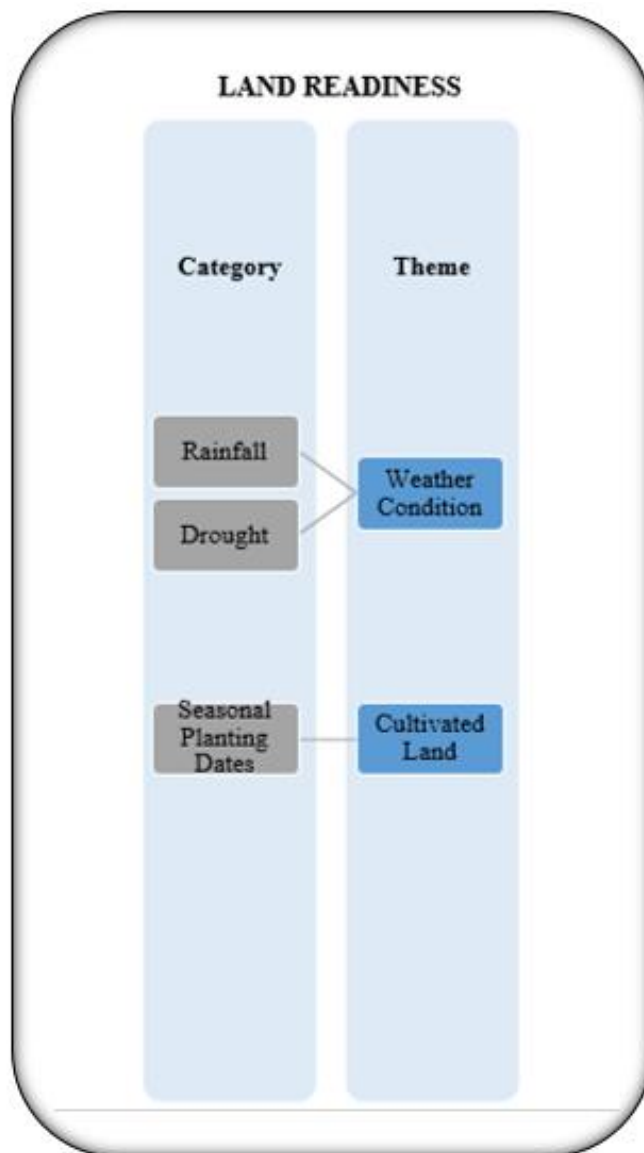


Figure 4.2: Map Showing Land Readiness

Source: Own Source (2017)

4.3.1 Theme 1: Weather Conditions

Weather conditions are considered to be atmospheric conditions that make up the state of the atmosphere in terms of temperature, wind, clouds and precipitation (Vocabulary.com, 2014). From this definition, some of the types of weather conditions that can be experienced are: hot, cold, dry, wet, windy, snow, sleet and drought. Being situated in the southernmost tip of the African continent, South Africa is seldom faced with snow and sleet, however, it is not exempt from experiencing rainfall and drought. South Africa's climate typically varies, the south-western corner of the country experiences Mediterranean conditions, the interior plateau experiences temperate conditions and the northeast, where Blinkwater Mills is situated, experiences subtropical conditions (SA-Venues.com, 2017). This corresponds with the weather patterns experienced in Mpumalanga in that their weather conditions are typically characterised by warm to hot summers and cool to mild winters with a slim probability of having frost to contend with. Due to these conditions constantly prevailing with a degree of certainty, it allows farmers and agricultural industries to plan properly and forecast for the seasons to come.

The ENSO cycle is a phenomenon which has the propensity to drastically impact on the climate a country is already experiencing. From this, the ENSO cycle can either contribute to exacerbate drought conditions or increase the rainfall experienced. Both having the ability to suspend and influence the manner in which agriculturally based organisations conduct their operations for any given season (National Weather Service: 2016).

EarthEclipse (2017), describes a drought as being extended periods where there is a shortage of precipitation, this period quantified as typically being for a season or more resulting in there being a lack of water for human activities or environmental sustainability. This is proven when there is a lack of rainfall throughout South Africa, crops suffer as a result, the soil becomes dry and infertile resulting in the growth of lower yields or inferior quality crops.

Although South Africa is not adversely affected by the presence of snow or sleet, colder months do have an impact on crop development. The ideal temperature for the successful growth of maize is between 19 degrees Celsius and 23 degrees Celsius, however farmers situated in high lying areas take frost into consideration as it has the ability to damage maize at all growth stages (du Plessis, 2003).

4.3.1.1 Category 1: Rainfall

In the agricultural industry, farmers are heavily dependent upon rainfall during the early stages of planting as a means of preparing the soil. Without this critical step, farmers would be unable to successful produce yields that are of viable quality. Farmers that harvest a yield of 3 152kg per hectare will require between 350mm and 450mm of rain per annum (du Plessis, 2003). Ensuring that there is sufficient rainfall is not something that can be controlled by farmers, however, learning rainfall patterns

to plant crops that require significant amounts of water is a practice which countless farmers practice as a means of survival.

Farmers require water to soften the soil before seeds are planted and crops eventually being their germination process. Usually this water comes in the form of rainfall, as irrigating the land season after season is extremely costly and given the water shortage crisis and boreholes drying up, farmers are heavily dependent on rainfall to aid in this process (Beever *et al.*, 2013).

The province of Mpumalanga, situated in Northern South Africa, experienced very little of the effects of the ENSO cycle. Given that the drought ravaged most of the farmers in the KwaZulu-Natal and Free State province. Blinkwater Mills is strategically situated within the province and experienced rainfall despite the severe drought conditions experienced country wide. However, given that the ENSO cycle compounded dry conditions, it has been noted that not all of the farmers strategically aligned with Blinkwater Mills benefited from the rainfall, given the sporadic and period nature of it. One of Blinkwater Mills depot controllers from the Limpopo Depot stated that:

“The farmers that are associated with Blinkwater Mills experienced two extremes. Some farmers experienced very little rain while others experienced an optimal amount. As a result, those farmers who experienced less than sufficient rainfall during the initial stages produced a smaller yield, while those farmers who experienced sufficient rain had a higher yield.”

Therefore, from this, it is understood that farmers in Mpumalanga, although they did not bear the brunt of the drought as much as others, were affected to some extent. Farming is an extremely unique sector, one which requires extensive knowledge and skill to ensure success in every season. However, farmers facing external influences such as rainfall, can plan and prepare to the best of their ability however, rainfall certainty is a factor even they cannot control. Which ultimately has a direct impact on the quantity and quality of yield produced.

It is more than just the quantity and quality of crops that were affected, there are long reaching effects that go beyond what Blinkwater Mills experiences. The General Manager who forms part of senior management goes on to explain that:

“Some of the farmers who are located near to Blinkwater Mills experienced enough rain during the season, while others did not. From this, those farmers who benefited from the rain enjoyed had a positive return due to the higher prices they were now able to command. For those farmers who were not as fortunate, subsequently were not able to benefit from an opportune situation where good money could be made.”

Farmers that experienced the required rainfall used it to soften the soil and promote germination and growth harvested the desired level of yield. Which ensured that they were able to ensure that they met all contractual obligations as well as demand a higher price for their crops. This was due to the short

supply of crops which were needed to meet consumption requirements, this enabling farmers to demand a higher price for their crops.

Not all of the farmers that were within Blinkwater Mills operational area, who were contracted to supply them with a predetermined quantity of yield, were able to produce in the allotted time due to the presence of extreme weather conditions. Those farmers which were negatively impacted by the lack of rainfall lost out in two ways. The first being that due to them not being able to produce enough to sell they were not able to make a profit from the crops normally harvested. The other one being, given the low supply and high market demand by the consumers in South Africa, those farmers that were able to produce enough and early enough to sell their crops, which was of a desired quality, were able to demand higher prices.

4.3.1.2 Category 2: Drought

As a direct result of a lack of rain, the farming land needed to operate and produce the required yields was drastically affected. The lack of rainfall meant that all those operating along Blinkwater Mills supply chain was affected. Every functioning entity involved in production or product transformation is considered to be a part of a larger supply chain. The farmers associated with Blinkwater Mills are not reliant on dams and boreholes, which gives rise to most of the farmers planting crops on dry land. However, despite having first-hand knowledge on how best to cope with and overcome a drought some affiliated farmers did not have the means to overcome the severity of it over the past seasons. Managing Director, who forms part of senior management, stated that:

“Some of the farmers that are affiliated with Blinkwater Mills experienced more rain than others, which had a direct impact on their yield harvest. While other farmers were not as fortunate and succumbed to the drought – lack of rainfall – which directly influenced the quantity of yield produced. From this it has been noted that the presence of drought conditions does have an effect on the farmers associated with Blinkwater Mills.”

It was evident that the drought had varying effects on farmers, some were able to continue positively with minimal disruptions while others were impacted rather drastically. Given the wide spread attention brought to the damaging effects of the drought, one can often forget that it is not only human consumption that is affected. Equally as important and affected is the livestock of many farmers. Human beings can afford to substitute staple foods given the scarce availability of demanded goods. However, livestock are not as fortunate in this regard, having to make do with the little animal feed that there is or in some cases having to go without. The Operations Manager, explains that:

“It can be noted that it is not only yield production that is affected as a result of the drought. Farmers that have livestock on their land also experience difficulties given that the drought hinders and decreases the grazing hectare. And given that the yield production is affected, it subsequently affects

and limits the availability of animal feed. Therefore, when droughts occur, farmers use their livestock as a buffer by means of selling their livestock as a means on minimising the shortfall.”

This shows that farmers were further affected by the drought, then merely the cultivation of crops, livestock too was not exempt from the long reaching effects of the drought. As a result, farmers were forced to sell their livestock as a means of securing additional funds to see their farming operations through the worst of the drought. Apart from providing additional funds to continue farming operations, the sale of livestock provided farmers with additional funds which serves to compensate for the loss of profit that was realised at the end of the harvesting season given the shortage of yield production.

4.3.2 Theme 2: Cultivated Land

According to Marriam-Webster (2017), cultivation is considered to be the preparation or the preparation and usage for the growth of crops. Tilling is considered to be the basis in any crop production system and is the single largest cost contributor in the production of maize (du Plessis: 2003).

From this it can be seen that the beginning of any new season is dependent on the quality of the land and soil being used. Farmers all over South Africa pay careful attention to this aspect in their production of crops as it is a determinant to the success or failure of their overall yield. Therefore, it is vital for farmers to invest and take the time to make sure that the soil being used is fertile enough to ensure that they are successful not only in the current season but in the season to come.

Farmers must know the type of soil that they are working with, as this will allow for the identification of improvement methods and to make amendments to it should it be required so as to ensure the growth of the best crops. The texture and fertility of the soil is to be tested so as to ascertain the current level of quality and if improvements need to be made to bring up the soil to the required standards.

However, having good soil is not enough, there are other external factors which impact on the cultivation of land, namely rainfall patterns and drought. The impact of either, can prove to be devastating by affecting the readiness of the land in time for the new season to begin if experienced in abnormal periods of time. Farmers experiencing excessive rainfall or prolonged drought conditions are not only impacted in the immediate months but in those to come as well.

According to a Limpopo Depot Manager, the farmers affiliated with Blinkwater Mills tend to call themselves “Weather Gods”, in that these farmers have toiled the land for many years and are well versed with what is required of them and when. These farmers like many others, have learned this from generations before, facilitating the ability to know how to read the climate and adjust accordingly when the need arises. There is no absolute science to this, rather generations of experiences and knowledge that has been passed down

4.3.2.1 Seasonal Planting Dates

To ensure that all factors culminate cohesively to produce land that is ready and cultivated rewardingly, a vital aspect which must be taken into consideration are the agricultural seasons. The timing of land cultivation and preparation must coincide with the seasons in which the crops are best yielded. This given, farmers must identify the months of the year that are ideal for the production of crops. Respondents were asked whether or not farmers affiliated with Blinkwater Mills required additional time to recover before resuming normal operations as a result of the drought, a depot controller from the Highveld depot stated that:

“No, farmers did not require additional time to recover from the drought because the planting time for maize is set and it is the same every year. This time frame is known by farmers and followed stringently to ensure optimal harvests.”

The General Manager too shared the same sentiment, much like, the other respondents in that:

“From year to year, the time frame for planting to harvesting remains the same. There were farmers that were identified by Blinkwater Mills who were negatively affected by the drought and could no longer farm consequently affecting them financially,”

Evidently farmers are held to a strict and well established cycle when farming agriculturally. The reason being is that crops are season sensitive and require specific conditions to ensure that production occurs optimally. Having this continued production occurring in set interval ensures that Blinkwater Mills not only receives the best crops yielded but can properly prepare for the season ahead. The planting time is considered to be “bound” and could not be extended, as there is a set period for planting, growing and harvesting to occur. It was essential that farmers stick to this time frame so as to ensure that the knock on effect of not producing in time does not travel to the following recipient in the supply chain.

