DURBAN UNIVERSITY OF TECHNOLOGY

SUPPLY CHAIN MANAGEMENT IN DISASTER RESPONSE: ACHIEVING EFFECTIVENESS IN DROUGHT INDUCED DISASTERS IN ZIMBABWE

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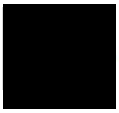
Signature:  Date: 20 February 2017

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"Forever and ever blessed be the name of the Mighty God"

Abstract

Zimbabwe is a Sub-Saharan African country which is exposed to the El-Nino effect. The frequent occurrence of the El-Nino phenomenon results in reduced precipitation in Zimbabwe. In recent years, the country experienced frequent and severe food shortages due to the effects of drought disasters affecting hundreds of thousands of people. The World Bank in 2013 reported that weather related disasters will continue to afflict the country hence the need for the country to devise robust drought coping strategies. The Zimbabwean government and registered private voluntary organisations work together in providing food relief to drought stricken communities. When rendering food aid, there are factors such as culture, leadership attitudes, the economy, political environment and the disaster management policy that affects the effectiveness of drought relief supply chains. The primary objective of this study was to explore the role of supply chains on the effects of drought induced disasters in Zimbabwe. The study objectives were to assess the disaster management environment in Zimbabwe; investigate the current supply chain management strategies used in drought disaster response in Zimbabwe; determine the extent to which disaster supply chains performance is affected by culture, leadership attitudes, political state, economic state, legal framework and to explore the adequacy of the disaster management policy in dealing with drought induced disaster in Zimbabwe.

The crunch and the disaster phase models were used as overarching theories on which the study is grounded. The study made use of a triangulated research design. Both qualitative and quantitative research approaches were applied. The research population comprised 200 participants in total, of which 26 were government officials and 174 were from Non-governmental organisations. Questionnaires and interviews were used to generate primary data. The data was analysed using Stata 13. The findings revealed that the identified factors were not enablers to drought relief response but exacerbated community vulnerability. Poor road network, lack of financial resources, poor stakeholder relations, poor communication and lack of information sharing affected the effectiveness of drought relief supply chains in Zimbabwe. The disaster management policy was also found to be reactive in posture and the Department of Civil Protection was not adequately resourced to effectively execute its mandate of coordinating and monitoring the activities of the different participants in drought disaster response. Another significant finding was that supply chain aspects such as transport

costs and warehouse costs reduced because of the level of education and work experience of the participants. The major conclusions of the study were that culture, leadership attitudes, political state and the disaster management policy were not enablers of drought relief response in Zimbabwe except for economic state and the legal framework. It was also revealed that drought relief supply chains were affected by poor state of roads, political interference, lack of financial resources, poor communication and lack of information sharing among relief participants and that, the drought disaster management policy was not providing for drought logistics planning. The expected outcomes of the study are to help improve the effectiveness of drought disaster response in Zimbabwe. Fundamentally, the study anticipated to influence the drought disaster management policy so that there is an effective drought disaster management framework.

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List of Acronyms

AU: African Union

CMED: Central Mechanical and Engineering Department

COAG: Council of Australian Government

CPP: Civil Protection Province

DCP: Department of Civil Protection

DDF: District Development Fund

DRM: Disaster Risk Management

DRR: Disaster Risk Reduction

DSS: Department of Social Services

EIA: Environmental Impact Assessment

ENSO: El-Nino Southern Oscillation

FACT: Field Assessment Coordination Team

FEMA: Federal Management Agency

GDP: Gross Domestic Product

HFA: Hyogo Framework for Action

HSC: Humanitarian Supply Chain

HSCM: Humanitarian Supply Chain Management

IDNR: International Decade for Disaster Reduction

IFRC: International Federation of the Red Cross

ISDR: International Strategy for Disaster Reduction

MLG, PW&UD: Ministry of Local Government, Public Works and Urban Development

NCPC: National Civil Protection Committee

NGO: Non-Governmental Organisation

PAR: Pressure and Release

PVO: Private Voluntary Organisation

RLU: Regional Logistics Unit

RTA: Road Traffic Accidents

SADC: Southern African Development Community

SC: Supply Chain

SCM: Supply Chain Management

UNDP: United Nations Development Programme

UNICEF: United Nations International Children's Fund

UNISDR:	United Nations International Strategy for Disaster Reduction
WFP:	World Food Program
WHO:	World Health Organisation
ZIMVAC:	Zimbabwe Vulnerability Committee