According to the Managing Director, the 50 commercial farmers and 5 - 10 substance farmers affiliated with Blinkwater Mills’ had to wait for rainfall before planting could occur and as a result, they could not plant early enough to be considered preferential suppliers at the end of the harvesting season. Those who were able to minimise the effects of the drought and overcome irrigation issues were able to capitalise on entering at the top of the planting cycle when most farmers were only just beginning. Those who had to wait for rainfall to aid in the planting of crops entering well into the planting cycle and consequently, when it came time to harvest, were at the tail end of selling yielded crops. However, although they ended in later, these farmers still had the ability to produce a yield, others were not as fortunate in that the lack of rainfall and irrigation left them stranded and without viable crops to sell for the season. This halted their operations altogether (Bandile and Eybers, 2015:1).

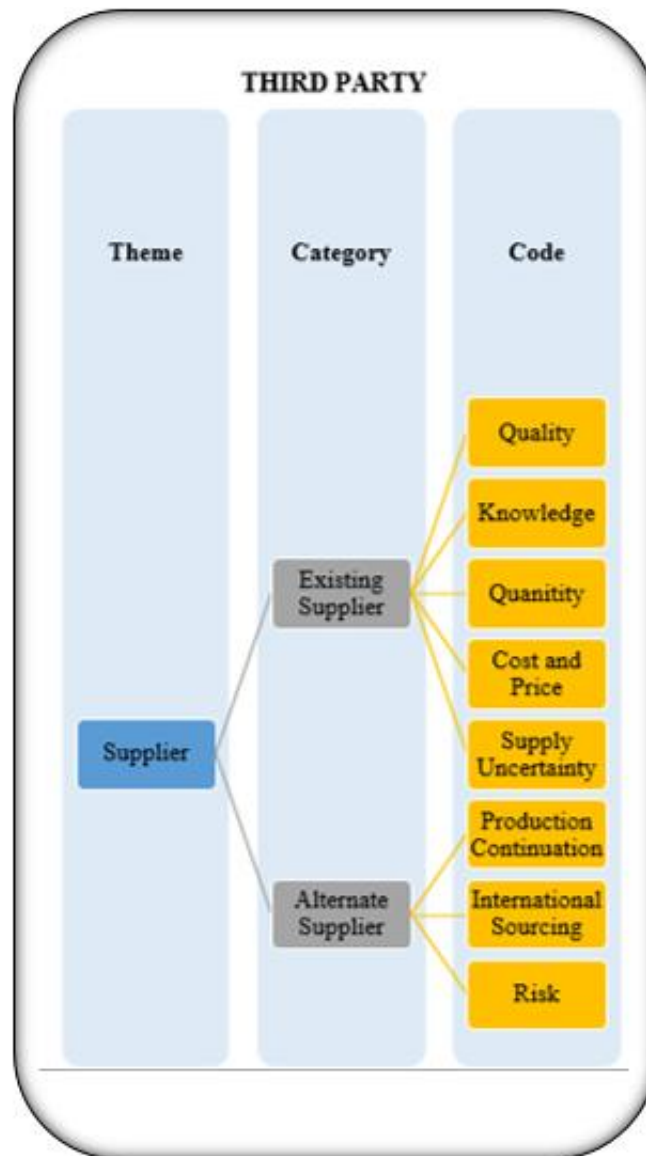


Figure 4.4: Map Showing Third Party

Source: Own Source (2017)

4.4 Third Party

Outsourcing occurs when an organisation actively engages in the transferal of business activity, including relevant assets, to a relevant third party (Hugo, Badenhorst-Weiss and Biljoen, 2015). According to Lysons and Farrington (2012), there are activities which can be easily outsourced, namely those that are: resource intensive – especially those activities with a high labour or capital costs; relatively discrete; require specialist competencies; characterised by fluctuating work patterns in loading and throughput; subject to quickly changing markets and those that are subject to rapidly changing technology requiring expensive equipment.

Blinkwater engages with local suppliers that are strategically located near to the mills, factories and offices. Engaging in third party transactions ensures that core and non-core items are of a quality and standard that ensures a competitive advantage given that the farmers Blinkwater Mills employs are vetted and considered to be the best in their respective field.

As cited in Lysons and Farrington (2006), there are five main drivers to why an organisation will actively seek out a third party as opposed to doing it in house:

- **Quality:** a situation can arise where actual capacity is unable to satisfy consumer demands. The quality motive is split into increased quality demands, shortage of qualified personnel and outsourcing as a transition period.
- **Cost:** outsourcing is considered when it can be used as a potential solution to increased costs and works in tandem with a cost leadership strategy. Through a decrease in costs, an organisation enables itself to be in a strategic position.
- **Finance:** given that organisations have a limited budget from which to work, these funds should be used for the investment in core business activities.
- **Core business:** is seen as that primary activity which generates an organisation revenue. Organisations must strive to focus on core business activities, making it of strategic importance. Other functions which service as supporting have the propensity to be outsourced.
- **Co-operation:** there is the potential for conflict to arise between organisations, and as a means of deflecting it, the activities produced by both organisations are subject to total outsourcing.

It is important to highlight the drivers of outsourcing as it is a fair representation of the codes within this theme. These drivers serve as a reminder as to why Blinkwater Mills chose to engage with certain suppliers and why they to choose to forgo said suppliers when the need arises. One or more of these drivers serves as the basis for Blinkwater Mills engaging in a relationship with local farmers. However, when said farmers can no longer provide the services for which they were specifically chosen, Blinkwater Mills is then left with actively seeking out an alternative option.

4.4.1 Theme 1: Supplier

Blinkwater Mills has always sourced from farmers that are within their area of operation, this allowed for transportation costs to be kept minimal, which help them in ensuring that the price that end consumers pay for their goods are reasonable and well within the abilities of the local community. Given the drought, Blinkwater experienced a situation where not all of their contracted suppliers were able to perform to the expectations. This brought about the need to identify alternative options to compensate for the shortage Blinkwater Mills experienced. The alternatives were to source from farmers that are located further than Blinkwater Mills operational area or to import the necessary raw materials.

From this that it is understood that the survival strategy of Blinkwater Mills was to source farmers from a further area given that the drought impacted farmers that are closely situated to them. Blinkwater Mills strives to source local farmers that are within a close proximity to their mills, plants and offices. However, given the lack of rain in some areas of Mpumalanga, not all farmers were able to produce enough to maintain the agreed upon quantity needed by Blinkwater Mills.

4.4.1.1 Category 1: Existing Supplier

Blinkwater Mills has established and nurtured a relationship with local farmers situated in the Mpumalanga province. Blinkwater Mills owner has built a long lasting relationship with said farmers that spans decades, choosing to source from small farmers in rural areas as it will aid them financially while ensuring Blinkwater receives the necessary raw materials. The majority of Blinkwater Mills farmers are located in Middelburg and Stoffberg and are strategically located close to the factories. Blinkwater Mills pay premium prices to farmers to maintain a good lifelong relationship, in particular to farmers that are based around the surrounding areas of the mill.

As a result of this fostered relationship, the majority of their yield produced by these farmers is sold to Blinkwater Mills first. Having a preferential buyer status among farmers is key to building long term sustainable relationships that have proven to be mutually beneficial at times. Blinkwater encourages the sharing of information between themselves and their farmers, ensuring communication occurs daily.

The drought rendered some of Blinkwater Mills farmers inadequate, which forced Blinkwater to make alternate choices to ensure production continued and were not forced to shut down. Many farmers were faced with inferior quality of goods harvested, inferior quantity of goods harvested, supply uncertainty and cost considerations. However, because farmers possess the knowledge to limit the damaging effects of the drought this ensures Blinkwater Mills is able to go back to using originally identified suppliers.

- *Code 1: Quality*

In relation to a product or service, quality is defined as being that characteristic which impacts on the ability to satisfy consumer needs, this is viewed as value perspective (Bozarth and Handfield: 2013). In addition to the value perspective, there is also the conformance perspective which seeks to understand the extent to which a product was made or service rendered as intended (Bozarth and Handfield: 2008). Extracted from this definition it is evident that there is a relationship between producing good quality and consumer consumption. In today's ever competitive business environment, consumers have access to information faster than they did 20 years ago, making them more well informed leading to better consumption choices. Therefore, without good quality, an organisation would find it difficult to retain a customer base, as the continuous production of inferior quality of goods will driver consumers towards seeking substitute products.

The respondents were asked if the quality of yield received from affiliated farmers were affected by the drought. This is an aspect of operations that affected both the farmer and Blinkwater Mills. The General Manager indicated that:

“Farmers that had enough rain were able to ensure that the yield produced was up to the required standard. However, for the majority of the farmers who did not have enough rain, the quality of the yield produced on their land was not up to the acceptable norm. This was clearly evident to us during the grading process.”

“The quality of our product was directly affected as a result of lower quality maize being used as a result of the drought, in the production of maize meal.”

This response indicated that there is a direct correlation between the amount of rainfall received in an area and the subsequent quality of crops yielded. In areas where there was enough initial rainfall the soil was rich enough to produce crops of a worthy standard. However, for the farmers that did not experience enough initial rainfall despite having irrigation systems, their yield suffered and this was evident in the grading process. As previously stated, every operational entity is considered to form part of a larger operational supply chain. As a result, when a farmer produced inferior quality crops, this was passed on to the next operational entity, this being Blinkwater Mills, and the cycle continues. This can be explained by way of: successful maize production is dependent upon the correct application of production inputs that will allow for the sustenance of the environment together with agricultural production. The Managing Director too shared the sentiment of the General Manager, that:

“For those farmers who experience little or insufficient rainfall during the initial stages of planting, produced a higher amount “wm” that was of a grade 2 quality. Subsequently, this yield was sold at a lower price compared to those farmers who could command a higher price given the superior quality of their yield as a result of them experiencing sufficient rain which ensured viability.”

The response of the managing director also brings forth that there is a relationship between rainfall and the quality of yield produced. In the response, “wm” is made reference to, that being “white maize”. So it can be seen that when rainfall is scarce, these farmers produce a higher percentage of grade 2 white maize whereby the price the farmer would receive would be much lower because of the inferior quality. Where grade 1 white maize is considered to be the best quality grade maize can receive.

- *Code 2: Knowledge*

Possessing knowledge relating to a specific piece of farming land takes years of practice and trial and error to perfect. When respondents were asked if affiliated farmers are equipped with the skills and knowledge regarding harvesting times and farming conditions to handle extreme weather conditions, a depot controller stated that:

“Yes, I do believe that the farmers associated with Blinkwater Mills are experience enough and would therefore be in an advantageous position to handle these adverse conditions when they arise. However, even with this being said, there is a limit to which farmers can prepare in the anticipation of the severity of the drought.”

Farmers affiliated with Blinkwater Mills have proven to be skilful and experienced when handling drought conditions. Affiliated farmers have an understanding of the land and the requirements that go into making a profitable season. No two seasons will require the same level of attention or preparation. Showing that farmers read the conditions and based off of what prior practices indicate, they implement proficient practices. Even though some farmers were forced to halt operations for a season or two, this does not imply that years of experience and knowledge about the land was not used to see them through and help as much as possible. The Financial Manager sought to characterise the affiliated supplier by stating that:

“All of the farmers that are affiliated with Blinkwater Mills have been a part of the continuous growth of the organisation throughout the years of operations. Each of our suppliers have been carefully selected as we strive to inculcate quality therefore, we employ farmers who have years of experience in the farming industry in South Africa.”

According to the Managing Director of Blinkwater Mills, farmers belonging to the farming industry of South Africa are held in a higher regard amongst the farming and milling community. It takes years of experience and knowledge passed down through generations to facilitate the successful running of agriculture that is seen among industry members today. The individuals belonging to this industry are considered to be worthy and reliable in the crops that they produce as well as their overall operations. From this, it can be seen that these farmers are trusted by milling companies, Blinkwater Mills included, as a viable option as a supplier.

In view of this being a tried and tested way to ensure successful crop yields, farmers are becoming increasingly aware of the benefits that can be derived from introducing technology into their operations. The Operations Manager briefly stated that *“our farmers also have state of the art farming equipment”*. This equipment can take the form of mouldboard ploughs, chisel ploughs and rippers as opposed to hand no-till systems. This all the more highlights that evolution in thinking and movement towards striving to produce a more competitive crop in a shorter time frame. Providing a holistic and combative review of the supplier interface is the Managing Director who states that:

“Agriculture is considered to be very distinct industry. As a result, the farmers that Blinkwater makes use of are highly specialised, given that this business requires in-depth knowledge of the land on which they work and crops which they produce. Associated farmers are well equipped in the best methods possible for successful farming activities.”

- *Code 3: Quantity*

Blinkwater Mills' survival is dependent upon designated farmers supplying sufficient yield, not just for the season but extra to ensure that if there is a disruption to transportation schedules there will be enough compensation to allow for operations to continue. By having the right amount of yield on hand ensures that operations continue on optimally, however should there be a disruption and there is not enough reserve stock, Blinkwater Mills faces the possibility of halting production up until sufficient yield can be procured to ensure the continuation of production. The consequence of which would be the loss in potential sale to competitors and the loss in revenue of repeat consumers.

It is evident that without the right yield procured, Blinkwater would not be in operation. Having the appropriate amount yield is the life blood of this organisation, as such respondents were asked if the quantity of yield received from farmers was affected by the drought, to which the Financial Manager responded:

“At Blinkwater Mills we have noticed that there seems to be a trend emerging in the wake of extreme weather conditions. When our farmers experience adverse weather conditions the harvests that we receive are below. However, when there is sufficient rainfall during a season, the quantity of the yield we receive from our farmers is on par with the norm we receive.”

This response highlighted that there is a correlation between drought conditions and the quantity of yield produced from a hectare of land. Implying that when drought occur, those farmers affiliated with Blinkwater Mills were affected to varying degrees. It also seeks to provide a comparison between normal seasons – when there is no drought – and during seasons where drought conditions occurs. Showing that farmers are not negatively affected during a normal season, but production was strained when drought occurs. Farmers are unable to provide the necessary quantities as contracted as yields did not grow as predicted. When posed the same question, the Operations Managers said that:

“Yes, the expected yield which we received from our respective farmers was less than usual. However, we were not the only ones that were affected as this was also the case for much of South Africa. Some of the other maize mills had the option of imported maize as an alternative to the decrease in yield received while smaller mills were forced to closed down for the rest of the season.”

This indicated that there were various responses to the drought conditions experienced country wide. No farmer or affiliated organisation was exempt from the far reaching effects of the drought worsened by the ENSO cycle but rather, each organisation found the best way to overcome the disturbance and move forward. Those organisations with the financial ability to source internationally were able to make use of international crops to compensate for what could not be produced by local farmers. However, those who were less fortunate, had to stop operations altogether, as it no longer became a viable option

to continue production with the little yields received or they were unable to pay the higher prices demanded by farmers.

From the responses provided and the views put forward, Blinkwater falls in the middle of the two options put forward by the operations manager, in that there was no need for Blinkwater Mills to close down, nor was there a need to source internationally. Blinkwater Mills had enough capital to ensure that they were able to secure additional maize at a higher price requested by farmers. Respondents were asked if Blinkwater Mills has relief funds available in the event of a supply chain disruption, to which the General Manger, responded:

“We do not keep a separate account for relief efforts in the event of a crisis. However, given that our operations have been successful over the years, we experience a positive cash flow. Therefore, in the event of a crisis, we are able to make use of these funds to carry us through until a time where normalcy is restored. We also have a good standing with our respective banks, so should we require additional funds, we are able to make use of this option”

The Managing Director goes on to elaborate that:

“No we do not have relief funds available because during the harvesting season we ensure that we have enough stock on hand. This is because we locate enough stock to meet the yearly demand at the beginning of every season. We base our yearly demand on the years gone, but we also take into account year on year growth. As a result, do not over stock or understock.”

Reaffirming the notion that they were liquid enough to survive disruptions without needing to make drastic changes. Unlike those organisations that had no option but to close down and re-evaluate their options, Blinkwater Mills had the option of seeking additional finance from their respective banks. Therefore, there was no need to establish relationships with foreign suppliers as a means of procuring additional maize to supplement operational activities.

- *Code 4: Cost and Price*

In order to remain competitive and successfully retain repeat consumers, Blinkwater Mills ensures that their prices are in keeping with their target markets’ spending power. However, given the drought, farmers had the propensity to charge more for maize seeing as there was a shortage in supply while demand for the good remained constant. Seeing that maize is the foundation of Blinkwater Mills’ operations and it is required irrespective of the cost so as to ensure continuation, Blinkwater Mills had to pay for the higher cost of maize charged by farmers. Respondents were asked if the downstream (end consumer) was greatly affected by the drought, to which the General Manager said:

“Overall the drought in South Africa resulted in higher maize prices being charged by farmers who could produce a good yield which in turn also affected us directly. Consequently, we were also needed

to sell our end product of maize meal at a much higher price to our consumers. This in turn had an effect on our sales volumes which decreased.”

“Our maize meal prices were much higher due to higher maize prices being charged by farmers. Some of Blinkwater Mills consumers could not afford maize meal at the new higher price and were therefore forced to start buying bread and rice as an alternative to our product. An alternative which is sought due to it being the cheaper option”

A Depot Controller from the Mpumalanga depot stated that:

“Yes, we at Blinkwater Mills were forced to increase our maize meal price as a result of higher maize prices that were charged by our affiliated suppliers. The presence of the drought caused the price of maize to be higher which made it difficult for Blinkwater Mills consumers that are based in rural areas to afford the maize meal at the higher price”

From this response, as a result of farmers charging more and Blinkwater Mills procuring maize at a higher cost, the cost ultimately filtered down to the consumer as Blinkwater Mills was unable to absorb the increase in price. It can be seen that there is a direct link between Blinkwater Mills paying more for maize and consumers having to pay more for maize meal. From this too, there has been a ripple effect on the volume of goods sold. When the price is too high for Blinkwater Mills repeat consumers, they tend to seek alternatives which leads to Blinkwater Mills not being able to sell as much Super B maize meal.

Despite having to make concessions in light of the drought, Blinkwater actively strives towards lowering costs. Therefore, irrespective of the weather occurring in a particular season, the supply chain operating costs are continuously looked at and revised to be optimal. Respondents were asked, for the purpose of transportation costs, are farmers situated close to each other, to which the General Manager stated that:

“At Blinkwater Mills all of our farmers are strategically chosen, and we look for farmers that are located as close as possible to us. The purpose of having our suppliers close to our mills is to minimise the inbound costs incurred. Thus ensuring that the end costs transferred down to the consumers are not more than they can afford.”

From this response, it is evident that one of the supplier selection criteria which holds significant importance to Blinkwater Mills is that of the farmers' location in relation to the operational mills of Blinkwater. By having low inward costs implies Blinkwater spends less on transportation costs which translated to saving on unnecessary expenses. This can then be carried down to the consumer during a season in which there are no adverse influences on operations. Adverse operations being drought conditions which forced Blinkwater to seek farmers that were located further. When asked the same question, the General Manager stated that:

“Yes, we are lucky that in area in which our mills are located we have our affiliated farmers close by. I am of the believe that because we have our affiliated farmers located nearby it translates to them providing us with a competitive advantage. Which helps us in ensuring growth and longevity in our operations”

It is apparent that consumers do reap the benefit with regard to Blinkwater Mills effort to minimise costs, along their supply chain. Apart from the cost implication of not having to spend more on fuel to go out to far reaching areas to retrieve crops, Blinkwater also had the advantage of having farmers closer to operations, leading to Blinkwater having quicker access to the raw material. By having the maize delivered quicker, Blinkwater has the added advantage of starting the milling process before competitors and as a result, have Super B maize meal out in the market before competitors. Some of Blinkwater Mills farmers are situated in Stoffburg while others are situated in the surrounding Middleburg area. At the most, the distance between any one farmer and Blinkwater Mills is roughly 100 kilometres. The cycle time for maize meal would still remain the same, however, the overall time to get the raw material from the farmer, milled and transported to the consumer is greatly reduced.

- *Code 5: Supply Uncertainty*

According to the Managing Director, the 50 commercial farmers and 5 - 10 substance farmers affiliated with Blinkwater Mills were affected to varying degrees as a result of the drought. Some farmers were able to continue to supply Blinkwater with the agreed upon tonnage, while others were less fortunate and required assistance. Those who were unable to supply the contracted amount of maize caused a knock on effect, which in turn affected the operations of Blinkwater Mills. It has been widely documented that farmers which were severely impacted found it difficult to bounce back within the season. This then had a ripple effect on the seasons to come. Respondents were asked if farmers affiliated with Blinkwater Mills required additional assistance given the drought conditions, to which the General Manager stated that:

“Some of the farmers associated with Blinkwater Mills lost their positive cash flows as a direct result of the drought. This is due to them not being able to produce sufficient crops at the require grade. Consequently, these farmers needed financing and early or prior payments from Blinkwater Mills as a means of sustaining their operations to a certain degree.”

From this response, farmers that were adversely affected by the drought suffered financial damages, ultimately eating into profits. This would prove to be a concern for Blinkwater Mills as farmers that were unable to survive and maintain a positive cash flow implied that they would find it difficult to operate in the foreseeable future. Seeing that maize is the life blood of Blinkwater Mills, without which operations would cease, Blinkwater Mills could not afford to have farmers who form part of their

strategic supplier network be unable to supply maize in the current season and those to come, this is according to the Operations Manager.

As previously stated, farmers affected by the drought could not supply sufficient yield which meant that they could not sell enough to milling companies, much like Blinkwater Mills, which in turn explained why farmers experienced cash flow problems. Farmers that were unable to secure additional funds which would have helped in extending production times resorted to banks as a method of securing loans and sought to negotiate an extension in payments dates. Another option is outlined by the Operations Manager:

“Yes, some of the farmers which are closely linked to Blinkwater Mills did require some assistance. This assistance came in the form of monetary means. Some farmers were forced to sell their livestock as a means of ensuring continuity of their yield production. However, if all of their livestock was sold, these farmers now resorted to asking for a higher overdraft at their banks just to help them manage through the year.”

From this response, even the livestock of farmers were used as a means of supplementing their income to allow for the continuation of land production. Additionally, farmers also gained assistance from government, however, not all farmers were able to benefit from relief funds that were made available. As farmers were affected to varying degrees and those significantly affected could not recuperate their losses with the relief funds that were made available. Blinkwater Mills bought out certain farmers from their contracts as they were unable to produce accordingly as a result of their land being irrecoverable as a result of the drought. This meant that Blinkwater Mills signed a contract with its farmers to pay a certain compensation price for a specific quantity of maize. However, given the inability of farmers to produce the contractual maize quantities, farmers could not get compensated fully, thus farmers were given a portion of their outstanding compensation to walk away from the signed contract. It is important from a farmers' point of view that by seeking alternative ways of funding their operations, they do not overextend themselves as it would be even harder to come back from having unviable land to work from and no crops to sell to compensate and increase cash flow. This would put farmers that are already on the back foot in an even tougher situation, adding to their inability to produce required crops in the seasons to come.

Therefore, it is important for Blinkwater Mills to understand the extent of the plight of farmers so as to determine their ability to continue in the seasons to come. If affiliated farmers are continuously unable to produce the contracted maize amount as a direct result of the impact that the drought had on their land, Blinkwater will be forced to seek permanent alternate suppliers to allow for the minimisation of disruptions. All organisations look to employ constituents which seek to add value with the minimal complications. Consequently, it is vital for affiliated suppliers to bounce back as quickly as possible as a way of showing good faith potential millers that they have the propensity to still produce viable crops

despite adverse conditions. By showing that there is no uncertainty in their supply will ensure that milling companies are repeat buyers.

4.4.1.2 Category 2: Alternate Supplier

In light of the drought and lack of rainfall which affected countless farmers throughout the country Donnelly (2015), and Blinkwater Mills being situated in Mpumalanga was not without consequence. According to Super B (2016), Blinkwater Mills services a large community in the greater Mpumalanga area and as a result, it is imperative that production continues in an efficient and effective manner. Therefore, Blinkwater faced the reality of the situation the drought brought about and actively sought alternate options to ensure continuity. The drought affected farmers' production resulting in Blinkwater having to make use of other farmers for their maize when existing suppliers could not produce in accordance to their contracts. Blinkwater Mills had to buy maize specifically from farmers that are situated in an area outside of their operational zone. Respondents consider that to be a non-traditional buying area.

The cost of engaging an alternative supplier is one that must be carefully considered before a transaction is brokered (Hugo, Badenhorst-Weiss and Biljoen, 2015). One of the major cost implications which Blinkwater Mills had to be mindful of was that of transportation. This added to an already high price Blinkwater Mills had to pay for maize. In addition to identifying local farmers to compensate for existing suppliers not being able to produce the required yield, Blinkwater Mills can also look to source internationally if the drought impacts farmers to the point where their respective domestic farmers cannot produce enough maize at a required quality. Assessing alternate suppliers is done so to facilitate the continuation of production for both domestic and international suppliers together with their risk susceptibility (Donnelly, 2015).