Chapter One

Introduction and Background

1.1 Introduction

Natural disasters have occurred in many parts of the world and have disrupted the well being of communities. The United Nations International Children's Fund (UNICEF) in 2016 reported that drought disasters caused an interruption of school attendance for about 2 million children in Ethiopia (Tadesse, 2016:6). Because of the increasing likelihood of drought disasters, the World Food Programme (WFP) in 2016 called for countries such as Angola, Madagascar, Malawi, Mozambique, Swaziland, Zambia and Zimbabwe to devise copying strategies that counter the negative effects of the El-Niño phenomenon. According to the recent Intergovernmental Panel on Climate Change (IPCC) in 2014, and as observed by Tadesse (2016:7); the threat of climate change increases the frequency, severity, duration, and spatial extent of drought events in the future. The IPCC report further affirms the World Bank (2013) report that forecasted that by 2030, there could be 325 million people trapped in poverty as well as rendered vulnerable to weather related events in Sub-Saharan Africa.

In April 2016, The United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA), issued a warning to the global community that 32 million people across Southern Africa were in need of food relief assistance, and that figure was expected to increase by the end of the year (UNOCHA, 2016). UNOCHA, (2016), further reported that over 60 million people around the world were affected by severe El Niño-linked drought impacts. More than half of the drought-affected people were noted as living in Africa. The WFP (2016b), reported that the 2016 El-Niño induced drought had severely affected the Southern African region, and the region had suffered the driest cropping season in at least 35 years. According to WFP, about 1.5 million people (16% of the rural population) were affected by drought in Zimbabwe (WFP, 2016a). In South Africa, the severe drought reduced agricultural production and hydroelectricity generation (World Bank, 2016).

Drought disaster effects are far reaching, as they affect many aspects of community livelihoods. According to Tadesse (2016:7), frequent drought disasters are threatening decades of development progress by making communities less able to absorb and adapt to a changing climate. This is especially true for a country such as Zimbabwe that has an agro-based economy. The government and its private voluntary organisations provide food relief

to affected communities. The provision of drought relief supplies to affected communities entails extensive application of supply chain management initiatives.

A significant number of researchers such as Cozzolino *et al*., (2012:5-14); Gustavsson (2003:6-8); Oloruntoba and Gray (2006:115-118) as well as Van Wassenhove (2006:475); have indicated that supply chain management is at the core of a successful disaster management mission. Available literature on the role of supply chain management is largely generalised and preoccupied with sudden on-set types of disasters and does not adequately address the impacts of inherent factors such as national disaster policies, cultures of communities, the political and economic state of a country. The slow-onset nature of drought, which often escapes the attention of the media, policy makers, and the public compared to other extreme events such as floods, hurricanes, earthquakes and volcanic eruptions (Tadesse, 2016:18), provides further justification for the study. It is against this background that this research seeks to explore the role of supply chains on the effects of drought induced disasters in Zimbabwe. The underlying assumption of this study is that Zimbabwe has a unique disaster management environment which warrants a standalone research. The next section focuses on the context of this research.

1.2 Context of the Research

Zimbabwe is exposed mainly to flood, epidemic and drought disasters. In 2013, the government of Zimbabwe, in its contingency plan, identified drought as a more likely disaster to occur in the future (Government of Zimbabwe 2013). In 2016 the government of Zimbabwe declared drought a national disaster (Government of Zimbabwe, 2016). In the same year, the Zimbabwe Vulnerability Committee reported that over 2 million people in Zimbabwe were in need of urgent food aid (ZimVAC, 2016). The government and its relief partners were therefore compelled to ensure that food supplies are sourced and distributed to the communities in need of food assistance. The distribution of food aid entails planning for the sourcing and subsequent logistics to ensure that all the needs of affected people are taken care of. The focus of this study was to explore the effectiveness of supply chain management in drought response in Zimbabwe. Supply chain management in disaster response has been extensively researched (Cozzolino *et al*., 2012; Gustavsson 2003; Oloruntoba and Gray 2006; Van Wassenhove 2006; Tomasini and Van Wassenhove, 2009) however these researches focused mainly on sudden on-set disasters (for example: The Japan earthquake, 2011; Brazil