- *Code 1: Production Continuation*

In the case of Blinkwater Mills, the continuation of production was vital as operational survival was paramount to the overall success of the mill for the affected season. As indicated, the majority of Blinkwater Mills farmers were not aware of the extent the drought had on operations until it was too late. As a result, Blinkwater Mills was forced to identify alternate areas as a means of identifying suppliers. However, throughout the drought, it has been noted that Blinkwater Mills was not forced to shut down operations for the season, nor were operations suspended up until enough stock or funds were allocated. The reasons as to why production could continue despite there being a disruption will be outlined in the analysis of this code.

In order to gain perspective as to why production could continue without delays, it begins by understanding the extent to which Blinkwater Mills' supply chain was affected. This includes the upstream where raw materials, in this instance maize, is procured from predetermined suppliers and the

downstream, where the final product, in this instance maize meal, is sold to the end consumer. The Managing Director stated that:

“At least 80 percent of the total costs Blinkwater Mills incurs is made up of fixed costs, as a result it is paramount that production continues. This in turn ensured that the mills are poised for producing maximum output at all times. Therefore, we ensure that we have a constant supply of raw materials which allows for the continuation of the mills.”

To ensure that there was a continuation of production, it was essential to have proper plans in place that facilitated the successful transition in the event of a supply chain disruption. This was done by analysing past trends and using it to predict the future demand and supply requirements. In order to ascertain whether or not this is implemented at Blinkwater Mills, respondents were asked if forecasting and planning were affected due to the drought, to which a Depot Controller from the Limpopo depot stated that:

“Yes, most of our affiliated farmers were not able to deliver according to their planning. Which means that they did not delivered within the required time frame and they were also not able to deliver the required quality of maize needed at Blinkwater Mills.”

However, the Managing Director stated that:

“Yes, all of Blinkwater Mills budgets were adjusted accordingly and when necessary. This was done as a result of the higher landed cost of maize. The maize mill is driven by volume which is why a constant level of maize is always required, as a result Blinkwater mills strives to achieve maximum output.”

Looking at the above responses to the question posed, the Depot Controller identified that it was the farmers’ planning and future predictions that were affected as a result of the drought. Farmers require a certain quantity of yield in order to break-even, while some farmers were able to yield sufficient crops to cover costs, others were not able to produce enough from the land to cover expenses. As a result, Blinkwater Mills purchasing was compromised, because it is not possible to ask a farmer to abide by contractual tonnage if seasonal issues prevent sufficient production.

However, the same question when posed to the Managing Director, the response made reference to the operations of Blinkwater Mills. The Managing Directors’ response shows that the supply chain was affected in that the funds originally allocated for maize had to be revised taking into consideration the new increased cost of maize. Blinkwater Mills operations is dependent upon receiving a certain tonnage from suppliers as a means of ensuring continuation which is why original budgets were adjusted and more was paid for the procurement of additional maize. The Operations Manager goes on to state that:

“Yes, it was. Some of the smaller mills were forced to stop their production as a result of their famers not producing enough yield to meet demand and operational requirements. Which lead to the majority

of their clients being forced to buy our maize meal. Production increased together with all raw material.”

From this response, it is more than the budget to which amendments were made, Blinkwater Water had to also compensate for other mills that were not able to produce enough to meet consumer demand in the allotted time period. Therefore, actual output would have superseded the original forecasted output as it would have only been once milling process began would competitors have realised that they would not be able to produce enough for the season, resulting in Blinkwater Mills capturing a portion of the market they would not have been able to do before.

Once the forecasting and planning was complete to the best of Blinkwater Mills ability given the uncertainty surrounding the true impact of the drought, the procurement and purchasing of maize commenced. The upstream is mostly concerned with the identification of suppliers, the quantity of maize received, the quality of maize received, the costs involved and the transportation thereof. Respondents were asked if the upstream supply chain was affected by the inconsistency in yield, to which a Depot Controller from the Highveld depot stated that:

“Yes, as a result of inferior maize quality being produced brought on by the drought, Blinkwater Mills were required to source from farmers further out of our area. Blinkwater Mills was forced to look into other suppliers as the quality produced was not of an acceptable standard for production.”

This response adds merit to the response put forward by the Managing Director in that as a result of making use of farmers from further areas, the transportation costs increased resulting in Blinkwater having to pay more for the procurement of maize from another supplier therefore requiring an adjustment in budget. Apart from transportation costs, the quality of Super B was affected as a result of lower quality maize being used. As previously stated, there is a correlation between the impact of drought conditions and the quality of maize produced. From this response, it can be noted that Blinkwater accepted maize from those farmers who had the ability to produce, however, it does not implicitly imply that because they were able to supply Blinkwater Mills with maize, that the quality of maize was of the standard norm.

However, as a result of using farmers situated further away, it allowed for production to continue and not be stagnant. As previously discussed, Blinkwater Mills only sought to employ farmers who are strategically placed in relation to the mill. On the other hand, given the need for alternatives, Blinkwater Mills had the means to seek viable alternative options. To highlight and reiterate this point, the Managing Director stated that:

“No, this is due to the yields of affiliated farmers having no effect in our supply chain. The farmers themselves may have experienced a shortage, however this is a problem that was not transferred to

Blinkwater Mills. To compensate for existing suppliers, we buy from a wider range of farmers so as to ensure sufficient stock is maintained for Blinkwater Mills operations.”

During much of 2015 and 2016, the Mpumalanga province experienced a water shortage, this coupled with the drought had devastating effects for farmers who relied on municipal water to compensate for the lack of rainfall. Respondents were asked if the water shortage in Mpumalanga hindered Blinkwater Mills production, to which the General Manager stated that:

“No, we bought all the yield we needed for our operations even though it was from farmers that are situated further from our factory. As a result, it allowed us to be able to produce the required quantity of maize meal we needed in order to meet our consumer demands for our various products.”

This response showed that Blinkwater Mills moved to other farmers that were not as badly affected as a means of procuring additional maize crops to ensure that even though the water shortage compounded the drought problem faced by farmers affiliated to Blinkwater Mills, they were not directly impacted by the issue facing farmers. However, when the question was posed to the Operations Manager, the response was:

“In some cases yes, farmers that made use of pivots for the irrigation of their farming land faced difficulties when the water table was getting low during the drought. In some cases, farmers were dependent on boreholes to sustain their operations, however this reprieve was short lived as this too eventually dried up hindering their operations.”

The view point of the operations managers was from that of the farmer. The response looked at the options faced by farmers given the impact of the drought compounded by the water shortage. Showing a survival strategy implemented by farmers as a means of trying to continue with production. As previously outlined, countless farmers faced the reality of financial uncertainty forcing them to implement measure that in a normal season would not have been implemented. By farmers fighting to continue their production, Blinkwater Mills could still patronise those of them to a certain extent.

The downstream supply chain is equally as important as the upstream, Bass (2017) describes the downstream as being responsible for the actual sale of the good to other businesses, governments and private persons (end consumer). When respondents were asked if Blinkwater Mills supply chain was directly affected by the presence of extreme weather, all 10 respondents stated that:

“Yes, overall the drought in South Africa resulted in higher maize prices which affected us directly. Also we needed to sell our end product of maize meal at a much higher price. As a result, our sale volumes decreased.”

From this response it can be deduced that consumers were unable to afford Super B maize-meal as a result of the maize price increases. Consumers when faced with the product of their choice and a

substitute of equal or slightly less value, will choose the substitute if they are no longer able to purchase the good of choice. Meaning consumers will forgo their preferred choice for a substitute. Therefore, despite ensuring that production continued and consumers received the desired quantity of Super B, not all consumers were able to compensate for the price increase. As economically stated, the law of supply and demand, price increases when the quantity demanded decrease – allowing only those that can afford a particular basket of goods the opportunity to do so (Ehrbar, 2017). The general consensus from respondents regarding the impact of the drought on the supply chain was that as a result of higher maize prices, Blinkwater had to sell maize meal at a higher price. This response coincides with the responses received, when respondents were asked if the downstream (end consumer) was greatly impacted as a result of the drought.

Finding that when price increased, demand for Super B was affected and consumers ended up paying a higher price for maize meal can be used interchangeably when analysing the impact on the supply chain and the impact on the downstream (end consumer).

Like the water shortage, it is important to understand if there are any additional factors which had the ability to hinder Blinkwater Mills production. This way Blinkwater Mills could derive contingency plans as a way to overcoming it. Additionally, it is equally important to have identified factors which had the propensity to cushion the effects of the drought. When this question was posed to respondents, the general response was that the drought was a given, measures were put in place to overcome and stem the effects thereof. Blinkwater Mills did not require any financial assistance nor was production halted. Business carried on as usual, Blinkwater Mills remained steadfast in their approach to providing the consumers with relatively affordable maize meal for consumption. Even though Blinkwater did not require any cushioning as a result of the drought, many of their farmers did, as the Operations Manager stated that *“financial aid from government for farmers”* sought to help farmers recover from the implications of having less rainfall and not enough yield to sell to make a viable profit. A Depot Controller from the Mpumalanga depot stated that: *“we have had some rainfall after the drought which helped a lot”*, implying that farmers affiliated with Blinkwater Mills received some respite for the upcoming season in that the rainfall would allow for the soil to be replenished with the required moisture and nutrients. Leading to there being a potentially better upcoming season for farmers associated with Blinkwater Mills, which would result in the mill not needing to source from farmers that are much further out than their usual sourcing area.

In order to ensure the continuity in production, Blinkwater had to seek alternative sources of maize as outlined in the preceding sections. The maize procured from farmers in the Mpumalanga area is predominantly stored in the Stoffberg area – with a storage capacity of 60 000 tons (Super B: 2017). Blinkwater Mills makes use of a total tonnage of 180 000 tons annual, what cannot be stored in the Stoffberg area is stored in a facility rented from Afgri (Super B: 2017). To allow for the smooth

transition from existing suppliers to new alternative ones, Blinkwater required buffer stock. Buffer stock is a system or scheme where the buyer purchases inventory when harvests are good to prevent prices from falling below a predetermined price level, and releases inventory during periods of bad harvests as a means of preventing prices from rising above a predetermined price level (Economics Online, 2017). Respondents were asked if Blinkwater Mills has any buffer stock in view of supply chain disruptions, to which the Operations Manager stated:

“Yes, we have roughly 2-3 months’ worth of buffer stock available on hand at Blinkwater Mills as well as at our respective designated silo’s to aid us in the event that there is a disruption which would result in there not being enough maize bought in a timely manner.”

This response indicated that Blinkwater Mills had proper planning in place and took into consideration the purchasing power of consumers when acquiring maize. Respondents have explicitly stated that farmers from further areas were being made use of in the place of those originally strategically chosen for their placement to the mill. With this, not only is there an increase in transportation costs but there is also an increase in transportation time. Therefore, it can be seen that in view of the increased transportation time, buffer stock can be used in the event that there is a delay in the scheduled transportation time. The General Manager stated that:

“Yes, engage in buying further positions of physical maize. The purpose of which is to mainly hedge ourselves against a risk which has the ability to stop production at our mills. However, should there be no disruption to our production, this maize will not be discarded but rather if needed we can reserve it as a buffer.”

This response speaks to the definition provided in that Blinkwater Mills purchased maize in advance when the crops harvested in a season are good enough and can be stored up until it is required. When asked if there are any risks, prior to extreme weather conditions that prompted Blinkwater Mills to make provisions and adjustments, the Managing Director stated that: *“No, there has always been enough maize, only the price fluctuations are taken into consideration”*, this corroborates the response of the general manager in that by buying further positions, Blinkwater Mills is considered to be a market participant in commodity exchange, Karuihe (2012), states that this implied that Blinkwater makes use of a price determination mechanism and a price risk management facility as a means of managing their exposure to opposing price fluctuations in the fundamental physical market where the performance by counterparties are guaranteed.

- *Code 2: Risk*

As outlined in chapter two, risk is seen as being either internal or external to the organisation in question. A critical component to understanding the reasoning behind seeking alternative sourcing given that Blinkwater actively built relationships with suppliers spanning more than two decades is the risk

involved in taking on the operational problems of another entity. Therefore, despite having long term relationships with suppliers and being chosen as preferred buyers, Blinkwater Mills does not actively engage in strategic alliance with these suppliers. Strategic alliances are described as being long-term collaborative forms of relations which is based on having high levels of trust. Respondents were asked if the risk of inconsistent yield as a result of extreme weather conditions shared between Blinkwater Mills and their farmers, to which the General Manager stated that:

“Yes, we at Blinkwater Mills believe that it is important to share all relevant and necessary information with farmers. We believe in fostering a healthy relationship with our respective farmers and this is evident in that we speak to our farmers on a daily basis. We have established a personal relationship with each and every one of our farmers.”

Based on this response, Blinkwater actively engaged in dialog with farmers so as to ascertain progress, land readiness, expected yield and the general well-being of the harvest. This opens up the notion of building and maintaining decade long relationships. However, when this question was posed to the Managing Director, to which the response was:

“No, Blinkwater Mills and their individual farmers covers their own risk. Therefore, when the drought occurred, it was the responsibility of the farmer to initiate recovery measures. This responsibility did not fall onto Blinkwater Mills, as we do not have measures in place to minimise the risks that affect our farmers.”

Even though Blinkwater Mills reaped the benefits from this form of relationship, their overall interaction with farmers cannot be considered to be strategic in nature as alternate suppliers are sought out to compensate when the quantity of maize required from designated suppliers did not meet the required limit. Risks are not shared nor transferred from farmers to Blinkwater Mills. As a result, Blinkwater Mills alternative option would be to consider early supplier involvement as an aid to affiliated suppliers, when this option was posed to which the General Manger, the response was:

“Yes, it will help our company and our respective suppliers to know how to manage the disruption as a result of a risk. This will allow our suppliers to be able to work through the disruption and establish viable methods to recover quickly. Therefore, ensuring that operations are continuously efficient and production is not halted.”

This forward thinking was corroborated by the Operations Manager, who stated that:

“Yes, early supplier involvement will help Blinkwater Mills and our close suppliers to known how to manage the risk disruption, to work through the disruption and also develop the ability to recover quickly once a disturbance has occurred.”

Therefore, considering farmers are not aided beyond the means and contracted obligations of Blinkwater Mills, there is an opportunity for future growth and development as well as a potential area that will strive to supply Blinkwater Mills with maize in times of limited supply. It will also allow for Blinkwater to stay ahead of competitors and explore an area that previously was not considered.

As previously stated, Blinkwater Mills had to make adjustments to their forecasting and planning schedules as a result of the drought and the consequential impact it had on the associated farmers. As a result, it was important to determine if there were any other risks which require Blinkwater to make amendments to their current operations. When asked if there are any risks significant enough to force Blinkwater Mills to make adjustments to their forecasted demand schedule, the General Manager stated that:

“Yes, there is a difference between the spread of SAFEX and maize processes. This year Blinkwater Mills decided to not to buy all of our maize all at one time (during one season), but rather to leave one third of purchases to the new season.”

SAFEX is the South African Futures Exchange which is a facet of the Johannesburg Stock Exchange (JSE) and is responsible for electronic futures and options (Johannesburg Stock Exchange, 2017). Trading on SAFEX is an effective way for Blinkwater Mills to manage price risk and market exposure in the South African agricultural industry. From this response it can be seen that Blinkwater Mills not only partakes in trading on SAFEX as a means of managing price fluctuations but also seeks to actively curve their exposure when the markets turn unfavourable especially when faced with external variables which have the propensity to effect nationwide production, such as the presence of the El Niño. Therefore, the General Manager stated a third of purchasing was left to a new season with favourable prices. With this being said, whether or not extreme weather – or other external factors – impact Blinkwater Mills or not, actively participating in SAFEX is a means to ensuring the longevity of Blinkwater Mills.

Therefore, it was important to establish whether or not extreme weather conditions constitutes enough of a risk to force Blinkwater Mills to make provisions; to which the Managing Director stated that: *“No, in Blinkwater Mills, there is always enough maize. The land in Mpumalanga is considered to be fertile enough and irrigated enough to ensure that even though there is a drought, we are not negatively impacted by it.”* However, this is a temporary solution to a problem that will continue to occur in varying degrees of impact. From this response it is evident that Blinkwater Mills was confident that their operations will continue irrespective of weather conditions in a season. When asked the same question, the Operations Manager, said: *“Yes it would, and we will look to import maize as a means of keeping operations going. As local farmers will not always be considered to be a surety in the future given the current state of their recovery ability”.*

Given that 7 out of the 10 respondents stated that extreme weather conditions did not constitute enough of a risk to force Blinkwater to make provisions for, and given that new suppliers had to be brought onboard as a means of continuing production, which was not previously done, it makes sense to deduce that prior to extreme weather conditions impacting affiliated farmers, there was no risks that Blinkwater incurred that was dire enough to force adjustments to be made.

The view put forward by the Operations Manager can be considered as forward thinking and seeking to provide a solution to a potential future problem as Trescott and Fenwick (2015), corroborate this notion given the opinion begin based on 750 global CEO's, in that more companies are taking the leading role in addressing the climate change by making it an urgent priority through unlocking the full potential of the private sector. However, not all of the respondents were of this opinion. In view of Blinkwater Mills seeking alternative suppliers as a means to fund their operations, it could prove worthwhile to relook at the supply chain and implement a resilient supply chain as a productive way of dealing with extreme weather conditions and other likely risks. Therefore, when asked if Blinkwater Mills will look to implement a resilient supply chain knowing extreme weather conditions are a repeat occurrence, the resounding response as stated by the Operations Manager is that the supply chain already is operation is *"the best there is"* and the Managing Director said:

"No, here at Blinkwater Mills we read the circumstance as it comes. We look at each season subjectively and look at the challenges posed in each season. Seeing that we are not situated in extreme drought conditions there is no reason to overall our operations for something that does not happen frequently."

However, the Operations Manager holds a differing perspective to the other respondents in that:

"Yes, it will help our company in that it will identify how and where we should invest as a way to mitigate risk and recover quickly from disruptions. A resilient supply chain will allow Blinkwater Mills to be proactive in preparing for a disruption such as a drought in the future."

From the responses, the operations manager was the only respondent with the opinion that Blinkwater Mills should look to implement a resilient supply chain as a means to manage risk. Subsequently, based on the responses put forward by respondents regarding the implementation of a resilient supply chain it corresponds to ideology and responses of respondents that establishing a framework for dealing with extreme weather conditions is not a viable option for Blinkwater Mills nor is it considered to be a priority.

The General Manager stated that: *"No, extreme weather conditions are not regular enough occurrence to force our hand to look in this as a viable and longstanding investment."*, to which the Managing Director too corroborated the notion that: *"No, we at Blinkwater Mills prefer to read the market as it comes, take our directive from this and thus we take each season as it comes."* These responses highlighted the reluctance of Blinkwater Mills to implement changes as the established supply chain

currently in operation is working well and they are yet to identify a cause drastic enough to force a change in protocol.

Lastly, as an alternative to establishing a resilient supply chain and establishing a framework to mitigate the effects of disruptions to Blinkwater Mills supply chain, the organisation too can seek to implement climate change policies as a general guideline in the best practices to follow as a means of constructively handling drought situations without harming the environment for future generations. Respondents were asked if the implantation of climate change policies were a priority for Blinkwater Mills, to which a Depot Controller from the Limpopo depot stated that: *“No, we do not believe that there is time to engage in that”*, sharing this sentiment, much like the other respondents, was the Managing Director, who went on to state that: *“No, that is an international issue, which we at Blinkwater Mills cannot do anything about.”*

While the Operations Manager is of the opinion that:

“Yes, I believe that it should be as it will allow Blinkwater Mills to know what to do in the event of minimal maize supply. It will also enable Blinkwater Mills to be able to manage the risk associated and brought about by climate change which in turn will not compromise the organisation.”

The aforementioned responses were an indication of the direction in which Blinkwater Mills is moving towards when dealing with supply chain disruptions. While some respondents are for the implementation of new climate change policies, like the Operations Managers, others like the Depot Controller and Managing Director are not. Therefore, the practicality and relevance of the policy must be carefully evaluated and judged in accordance to whether or not it is value adding and profitable in both the short term and long term, given the obligations and current consumer demands.

- *Code 3: International Sourcing*

Apart from pursuing domestic suppliers, Blinkwater Mills also has another potential source of raw materials. Sourcing internationally has not been an option that has actively been pursued by Blinkwater Mills in light of extreme weather conditions. When choosing to source internationally, one must take into consideration the size of one's operations as well as the nature of raw materials required. Of the respondents, 9 out of the 10 are of the opinion that there is always sufficient maize in Mpumalanga and it is for that reason that Blinkwater Mills does not choose to engage with international suppliers. Given the relationships that are built with existing suppliers, Blinkwater is hesitant to engage with suppliers that are foreign.

It was only if Blinkwater Mills was faced with no other option, would they then be forced to import maize in order to keep operating. There are two major contributing factors for Blinkwater not actively pursuing international sourcing, that being: the cost and quality of international raw materials.

The current economic climate has seen the rand progressively depreciate in light of political instability, this has caused many to rethink the notion of making use of international sourcing as a viable means of sustaining business operations given the effect the drought had on agriculturally based organisations. The weakened state of the rand implied that organisations wishing to import raw materials would do so at a higher rate than before. It is only those with existing contracts with international suppliers that would not be as drastically affected. When asked if sourcing internationally would be an alternative option for Blinkwater Mills, the Operations Manager stated that:

“Yes, if there is no other viable domestic alternative for Blinkwater Mills to consider. The cost impact of sourcing internationally will be a stumbling block which we would have to overcome. However, this in turn will have a knock on effect resulting in higher maize meal prices.”

The higher maize meal price which would ultimately be transferred down to the consumer is made up of more than the cost of procuring the raw material. There are additional costs which Blinkwater Mills would incur, such as import taxes, levies and insurance. Therefore, given the fluctuation in the rand, Blinkwater Mills will have to make significant investments to ensure that proper logistics channels are set up and free from error. This will require an entire shift in operation as Blinkwater is familiar with farmers that are situated close by, having supplier that are across borders or even continent would mean a significant increase in transportation costs than what was previously incurred.

Trading in foreign currency is a risk Blinkwater Mills will have to look to hedge against so as to ensure that in the long run operations will not only continue but will indeed do so in a profitable manner. This will ensure that Blinkwater Mills consumers do not bear the brunt of international sourcing given that consumers are already finding it difficult to cope with the increase in price when domestic farmers were utilised to ensure the continuation of production.

Another major contributing factor as to why Blinkwater is resistant to source internationally is that the quality of international maize is well below that of South African standards. When asked the same question, the General Manager stated that:

“No, this is due to the quality of international maize not being good enough. We are accustomed to a certain standard and have expectation of the maize we purchase, which we at Blinkwater Mills believe that internationally, it does not meet our expectations. Consequently, we would not want our product to be negatively affected by the poor quality of internationally sourced maize”

Based on this response it was clear that international standards do not live up to the requirements of Blinkwater Mills. As they have an already established brand with loyal consumers that expect a certain level of quality. It was evident that Blinkwater strived towards ensuring that the procurement of maize is done so to enforce standard worthy maize. This practice was apparent and seen when in drought conditions, knowing that farmers could not produce enough and what was produced was not of a high

enough standard, Blinkwater actively sought out alternative domestic farmers as a means to compensate for the yield shortage and to ensure that superior quality is transferred down to the consumer.

However, if Blinkwater had to source internationally, countries that would be viable options to form alliances with would be Argentina and The United States of America (USA) (Onyango, 2017) Between the two, despite USA being the leader in maize production, Blinkwater should make Argentina the priority. This is as a result of South Africa's white maize grade 1 (wm1) being the best quality in the world and the American Corn1 is equivalent to South Africa's white maize grade 2 or white maize grade 3 (Onyango, 2017).

4.5 Conclusion

In conclusion, this chapter outlined and discussed each of the relevant themes identified during the thematic analysis process. First the chapter outlined the steps and process needed into to successful interpret the findings from the data set. Thereafter, the chapter graphically displayed the findings identified from the thematic analysis. The themes that emerged were that of "Land Readiness" and "Third Supplier". From this, each theme, corresponding categories and codes were discussed in detail. Highlighting the importance of lifelong relationships which allows for Blinkwater to take advantage of good business relationships when faced with supply uncertainty. Chapter five will present the findings of the study, recommendations, areas for future study and concluding remarks.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter serves to tie together the preceding chapters and form a cohesive understanding of the study. The chapter begins by detailing each of the respective chapters outlining the pertinent aspects. Thereafter, each research objective will be explained in relation to the research question and the extent to which the study was successful in gaining an understanding into the survival strategies of Blinkwater Mills. Lastly the chapter puts forward recommendations which would aid in the future operations of Blinkwater Mills as well as areas for future research given the limited knowledge on extreme weather conditions especially within a South African context.

5.2 Review of Research Objectives and Research Questions

Before a summery discussing the detailed analysis conducted on each of the research objectives is done, it is important to review the respective objectives. It is important to analyse each of the research objectives so as to determine the extent to which the research was successful in explaining the important of each, not just in the data collection but also to what extent is it supported by relevant literature.