flooding and landslides, 2011; Haiti earthquake, 2010; Yogyakarta earthquake in 2006; Pakistan earthquake, 2005; Hurricane Katrina, 2005; The Indian Ocean earthquake, 2004) (da Costa et al., 2012:598-607). The sudden on-set disasters helped to explain the importance of supply chain management in saving lives as well as damage limitation. This study therefore aims to explore the role of supply chain management when responding to slow on-set disasters such as droughts. As reported by the World Bank (2013), droughts will increase in frequency and intensity hence the need to for the country to be prepared to respond to future droughts. This research explored the application of supply chain management interventions to drought disasters in Zimbabwe. Supply chains that are applied in disaster management are known as humanitarian or emergency supply chains (Tomasini and Van Wassenhove, 2009:9).

Gustavsson (2003:6) defines a humanitarian supply chain as a complex and interlinked network in which different actors, processes, decisions, and information are mixed to serve the needs of the victims in a catastrophe. Therefore, the major objective of a humanitarian supply chain is to prevent loss of life and minimise suffering of victims (Oloruntoba and Gray, 2006:116). Notwithstanding this, the effectiveness of drought supply chains is affected by factors such as culture, politics, economic situation, legislation and many other factors (Tomasini and Van Wassenhove 2009; McEntire, 2001). This study examined some of the key variables in the humanitarian business environment and how these affect the effectiveness of humanitarian supply chains in Zimbabwe. The study focused on the following drought stricken districts; Chiredzi, Bikita, Chivi, Chipinge, Binga, Buhera, Tsholotsho, Kariba, Mwenezi, Bulilima, Mangwe and Hwange. These districts are situated in ecological regions IV and V which receive minimum annual rainfall.

1.3 World Disaster Cases

There are many world cases of disasters that have befallen mankind including, but not limited the Haiti earthquake in 2010, Pakistan earthquake in 2005, Tsunami in 2011, Brazil landslides in 2011 (da Costa, Campos and Bandeira, 2012:598; EM-DAT, 2014). These disasters have resulted in tens of thousands of people perishing, some being displaced and property worth billions of dollars being destroyed. Destruction from disasters leaves countries reeling from financial strain which in some cases runs into billions of dollars. The World Bank estimated that the disaster in Japan caused damage totalling $235 billion. The Hurricane Katrina damage totalled $81.2 billion, while the Haiti earth quake damage totalled $8 billion

and the 2004 Tsunami damage totalled $9.5 billion (Park, Hong and Roh, 2013:75). Disasters of this magnitude have devastating effects that overwhelm the resources of the affected nation. The response to these disasters entails the shipment of rescuers, medical supplies, food and other materials for shelter construction. The effective functioning of a supply chain is of essence in responding to such devastating catastrophes in order to save lives and reduce consequential damage (da Costa, *et al.*, 2012:598).

1.4 Disasters in Africa

In Africa, disasters are mostly as a result of climate change, destructive actions, crises and plagues (EM-DAT, 2014), and hence there is urgent need to have supply chain management frameworks that help African countries to cope with these impending disasters. According to the World Bank (2013) report, the global climate continues to change and developing countries face mounting losses from severe floods, droughts, and storms. The World Bank forecasts that by 2030, there could be 325 million people trapped in poverty and also vulnerable to weather-related events in Sub-Saharan Africa and South Asia (World Bank, 2013). Current trends point to frequent occurrences of the El-Nino effect in the Pacific Ocean which causes severe droughts over Sub-Saharan Africa. As African nations craft disaster management frameworks, clearly defined and robust supply chains are fundamental in enhancing resilience amongst African communities.