Table 5.1: Review of Research Objectives and Research Questions

Research Objective	Research Question
To determine the extent of the impact extreme weather conditions had on farmers affiliated with Blinkwater Mills	Did the presence of extreme weather conditions have any impact on the farmers that are affiliated with Blinkwater Mills?
To examine if the presence of extreme weather conditions directly affects the upstream supply chain	Was the supply chain of Blinkwater Mills directly affected by extreme weather conditions?
To examine if there are any extenuating circumstances that prompt Blinkwater Mills to make adjustments to their forecasted demand schedule	Are there any risks significant enough to force Blinkwater Mills to make adjustments to their forecasted demand schedule?
To determine whether a resilient supply chain would be beneficial to mitigate risk considering the likelihood of the reoccurrence of extreme weather conditions	Would a resilient supply chain be beneficial to mitigate risk considering the likelihood of the reoccurrence of extreme weather conditions?

5.2.1 Findings: Objective 1

To determine the extent of the impact extreme weather condition had on farmers affiliated with Blinkwater Mills.

It is important to understand the type of relationship Blinkwater Mills shared with affiliated farmers so as to determine the degree to which inconsistent yield is transferred to Blinkwater. Blinkwater Mills traditionally makes use of farmers that are strategically located close to their milling operations. These farmers go beyond acquaintances and have built long lasting relationships with Blinkwater Mills. Having fostered long term relationships can prove to be beneficial in time of crisis. However, when Blinkwater Mills primary source of maize yield was compromised as a result of the drought, it was

essential to assess the degree to which Blinkwater Mills utilised these farmers in their operations going forward.

The 50 commercial and 5 – 10 subsistence farmers affiliated with Blinkwater Mills farmers were affected in one way or another as a result of the drought. Many of the farmers that relied on rain to aid during the plantation phases had to halt production to a time better suited. Given the lack of rain, the soil was not fertile enough to ensure that the maize produced was of a quality equivalent to the norm. It was important for affiliated farmers to produce maize that are of a certain quality as this directly affects the quality of product put out by Blinkwater Mills.

In addition to quality of maize crops being affected, seeing as farmers had to delay production on account of the drought, they consequently lost out on potential profits during the sale of crops. This was as a result of that the demand for maize outweighing the scarcity of the commodity. As a direct result, of this many farmers had to seek additional funding as a means of sustaining their operations. Some of the ways farmers had to identify secondary sourcing of funding is applying for loans and mortgage loans from banks; asking to be bought out of contracts early from Blinkwater Mills; seeking earlier payment from Blinkwater Mills; applying for government relief as well as selling of livestock. This was yet another way in which affiliated farmers were affected beyond not being able to produce the required maize in the allotted time.

In conjunction with inferior quality as a result of poor soil fertility, the quantity produced was also not on par with the contracted norm of that of a normal season. Blinkwater identified many of their farmers as not being able to deliver the contracted tonnage given the impact of the drought on local production. It was also noted that farming is a skilled industry which requires in-depth knowledge on planting times and dates together with how best to overcome environmental issues specific to certain landscapes. Affiliated farmers proved to be specialised with the latest technology, however, both proved to be ineffective when faced with the impact of the ENSO cycle.

Some of the affiliated farmers were affected to the extent that they could no longer operate for the season, continuing with maize production was no longer a viable option. This is in view of farmers not having enough funding to secure their position for the season or they were unable to secure additional funding through alternative means. Stopping production and not seeking to go further out of necessity allowed farmer to recuperate their losses in hopes of preparing for the new season. Land which farmers till for the production of maize, was also affected as a result of the dry conditions. This also had an impact on the planting conditions for the upcoming season. As a result, those farmers who had to stop production altogether had to ensure that the land maintains its fertility in anticipation of the season to come.

Conclusion:

Therefore, it can be seen that affiliated farmers associated with Blinkwater Mills were affected to varying degrees, while some farmers could sustain their operations and successfully produce the contracted tonnage, others were not as fortunate and as a result suffered from the arid conditions. Even though farmers affiliated with Blinkwater Mills possess the required knowledge to deal with adverse conditions and they have the understanding on how best to circumvent the environmental conditions, it was not a match for the degree of drought experienced.

5.2.2 Findings: Objective 2

To examine if the presence of extreme weather conditions directly affects the upstream supply chain.

It was important to understand the extent to which extreme weather conditions affect the upstream of a supply chain, given that this is the portion of the supply chain that is responsible for the procurement or searching and extraction of raw materials essential to the operations of an organisation (Bass, 2017). The upstream is not responsible for the production of the raw material extracted but rather search for it (Bass, 2017). In the case of Blinkwater Mills it was vital to identify the extent to which the upstream was affected given that Blinkwater Mills is raw material sensitive. Without having raw materials to transform, the operations of Blinkwater Mills will cease to exist. Therefore, in the face of supply chain disruptions it was important to identify potential risks before hands as a means of getting ahead of the problem and adequately pinpointing the affected areas.

By identifying potential risks and problem areas, Blinkwater Mills was able to prevent bottle necking from occurring. Bottlenecking is also considered to be a constraint facing an organisational supply chain whereby that part of the supply chain that is no longer able to optimally operate as a result of an external influence, thus resulting in a backlog of production and causing the entire supply chain to now operate less than efficiently (Castaldi, 2014). Consequently, limiting production output to being less than the norm in a given time period.

Blinkwater Mills had fixed costs which amount to approximately 80 percent of total costs. Therefore, Blinkwater Mills needed to ensure that turbines operate continuously and as a result, it was vital to ensure that there is a continuous supply of maize so as to prevent the turbines from stopping. Which lead to importance being placed on the upstream supply chain. Ensuring that there was a continuously supply of maize during a normal season – one where there are no adverse environmental conditions to contend with – is relatively easy to ensure, however when up against drought conditions, it is that much more important to have contingency plans in place to allow for the uninterrupted production of maize to maize meal.

During a normal operating season, Blinkwater Mills employed farmers from nearby areas to decrease inbound transportation costs and to service and build the local community. Which lead to the upstream

supply chain being relatively easy to manage and source from. However, when faced with adverse conditions, it was that Blinkwater Mills looked to employ farmers from further areas to ensure the continuation of production. The further the farmer was from the operating mills, the more consideration was given to the time taken to deliver the maize, as the time frame that Blinkwater Mills was previously accustomed to is no longer applicable. More consideration was given to lead time when Blinkwater makes use of farmers that are situated further away.

In order to gain a holistic approach to the overall supply chain of Blinkwater Mills, the upstream supply chain cannot be looked at in isolation. A value chain is made up of various complex components all of which must work together in cohesion to ensure the successful production of a viable product. With that being said, a supply chain is made up of two key points, namely: the upstream and downstream. The significance of the upstream supply chain of Blinkwater Mills has been outlined and discussed. Additionally, the reason for the upstream supply chain being of extreme importance to this study is its correlation with the concept of procurement. Procurement is a concept which has been derived from purchasing, and is now considered to be a more strategic activity within the supply chain department. It was important that Blinkwater Mills sourced strategically so as to ensure that the local community which serves as the target market was able to be repeat consumers. Without which Blinkwater Mills would have no longer be able to successfully operate within their environment. Procurement goes beyond merely identifying the cheapest option and utilising that supplier. More thought, consideration and screening goes into ensuring that the best possible supplier is identified as this will ensure that value is added to Blinkwater Mills operations.

However, as discussed in Chapter 4, although this aspect of operations was affected it was not the only aspect of the supply that was of importance to the operations of Blinkwater Mills. The midstream of a supply chain is also known as the decoupling point, serves to connect the upstream to the downstream. For the product is transferred downstream to the respective consumer.

Blinkwater Mills has established their own network of approximately 300 depots and shops situated mainly in the rural areas of Mpumalanga, Limpopo and the Highveld all of which are used to sell their main product lines being: Super B, Mododa and Safuti Braaipap (Super B, 2017). The study showed that as a direct result of the drought, Blinkwater Mills had to pay a higher price for maize which in turn resulted in consumers having to pay more for Super B maize meal. This in turn had an effect on the sale volumes. This was in view of consumers forgoing Super B maize meal as their first choice and choosing an alternative substitute of less rand value. Even though Blinkwater Mills did see new consumers patronising their depots – consumers who could no longer purchase from smaller mills that had to close down as a result of the drought – sales volumes were still not on par with the norm that Blinkwater Mills experiences in a season where there are no adverse environmental conditions affecting operations.

Conclusion:

It must be noted that the upstream was affected by way of procuring new farmers which are situated further away, however, the overall operation of the supply chain remained the same. The new farmers served to compensate for the yield inefficiency of existing suppliers. As stated the need for continuous production drove Blinkwater Mills to actively seek out alternatives given their own operating expenses. However, the downstream supply chain was affected to a certain degree as well with regular local consumers no longer able to purchase Super B maize meal at the higher price as a result of Blinkwater Mills not being able to absorb the costs of procuring maize at a higher price and from a further distance.

5.2.3 Findings: Objective 3

To examine if there are any extenuating circumstances that prompt Blinkwater Mills to make adjustments to their forecasted demand schedules.

As outlined and discussed in Chapter 2, risks affect an organisation in various different ways. As a result, it is important to not only be aware of what they are but to also seek ways to actively minimise the effect or mitigate it completely. Risks and supply chain disturbances can either have a positive, negative or catastrophic impact on an organisation therefore, it is best to be prepared and understand the circumstances leading up to potential problems as opposed to dealing with the aftermath.

Forecasted demand schedules make reference to Blinkwater Mills ability to understand the spending power and patterns of consumers and adapt production to ensure that consumer demand is not only met but there is room for growth and expansion both for the season in question and those to come. Therefore, it was important for Blinkwater Mills to make provisions for any disruption which may have the propensity to alter forecasted demand. It was important that Blinkwater Mills stuck as closely as possible to the original forecasted demand given that continued operations is necessary to ensure that costs are covered. The study showed that even though the forecasted demand schedule was not affected by any external factor nor can it be affected by any external factor; Blinkwater Mills planning was not completely absorbed in that budgets had to be adjusted to take into account the higher price in maize charged as a result of the decrease in national quantity supplied.

However, as discussed and outlined in Chapter 4, there were no extenuating circumstances which had the propensity to force Blinkwater Mills to alter forecasted demand schedules. Management is of the opinion that each season is new and has its own set of unique challenges all of which can be handled and contained. Giving rise to the notion that no situation is too big or too small for Blinkwater to successfully overcome.

For example, there may be an external factor, such as the drought, which has the propensity to affect the regular production cycle at Blinkwater Mills site of production, as a result Blinkwater actively seeks

ways in which to compensate for this disruption during the early stages of the season. Some of these compensation methods, as stated are: ensuring that there is enough buffer stock on hand at the silo's, buying from farmers earlier in the season; not making all purchases in one season and hedging positions.

Despite Mpumalanga being one of the provinces in South Africa that was worst affected by the water shortage, this factor did not play as significant of a role in the planting and harvesting of farmers as countless farmers made use of irrigated land, bore holes and dams where necessary. However, given that most farmers plant on dry land, not many farmers are heavily dependent on these sources of water to sustain their operations.

Conclusion:

Blinkwater Mills adopts a very unique but rather common approach to handling risks and supply chain disruptions in that action is only taken after the event. With this being said, each external factor which impacts Blinkwater Mills is treated on a case by case basis, with no two disruptions having the same effect and the same treatment. As a result, there are no drastic factor significant enough which would force Blinkwater Mills to make amendment to their forecast, given that their forecast is relatively solidified given the cost implications associated with the running of operations.

5.2.4 Findings: Objective 4

To determine whether a resilient supply chain would be beneficial to mitigate risk considering the likelihood of the reoccurrence of extreme weather conditions.

A resilient supply chain is a supply chain that is able to withstand a disturbance and either return back to normal operations or be in a better position than before the occurrence of the disruption (Christopher and Helen, 2004). As seen with Blinkwater Mills, there has been challenges faced on the upstream as well as the downstream supply chain as a result of the drought faced. As the findings indicated, nothing could have been done to prevent the consumer from ultimately paying more as a result of food scarcity.

The likelihood of the El Niño is upon South Africa with it occurring within the next 24 months on 2017. With this being said, it is important now that the presence of extreme weather conditions is being brought to the attention of affected organisations and consumers alike. Rising awareness on this matter is increasingly important given the limited literature on the subject matter. The more informed consumers are about the effects of the El Niño on ordinary consumption goods, the better choices consumers will make in the long run together with budgeting their spending power accordingly.

Based on the results of the study, Blinkwater Mills did not find it necessary to implement a resilient supply chain. This was in view of their current supply chain operating well under all conditions. It must be noted, as stated previously, the supply chain of Blinkwater Mills was not compromised given the

presence of extreme weather conditions. Therefore, giving merit to the notion put forward by respondents as to why it is not necessary to make changes to a supply chain that is already faring well.

Building a resilient supply chain unique to Blinkwater Mills would have stemmed from adopting best practices, climate change policies as well as developing a specific risk based framework for mitigating risks. However, given the stance Blinkwater Mills adopted with regard to handling each situation as it comes, there is no need to make use of such reference methodologies. The reason behind not wanting to adopt climate change policies and frameworks from which risk can be mitigated is Blinkwater Mills operates locally and services communities within their reach. Operating domestically, Blinkwater Mills does not see the need to invest in changes which they deem along affect international markets.