1.5 Background to the Study

Zimbabwe has suffered its fair share of disasters with regards to droughts and disease outbreaks in recent times. The international disaster data base EM-DAT (2014), indicates that from 2000 to 2014, over 6000 people have died and over a million people have been affected by weather related disasters. Of these weather related disasters, drought disasters have occurred more frequently than others. From 1982 to 2016, Zimbabwe has experienced a total of eight (8) drought disaster events. In the eight (8) drought disaster events, more than 18.6 million people were affected cumulatively EM-DAT (2016). While there are no deaths recorded as a result of droughts, it is, however, very clear that effective humanitarian supply chain management practices are of paramount importance in alleviating the suffering of affected communities.

Food distribution to drought affected areas is an important responsibility of the government and its non-governmental partners. Food aid distribution supply chains are face with

challenges that disrupt their effectiveness. The Daily News issue on the 16th of April 2015 revealed that the Zimbabwe Human Rights Commission (ZHRC) had serious concerns over partisan distribution of food aid. The ZHRC (2017) in its watch report published overwhelming evidence that politicisation of food aid distribution. The Commission particularly fingered ZANU (PF) youths as responsible for identifying those who should receive food aid or not. Corruption was also identified to affect the effectiveness of drought response. Lack of transparency and accountability in food aid distribution represented other areas negatively affecting the distribution of food aid in Zimbabwe. The effectiveness of drought supply chains in Zimbabwe must be proved against the tests of cultural and political impediments and other institutional bureaucracies. It is against this background that this study sought to explore how drought relief supply chains could enhance drought disaster response in Zimbabwe.

1.6 Research Problem and Aims

Zimbabwe is an agrarian economy and the frequent droughts that the country has experienced have impacted negatively on the food security of the nation. The numbers of people who are affected by drought induced disasters continue to increase in Zimbabwe. According to the Zimbabwe Vulnerability Committee (2016), an estimated 4 million people are in need of food assistance as a result of a severe 2015-2016 drought. The WFP reported that about 1.5 million people (16% of the rural population), were affected by drought in Zimbabwe (WFP, 2016a). This situation calls for Government and other NGOs to intervene by providing food supplies to the affected people. Greater numbers of affected people needing food assistance provide a stimulus that sets humanitarian supply chain response into action. The actions of humanitarian supply chains entail the sourcing and shipment of food supplies to starving communities.

A plethora of research has been carried out on the role of supply chain management on disaster management (Pateman and Cahoon, 2013:81-102; da Costa *et al.*, 2012:598-607; Mohan, Gopalakrishnan and Mizzi, 2011; Balcik, 2010; Gatignon et al 2010, 2010; Oloruntoba and Gray, 2006). These researchers were mainly concerned with supply chains responding to sudden onset disasters. Carr (1932:211) reckons that communities' reaction to disasters is "determined by culture, morale, leadership, and by speed, scope, complexity, and violence of the disaster itself". Drought disasters and supply chain management have not

attracted the interest of researchers. The failure to attract research attention was aptly put across in Tadesse's (2016:18) observation of "the slow-onset nature of drought, which does not capture the attention of the media, policy makers, and the public when compared to other extreme events such as floods and hurricanes". Coupled with this, the study seeks to explore the effectiveness of supply chains in drought disaster management Zimbabwe. The underlying assumption being that Zimbabwe has a unique cultural and political environment; as well as institutional bureaucracies that can enhance or impede the effectiveness of drought disaster response.

1.7 Research Objectives

The objectives of this study were, *inter alia*:

- To assess the disaster management environment in Zimbabwe.
- To investigate current supply chain management strategies to drought disaster response in Zimbabwe.
- To determine the extent to which disaster supply chains performance is affected by culture, leadership attitudes, political state, economic state, legal framework and the disaster management policy in Zimbabwe, and
- To explore the adequacy of the national disaster policy in dealing with drought induced disaster in Zimbabwe.