Conclusion:

Even though extreme weather conditions are considered to be a hindrance to many organisations operating in the agricultural industry, Blinkwater Mills had been able to identify ways in which to overcome this supply chain disruption with minimal difficulties. Leading to there being no valid reason as to why there needs to be a redesign to a supply that is considered to be more resilient in its handling of supply chain disruptions. Internationally, there are best practices outlines and climate change policies that are being brought to the forefront of countless organisations as a means of understanding risks better and better equipping supply chains to ensure resilience and agility. However, given the context in which Blinkwater Mills operates, international practices and policies hold no weight and applicability to bettering the operations of Blinkwater Mills.

5.3 Recommendations

The recommendations are as follows:

- Identify and formulate a strategic supplier base

The study revealed that Blinkwater Mills made use of farmers that were situated close to their base of operations. An avenue that Blinkwater Mills can look to pursue is to incorporate farmers that are situated further away into their strategic supply base. By having a diverse range of farmers that are situated throughout the province as opposed to concentrated in one area will ensure that should disruptions to Blinkwater Mills supply chain occur, they already have established relationships which they can make use of so as to promote continuity in production. This approach is opposed to the current practice where farmers that are situated further away from Blinkwater Mills operations are only called upon at the last minute when existing suppliers can no longer supply the required tonnage. It would prove to be beneficial to incorporate alternative suppliers into the supply base as this will allow Blinkwater to build relationships that would see them benefiting in terms of being preference buyers or price discounts.

As indicated, there are also internationally viable options that are available for Blinkwater Mills to make use of when faced with a shortage of yield. The top five countries that Blinkwater Mills can make use of are: United States of America, China, India, Brazil and Argentina. Identifying suppliers that are geographically dispersed does have advantages therefore, to foregoing local South African producers for international supplier could circumvent local problem suppliers. Building relationships with suppliers are strategic in nature and should be adequately considered together with cost implications.

- Invest in hedge inventory

When Blinkwater Mills is faced with a situation in which the quantity and quality of inventory is compromised, instead of having on hand only enough buffer stock to ensure the continuation of production for a certain period of time, Blinkwater Mills should seek to invest in hedge inventory. Hedge inventory is an accumulation of inventory which serves as a buffer against an event that may or may not occur (Bozarth and Handfield, 2008). For Blinkwater Mills to make use of hedge inventory, planning needs to be involved, however given that there may or may not be an event for which inventory is held, there is a large degree of speculation which must be used. Speculation regarding an increase in prices, labour unrest, political instability and various other factors would could affect the operations of Blinkwater Mills. Given the nature of operations of Blinkwater Mills in that each season is taken as it comes, Blinkwater Mills will benefit by having hedge inventory on hand in that Blinkwater is only able to ascertain which farmers will be able to produce as per contractual obligations and which would not.

Therefore, by having hedge inventory on hand, Blinkwater would not have to be too concerned regarding the extent to which their suppliers are affected seeing as they would be adequately covered. This would also mean that Blinkwater is not vulnerable to price fluctuations which ultimately would translate down to consumers in that they would not have to pay more for goods thus ensuring repeat consumers.

- Formulate a framework for dealing with risk

Research has shown that there is a need for developing an organisation specific framework that targets supply chain disruptions be it extreme weather conditions or the inability of a producer to supply. Therefore, it would be advisable for Blinkwater Mills to establish a decision making framework that incorporates the effects of extreme weather conditions. Although their affiliated farmers are not an integrated part of the organisation it was evident that they were still impacted as a result of their producers' inability to overcome the effects of the drought. Blinkwater Mills should look at taking proactive steps towards minimising the effects of extreme weather conditions, knowing that this is a problem and it is going to be reoccurring. Being prepared as opposed to dealing with the after effects will only be indefinitely successful. Thus planning ahead through the formulation of a decision making framework will serve as a point of reference when dealing with risks affecting Blinkwater Mills. A wait

and watch and hope for the best attitude will not serve Blinkwater Mills in the long run if the ultimate goal is to ensure a competitive advantage and capitalise on the market by ensuring that only the best quality of maize is procured.

Organisational planning and strategy redesign should be undertaken to incorporate the effects of extreme weather conditions. Although the effects of the ENSO cycle in 2015 and 2016 was not dire for Blinkwater Mills, it does not mean that in the years to come the effects will be the same. Therefore, it is essential that constructive steps and processes are put in place to avoid drastic disturbances and impacts should the effects of the ENSO be worse in the years to come.

- Greater awareness to relief funding initiatives

There are a number of initiatives and grants available to farmers and producers alike that were affected by the drought. Given the current state of the economy and the default recession South Africa is current in, the likelihood of more funds being allocated to fund the relief aid of affected farmers is slim. This saw the introduction of the private sector to the agricultural sector as an external means of relief funding. However, not enough attention is being brought to the plight of farmers and the consequential impact it is having on consumers. Initiative such as the Wimpy Cappuccino's are few and far between, highlighting the need for consumers to be made more aware. These initiatives should also be ongoing and not a fad as relief aid will always be useful to farmers in need. Another reason to have continuous investment from the commercial public is to accumulate funds for future needs and not for it to be done after farmers are affected and cannot recover in time to meet their obligations for the season. There should be continuous engagement from the commercial public as the inability of commodity producers to harvest has a direct implication for consumers.

5.4 Area for Future Study

The areas' for future study are as follows:

- A South African perspective on the impact of extreme weather conditions on local organisations.

The knowledge and literature regarding the impact extreme weather conditions has on local small business owners is very limited. It has been documented that the reoccurrence of the ENSO cycle is likely to happen within the next 24 months as a result, it is no longer a subject matter that can be place on hold and avoided until a later time. Given the current political and economic climate there is a high amount of uncertainty facing the strength of the Rand. With this being said, it would be increasingly more difficult for small agriculturally based organisations to keep servicing communities in the face of food scary. Therefore, more attention needs to be brought and light shed on matters directly affected the local economy and consumers. By way of educating respective organisations and consumers allows for better informed decisions to be taken.

Additionally, in view of international practices, climate change policies and risk mitigating frameworks being too costly and out of reach for many small to medium business owners, a South African specific and unique frame should be derived to better suit this market. By doing so, it forces organisations like Blinkwater Mills to look at how can they improve their operations and make it more sustainable. Dealing with disruptions on a case by case basis, and dealing with a disruption after it has occurred rather than combating the issue before it becomes a problem - much like Blinkwater Mills does is an unsustainable practice in view of the culminating extenuating circumstances such as a weak Rand, political instability, water shortages and the quality of international maize not being on par.

It is evident from the aforementioned, that survival strategies are valuable tools which can be utilised to by organisations and affiliated producers. However, in order for these strategies to be successful, especially for agriculturally based organisations in South Africa, it is imperative that steps are taken now and strides are made towards ensuring better seasons. By taking on board the best suited survival strategies and activity working towards adapting current practices to address the effects of extreme weather, will see those organisations not only benefit in the long run but also capitalising when others are no longer able to service their portion of the market.

From the relevant literature, it can be seen that it is vital to incorporate survival strategies into the overall business strategy and not to treat dealing with the impact of extreme weather conditions as a once off fix. It has also shown that through the adaptation of this approach, organisations are able to identify weak areas within the supply chain and correct them so as to ensure that processes are sustainable and efficient. Supply chain disruptions are inevitable and as such, anticipating and counteracting the effects is the best way to ensure that operations continue and do so in a manner that will not detract from the profitability of the organisation for that period of time.

- Viability of micro-insurance

Literature has proven that the establishment of co-operative has several benefits for their members. This includes providing aid when necessary or compensating for one member's shortfall with another member. The advantage of a co-operative is its ability to provide affiliated farmers with new possibilities of entering the market they would not have previously had. This is a methodology that can be adopted in South Africa, where farmers collectively aid one another for the betterment of the community and in turn organisation do not face a shortage and they do not suffer a great crop and income loss.

Utilising the co-operative structure that is already in place and has success can be used to pass down information to educate disadvantaged farmers on their rights and highlight the possible initiatives that can help in protecting their crops as well as their livelihoods. Micro-insurance is one of these initiative that can prove to be beneficial given that farmers and their family suffer as a result of their land not

being ready or producing crops that are of an inferior quality. Micro-insurance will protect farmers and it serves as their own form of relief aid when faced with adverse weather conditions.

Micro-insurance could be a viable way for Blinkwater Mills smaller maize producers to be protected and it will also provide funds needed to recoup losses that would have been incurred. Therefore, integrating micro-insurance into the objectives and responsibilities of co-operatives will leave farmers at a greater advantage in the seasons to come.

Having micro-insurance and passing on the risk associated with agricultural commodities is shown to have merits and value. South African farmers apart from seeking assistance from co-operative can also protect themselves through these measures. Alternatively, as done in Nicaragua, South African farmers can go via their co-operatives to help in setting up micro-insurance and transferring risks to a third party. This will allow for farmers both commercial and substance to be protected to a certain degree against extreme weather conditions thus avoiding another R2.1 billion loss in agriculture due to the 2015 and 2016 drought.

It can be seen that in order for these measures to be successful, farmers must be made aware of them. This in turn leads to the notion of ensuring that farmers are properly educated, not only in farming techniques but also in ways which will see their farming techniques pay off in the years to come. Through the preceding discussion it is evident that having trade skills is not enough to see a farmer being successful, other tools and skills need to be highlighted and farmers made aware of possibilities to realise their potential.

- Integrated landscape management

Working together with banks, local communities and conservation groups could seek to alleviate some of the strain and pressure placed on government to be the sole provider to solutions to problems. Through the joint efforts put forward by the aforementioned, problems are solved quicker with little to no downside for either of the members as they are all working towards solving a common difficulty. Getting the backing and financial funding from organisations, local communities and banks can prove to be difficult the current economic climate. Therefore, there are several cases that show the benefits of such partnerships, the transferability to South Africa may prove to be difficult on a larger scale. Much like the piloted studies in Kenya and Ethiopia, South Africa can look at small scale partnerships and test the viability of it commercially. Banks and larger organisations will trust in the application of integrated landscape management if there is successful application within a South African context.

Blinkwater Mills is positioned strategically within the milling community in South Africa. Their operations are self-sufficient and there is enough reserve funds to ensure that should a significant enough disruption occur, they would not be left wanting. Blinkwater Mills does not pursue an active integrated engagement with its suppliers as it does not want to take on their associated risk, therefore,

integrating with more than one partner may not an opportunity Blinkwater Mills will seek out first. However, that does not mean that this approach would not be viable for other milling companies in South Africa.

- Feasibility of sustainable farming techniques

Possessing the knowledge and skills needed to ensure that crops are yielded correctly and efficiently is not the only way to guarantee a successful season. It is not a requirement to have state of the art farming equipment nor is it necessary to employ several workers however, it is important that the manner in which a farmer conducts their operations is efficient and effective. The purpose of which will ensure that costs are reduced and this saving is transferred down to the consumer. The implementation of post-harvest techniques such as drying, storing and processing will ensure that agriculturally commodities retain their quality and these goods are passed down to consumers. However, in South Africa, small scale producers would not have access to facilities that commercial farmers have and as such their harvests are affected if not passed on to miller timeously. Substance farmers can look to partner with commercial farmers to make use of their facilities or equipment in return for a small fee. This would help disadvantaged farmers as they would not have to outlay funds they do not have or could not procure and still cultivate for a season.

Alternatively, government can undertake an initiative that will identify all small and emerging farmers throughout South Africa and singly provide help needed in the form of equipment or through the construction of communal facilities that can be used by a range of farmers from neighbouring areas. The undertaking of such an activity would prove to be extremely costly and resource intensive, however, the potential payoff in the long run would see the establishment of self-sufficient farmers that would contribute towards the growth of the economy.

5.5 Concluding Remarks

Blinkwater Mills is an agriculturally based organisation with deep ties to the local community which it employs and services. From this study, it has come to light that Blinkwater Mills is strategically placed within South Africa, in that the land is characterised as being naturally dry and farmers are equipped with not only the latest technology and machinery but with years of knowledge regarding the landscape and how best to overcome challenges that threaten the viability of the land. Therefore, allowing Blinkwater Mills not to have to make drastic changes to their supply chain or to have to stop production all together. Furthermore, the findings clearly indicate that that there is no viable and pressing reason for Blinkwater Mills to establish a resilient supply chain as a means of overcoming extreme weather conditions. Which servers to address the objective put forward but the researcher.