1.8 Research Questions

This study addressed the following research questions:

- How is the disaster management environment like in Zimbabwe?
- What are the current supply chain management strategies to drought disaster response in Zimbabwe?
- To what extent are supply chains affected by culture, leadership attitudes, political state, economic state, legal framework and the disaster management policy in Zimbabwe?
- Does the national disaster policy provide an effective disaster management framework?

1.9 Significance of the Study

This study sought to enhance the effectiveness of drought relief supply chains in Zimbabwe in responding to drought disasters. The importance and value of this study can be expressed as follows;

- To unpack enablers of drought relief response and also identify the challenges affecting drought supply chains with a view to improving the effectiveness of drought response.
- To encourage logistics planning for drought relief to guarantee high performance drought relief supply chains.
- To influence the improvement of the national drought policy in Zimbabwe.
- To add to the supply chain management body of knowledge.

1.10 Theoretical Framework

The overarching theoretical underpinning of this research is the Disaster Phase Model by Carr (1932:208). The theoretical disaster phase model by Carr (1932:208) recognises that disaster management follows a sequence of phases namely mitigation, preparedness, response and recovery.

1.10.1 The Disaster Phase Model

The Disaster Phase Model, also known as the Disaster Management Cycle has four important phases namely the preparedness, response, recovery and the mitigation phases. In the model, Carr (1932:208), suggests that there is an inherent sequence pattern to disasters. The preparedness and mitigation phases ensure that the communities develop resilience in order to reduce the impact of the disaster when it eventually occurs. Developing resilience is not the sole task of the communities. The governments have the mandate of ensuring that its citizens are free from harm. When a disaster event eventually occurs, response and reconstruction are triggered into action. The nature of response is determined by the nature of a disaster event and the magnitude of its effects. Some disasters are sudden onset while others are slow onset (Tomasini and Van Wassenhove, 2006:45). The thrust of this study is on the effectiveness of supply chain management at the disaster response stage.

At the response stage, there is urgent need to source and transport actors, food and medical supplies, and shelter materials (Oloruntoba and Gray, 2006:116; Tomasini and Van Wassenhove, 2009:41). The response stage is further complicated by the diversity of stakeholders it attracts. Stakeholders to a disaster situation range from the government

(through relevant departments), the army, Non-Governmental Organisations, private companies, individual volunteers and other countries (da Costa *et al.*, 2012:599). All these actors bring with them diverse culture, objectives, knowledge and experience which make supply chain coordination a complex task (Balcik, Beamon, Krejci, Muramatsu and Ramirez, (2010:23).

1.10.2 The Crunch, and the Pressure and Release Models

While the Disaster Phase Model presents a disaster management cycle, the crunch model, which is the brain child of O'Keefe, Westgate and Wisner (1976), and the Pressure and Release Model, also a brain child of Blaikie, Cannon, Davis and Wisner (1994) were developed to help understand the progression of community vulnerability to disasters. The two models are very similar in their scope. The two models identify sources of vulnerability and trigger events, the combination of which, will lead to a disaster. These models will be presented in significant detail in Chapter Two. The following section looks at the disaster risk management model.

1.10.3 The Disaster Risk Management (DRM) Model

The DRM is the brain child of Baas, Ramasamy, de Pryck and Battista (2008:5). The model identifies three important stages in disaster risk management namely, pre-disaster, response and post disaster stages. This model has the advantage that it is more detailed than the other disaster models. At each stage of disaster risk management, it prescribes the expected actions. It also emphasises the building of resilience at the pre-disaster stage. A detailed analysis of this model will be presented in Chapter Two. The next sections provide important definitions of the key terms used in this research.