The study has shown that while most organisations that are agriculturally based suffered from the effects of the ENSO cycle, the implications for Blinkwater Mills was not as sever. When looking at the

international best practices and frameworks put in place to serve as a relief mechanism, not all can be easily translated and adopted successfully in a South African context. For those South African based organisations with the capacity and the budget to undertake an overhaul of their supply chain in order to ensure resilience in the face of disruptions it serves as a viable and futuristic possibility. However, for most small milling companies such as Blinkwater Mills, the reality of the circumstance is that adopting internationally recognised best practices is not feasible or necessary in some cases. This seeks to comprehensively answer the researchers' original objective of determining the extent of the impact extreme weather conditions had on farmers associated with Blinkwater Mills.

Literature has shown that there are countless ways in which an agriculturally based organisation can overcome extreme weather conditions. In the case of Blinkwater Mills, their survival strategy was to identify alternative farmers and source maize from them. In view of some of Blinkwater Mills farmers being affected by the drought in varying degrees, not all of the predetermined farmers were able to produce maize at the contracted tonnage. As a result, Blinkwater Mills had to compensate for the shortfall in maize received so as to ensure that production continues uninterrupted. Thus guaranteeing that consumer demand are met and the inconsistency between supply and demand is minimised. Based on this stance, it is evident that although the objective was to examine if the presence of extreme weather conditions directly affected the upstream supply chain, the findings also highlighted that consumers – who constitute the downstream – were also directly affected as a result of extreme weather conditions. Furthermore, the researcher was able to address the objective of examining whether or not there are any extenuating circumstances that would prompt Blinkwater Mills to make adjustments to their forecasted demand schedule. The likes of which is also driven by the fact that agriculturally based organisations are governed by stringent time frames in which optimal operations are preferred.

In view of Blinkwater Mills sharing a long term relationship with local farmers, Blinkwater retains a stance of not taking on the risks associated with farming. Blinkwater Mills does not absorb any risks that are not their own. Contrary to typical supply chain practices which advocate a long-term, honest, transparent and risk bearing relationship, Blinkwater Mills enjoys a culmination of a transactional relationship as well as a strategic alliance. In that they are able to be preference buyers to their suppliers but are not obligated to only purchase maize from them when they are no longer able to produce the required tonnage.

The nature of the study is one that is unique and still in its infancy stages of research in South Africa. The findings of the study are subjective to the overall impact of the ENSO cycle on agriculturally based organisations this is in view of the operational activities and the stance Blinkwater Mills takes in handling supply chain challenges. The size and culture of Blinkwater Mills dictated the responses analysed. Therefore, it can be noted that the objectives initially outlined with regard to extreme weather survival strategies has been fully met. The approach applied by Blinkwater Mills is unique given the

circumstances under which they operate. Consequently, it is important to provide greater insight into the various types of survival strategies as no two organisations can implement the same guidelines with hopes the achieving the optimal outcomes. While Blinkwater Mills seeks alternative farmers as their survival strategy, other organisations, may hold a differing view point on how best to deal with the impact of extreme weather conditions.

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LIST OF APPENDICES

APPENDIX A: ETHICAL CLEARANCE



02 February 2017

Ms Priya Ramgovind (212518807)
School of Management, IT & Governance
Westville Campus

Dear Ms Ramgovind,

Protocol reference number: HSS/0050/017M

Project title: Extreme weather survival strategies for agriculturally based organization's – a case on Blinkwater Mills

Full Approval – Expedited Application

In response to your application received on 09 January 2017, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and **FULL APPROVAL** was granted for the protocol.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

Dr Shenika Singh (Chair)

/ms

Cc Supervisor: Jaynisha Ramasamy-Gurayah
Cc Academic Leader Research: Professor Brian McArthur
Cc School Administrator: Ms Angela Pearce

Humanities & Social Sciences Research Ethics Committee

Dr Shenika Singh (Chair)

Westville Campus, Govan Mbeki Building

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Website: www.ukzn.ac.za



Founding Colleges: Edgewood Howard College Medical School Pietermaritzburg Westville

APPENDIX B: INFORMED CONSENT

UKZN HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE (HSSREC)

APPLICATION FOR ETHICS APPROVAL

For research with human participants

Information Sheet and Consent to Participate in Research

18 November 2016

Greetings,

My name is Priya Ramgovind I am a student at the University of KwaZulu-Natal, student number 212518807, contact number 073 348 1384, email address: priyaramgovind@gmail.com.

You are being invited to consider participating in a study that involves a qualitative research study. The aim and purpose of this research is to determine the survival strategies for agriculturally based organisations brought about as a result of extreme weather conditions. The study is expected to include 20 participants in total, of which 8 make up the sample population and 2 make up the pilot study which would span the Management of Blinkwater Mills and Depot managers at their sites and office in Mpumalanga. It will involve the following procedures: the research topic that will be investigated will take the form of a case. The case will comprise of the analysis of primary data that will be qualitatively gathered. In order to test the validity of the study, a pilot study will be conducted. Descriptive research will be used so as to achieve the research objectives through the means of correlation research. The time horizon for which the researcher intends is cross-sectional. The research will make use of in-depth telephonic interviews. From the gathered data, deductions and inferences will be made from the research findings. Thereafter, recommendations and possible solutions will be proposed. The duration of your participation if you choose to participate and remain in the study is expected to be 1 day.

We hope that the study will create the following benefits: enlighten you on other possible tools and techniques would could be implemented to better aid small scale farmers when faced with a drought or other extreme weather condition.

This study has been ethically reviewed and approved by the UKZN Humanities and Social Sciences Research Ethics Committee (approval number_____).

In the event of any problems or concerns/questions you may contact the researcher at (073 348 1384) or the UKZN Humanities & Social Sciences Research Ethics Committee, contact details as follows:

HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION

Research Office, Westville Campus

Govan Mbeki Building

Private Bag X 54001

Durban 4000 KwaZulu-Natal, SOUTH AFRICA

Tel: 27 31 2604557- Fax: 27 31 2604609

Email: HSSREC@ukzn.ac.za

Your participation in the study is voluntary and by participating, you are granting the researcher permission to use your responses. You may refuse to participate or withdraw from the study at any time with no negative consequence. There will be no monetary gain from participating in the study. Your anonymity will be maintained by the researcher and the School of Management, I.T. & Governance and your responses will not be used for any purposes outside of this study.

All data, both electronic and hard copy, will be securely stored during the study and archived for 5 years. After this time, all data will be destroyed.

If you have any questions or concerns about participating in the study, please contact me or my research supervisor at the numbers listed above.

Sincerely

-----P.Ramgovind-----

CONSENT TO PARTICIPATE

I (Name) have been informed about the study entitled (provide details) by (provide name of researcher/fieldworker).

I understand the purpose and procedures of the study (add these again if appropriate).

I have been given an opportunity to ask questions about the study and have had answers to my satisfaction.

I declare that my participation in this study is entirely voluntary and that I may withdraw at any time without affecting any of the benefits that I usually am entitled to.

I have been informed about any available compensation or medical treatment if injury occurs to me as a result of study-related procedures.

If I have any further questions/concerns or queries related to the study, I understand that I may contact the researcher at (provide details).

If I have any questions or concerns about my rights as a study participant, or if I am concerned about an aspect of the study or the researchers then I may contact:

HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION

Research Office, Westville Campus

Govan Mbeki Building

Private Bag X 54001

Durban

4000

KwaZulu-Natal, SOUTH AFRICA

Tel: 27 31 2604557 - Fax: 27 31 2604609

Email: HSSREC@ukzn.ac.za

Additional consent, where applicable

I hereby provide consent to:

Audio-record my interview / focus group discussion YES / NO

Video-record my interview / focus group discussion YES / NO

Use of my photographs for research purposes YES / NO

Signature of Participant

Date

Signature of Witness

Date

(Where applicable)

Signature of Translator

Date

(Where applicable)

APPENDIX C: INTERVIEW GUIDE

INTERVIEW GUIDE

(Proposed Interview Time: 45 minutes)

Name:

Position:

Contact details

Section 1 – Extent of extreme weather

To determine the impact extreme weather conditions had on farmers affiliated with Blinkwater Mills

1.1 Does the presence of extreme weather (drought) have any impact on the farmers affiliated with Blinkwater Mills? Please explain your answer.

1.2 Was the quality of yield received from farmers affected by drought? Please explain your answer.

1.3 Was the quantity of yield received from farmers affected by drought? Please explain to what extent.

1.4 Did the presence of drought result in farmers affiliated with Blinkwater Mills to require additional assistance? Please elaborate your answer.

1.5 Did the affiliated farmers require additional time to recover before resuming normal operations as a result of the drought? Please provide an explanation for your answer.

1.6 Are the farmers affiliated with Blinkwater Mills skilled and knowledgeable with regard to harvesting times and farming conditions to handle extreme weather conditions? Please discuss.

1.7 For the purpose of decreasing transportation costs, are farmers situated close to each other? If so, please explain.

1.8 Does Blinkwater Mills have strategic alliances with suppliers? If so, please discuss.

Section 2 – Impact on the organisation

To examine if the presence of extreme weather conditions directly affect the upstream supply chain

2.1 Was the supply chain of Blinkwater Mills directly affected by the presence of extreme weather (drought)? Please explain how do.

2.2 Was forecasting and planning affected due to the drought? Please explain your answer.

2.3 Did the water shortage in Mpumalanga hinder production? Please discuss the extent.

2.4 Was the upstream supply chain affected by inconsistency yield? Discuss your answer.

2.5 Was the downstream (end consumer) greatly impacted by the drought? Discuss your answer.

2.6 Were there any additional factors (i.e. economic, rainfall, electricity rationing etc.), which cushioned the effect of the drought? If so, please discuss each identified factor.

2.7 Does Blinkwater Mills have any survival strategies in place? If so, please discuss them.

2.8 Does Blinkwater Mills have any buffer stock in the event of a supply chain disruption? Explain the reason for your answer.

2.9 In the event of a supply chain disruption, does Blinkwater Mills have emergency relief funds available? If not, why?

2.10 Is the risk of inconsistent yield as a result of extreme weather shared between Blinkwater Mills and their farmers? If not, why?

Section 3 – Risks

To examine if there are any extenuating circumstances that prompt Blinkwater Mills to make adjustments to their forecasted demand schedule

3.1 Are there any risks significant enough to force Blinkwater Mills to make adjustments to their forecasted demand schedule? If so, please explain your answer.

3.2 Would extreme weather constitute a significant enough factor to force Blinkwater Mills to make provisions? If so, please explain your answer.

3.3 Prior to current extreme weather conditions, did Blinkwater Mills have any risks which provisions and adjustments were made for? Please substantiate your answer.

3.4 Does Blinkwater Mills have sustainability initiatives? If so, is this extended to farmers as well?

Section 4 – Organisational response

To determine whether a resilient supply chain would be beneficial to mitigate risk considering the likelihood of the reoccurrence of extreme weather conditions

4.1 Would Blinkwater Mills look to implement a resilience supply chain knowing extreme weather conditions is a repeat occurrence? Please provide an explanation.

4.2 Would sourcing internationally be an alternative option? Provide a reason for your answer.

4.3 Is the implementation of climate change policies a priority for Blinkwater Mills? Provide an explanation for your answer.

4.4 Would Blinkwater Mills consider early supplier involvement as an aid to affiliated suppliers? Discuss your reason provided.

4.5 Would Blinkwater Mills consider sourcing from alternative domestic farmers? Provide a reason for your answer.

4.6 Would establishing a framework for dealing with extreme weather conditions be a viable option for Blinkwater Mills? Please provide an explanation.

4.7 Given the presence of extreme weather conditions, would this be an area for Blinkwater Mills to exploit in terms of future growth and development. Please explain your answer.

Thank you very much for your input today. Are there any last comments that anyone would like to make? The information you provided will help me write my dissertation and inform the extreme Weather Survival Strategies for Agriculturally based Organisations such as Blinkwater Mills.

APPENDIX D: GATEKEEPERS CONSENT

56 Jacaranda Crescent
Isipingo Hills
4133
10 October 2016

To whom it may concern

REQUEST PERMISSION TO CONDUCT RESEARCH AS PART OF THE MCOM QUALIFICATION

I am a student at the University of Kwa-Zulu Natal (student number: 212518807). As part of my studies I am to undertake a dissertation as the basis of the MCom qualification.

My approved dissertation topic is: "Extreme Weather Survival Strategies for Agriculturally based Organisations: A Case on Blinkwater Mills". Even though the study is for academic purposes, it may shed some light on the extent to which the drought in South Africa, coupled with the dwindling Rand and water crisis, is affecting the upstream supply chain as well as the value chain. Should you require a brief description of the results, this will be forwarded to you.

Kindly grant me permission to collect data for my research.

Sincerely

Priya Ramgovind
Academic – Management Collage of Southern Africa (MANCOSA)
073 348 1384

Permission is granted to carry out the above research

Albin van der Berg

Name and Surname

Albin van der Berg

Signature

10/10/2016

Date

Position:

General Manager