1.10.4 Supply Chain Management

This research is aimed at exploring the role of supply chain management (SCM) in disaster management. SCM is a management process that is well established in the world of business. In recent times, SCM has emerged as a strategic business critical success factor (Krajewski, Ritzman, and Malhotra, 2013; Tomasini and Van Wassenhove, 2009; Van Weele, 2006; Lysons and Farrington, 2006). The discipline has also attracted a lot of research interest in the emergency humanitarian operations sector. In humanitarian mission terms, it is referred to as Humanitarian Supply Chain Management (HSCM) (Tomasini and Van Wassenhove, 2009:9; Oloruntoba and Gray, 2006:115; da Costa *et al.*, 2012:5). In disaster management, supply chain management plays an important role in ensuring that goods and responding teams reach the affected communities as quickly as possible. Van Weele (2006:475) defines the term

supply chain as "a group of independent organisations connected together through the products and services that they separately and/or jointly add value on in order to deliver them to the end customer". This definition has a commercial perspective; however, it is also applicable in humanitarian terms. For a humanitarian supply chain (HSC) the *custome*r represents the recipient of aid. According to Patemen, Hughes and Cahoon, (2013:83) humanitarian supply chains provide the response to disasters and are defined as "the process of planning, implementing and controlling the efficient, cost-effective flow and storage of goods and materials, as well as related information, from the point of origin to the point of consumption for the purpose of alleviating the suffering of vulnerable people". This definition elicits the important insights namely that these supply chains have to be efficient and cost effective. The actions of managing a supply chain are called supply chain management. Van Weele (2006:475) defines Supply Chain Management as "the management of all activities, information, knowledge and financial resources associated with the flow and transformation of goods and services up from the raw materials suppliers, component suppliers and other suppliers in such a way that the expectations of the end users of the company are met or surpassed".

1.11 Conceptual Framework

This study explored various supply chain management conceptual models that include, lean supply chains, agile supply chains, triple-A supply chains, centralised supply chains, and decentralised supply chains. Supply chain models emphasise on the organisation of the supply chain in order for it to be more competitive in the market place (Van Weele, 2006; Lysons and Farrington, 2006). The supply chains that operate in disaster management are called humanitarian supply chains or simply emergency supply chains (Oloruntoba and Gray, 2006:116; Van Wassenhove, 2006:475). Gustavsson (2003:6) defined a humanitarian supply chain as a complex and interlinked network in which different actors, processes, decisions, and information are mixed to serve the needs of the victims in a catastrophe. This study will utilise a model on humanitarian supply chains proffered by Oloruntoba and Gray, (2006:116). It is imperative to point out that humanitarian supply chains must be effective and efficient, notwithstanding coordination of complex relationships of participants in such a supply chain (Van Wassenhove, 2006:475). The model shows the participation of diverse actors hence the dynamics of the humanitarian supply chain will be examined in detail in the preceding chapters.

1.12 Empirical Literature Review

It has been pointed out already that humanitarian supply chain management has attracted interest from several researchers. The majority of researchers (Mohan *et al*, 2011; Costa *et al.*, 2012; Pateman and Cahoon, 2013; Balcik *et al.*, 2010; Gatignon, Gatignon et al 2010, 2010 Oloruntoba and Gray, 2006) concur that supply chain management is at the core of a successful disaster management operation. There is also empirical evidence from the study of disasters that occurred in the past that indicate that the impact of certain supply chain fundamentals such as coordination, relationship management and supply chain designs on the performance of a Humanitarian Supply Chain. da Costa *et al.* (2015:598) found out that there were significant challenges experienced when responding to disaster that included but are not limited to supply chain overload, a large amount of waste, high transport and storage costs. World disaster cases that were used as empirical evidence in this study include the Indian Ocean earthquake (2004), the Pakistan earthquake (2005), the Brazil floods and landslide (2011), the Japan tsunami (2011), Haiti earthquake in 2010, Yogyakarta earthquake in 2006, and Hurricane Katrina in (2005). The evidence from these cases brings to the fore the lessons that were learnt from a humanitarian supply chain management perspective.

1.13 Research Gap

As has been alluded to earlier in this chapter, research on supply chain management in disaster management has been done to a greater extent. However, this study sought to examine the role of supply chains in drought induced disasters in Zimbabwe. There is a literature gap on Disaster Supply Chains dealing with specific slow on-set disasters such as drought. In addition, this research is a first of its kind as it explores the impact of Zimbabwe's unique characteristics such as culture, political state and economic state, and how these impact on drought relief supply chains.

Zimbabwe is a country which is rich in culture and traditions. Disaster responses are subjected to political, cultural and leadership attitudes which have a fundamental bearing on the effectiveness of disaster supply chains. The long standing history of frequent drought induced disasters that have afflicted the country lead to the establishment of a traditional food security model called the Zunde raMambo social welfare system (Mararike, 2001:53-65). Traditionally the Zunde raMambo was an important component of the village food security system in times of drought and hardship (Stathers, Sibanda and Chigariro, 2000). The initiators of the Zunde are the tribal chief and to this day they influence the distribution of

food in their areas of dominion (Mararike, 2001:53-65). The attitudes of leadership of a country or even at tribal level influence the response to disaster. It is against this background that this research seeks to examine the effectiveness of drought relief supply chains in Zimbabwe.

1.14 Disaster Management Policy

The supreme law governing disaster management in Zimbabwe is the Civil Protection Act [Chapter 10:06] of 2001. The Act provides a framework for all types of disasters in Zimbabwe. The National Policy on Drought Management (NPDM) of 1999 provides a more focused framework for drought disaster management. There are other pieces of legislation that support disaster management in Zimbabwe. These include the Private Voluntary Organisation Act [Chapter 17:05] of 2002. The Private Voluntary Act regulates the registration and the activities of Non- Governmental Organisations.

1.15 Communities and Geographical Area for the Study

The study targeted respondents from government and Non-Governmental Organisation officials involved in drought relief operations only. The geographical districts covered by this study were as follows; Chiredzi, Bikita, Chivi, Chipinge, Binga, Buhera, Tsholotsho, Kariba, Mwenezi, Bulilima, Mangwe and Hwange. These districts are found in ecological regions IV and V which receive the least rainfall in Zimbabwe.

1.16 Demarcation of the Study

This study was delineated as follows;

- Drought relief practitioners from government and NGOs only.
- Zimbabwean districts that include Chiredzi, Bikita, Chivi, Chipinge, Binga, Buhera, Tsholotsho, Kariba, Mwenezi, Bulilima, Mangwe and Hwange.
- The study focused on drought relief supply chains only.

1.17 Research Discipline

This study was anchored on disaster management; however, the study objectives and research outcomes were based on supply chain interventions. The major impact and contribution to the body of knowledge of this study was on the supply chain management discipline. Contributions were also made on drought disaster management policy.

1.18 Limitations of the study

The study utilised the case study approach which means data was collected in Zimbabwe. The case study approach facilitated data collection and controlling for diversity, however, it limited the generalisability of the findings. Data was collected from drought relief actors only, excluding the beneficiaries of food aid who may have different views of the factors that affect the effectiveness of drought relief supply chains. While acknowledging these limitations, this research exhibits a deeper comprehension of drought disaster management and the role of supply chain management.

1.19 Definitions of Key Terms

For the purposes of this study, the following terms were defined as follows;

Disaster - "a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceed the ability of the affected community or society to cope, using its own resources" (The UNISDR 2007).

Disaster management - "a continuous and integrated process of planning, organising, coordinating and implementing measures which are necessary or expedient for prevention of danger or threat of any disaster; mitigation or reduction of risk of any disaster or its severity or consequences, capacity building; preparedness to deal with any disaster; prompt response to any threatening disaster situation or disaster, assessing the severity or magnitude of effects of any disaster; evacuation, rescue and relief; and rehabilitation and reconstruction" (Yazdanipour and Yazdanipour, 2012:231).

Disaster Risk Management - refers to legal, institutional and policy frameworks and administrative mechanisms and procedures related to the *management* of *both* risk (*ex ante*) and disasters (*ex post*), therefore, including also the *emergency management* elements. According to this definition, it is clear as has been alluded to earlier in this chapter that there are more variables in emergency management that can act as enablers or hindrances such as legal, institutional and policy frameworks (Baas *et al.* 2008:5).

Humanitarian Supply Chain Management - "the process of planning, implementing and controlling the efficient, cost-effective flow and storage of goods and materials, as well as

related information, from the point of origin to the point of consumption for the purpose of alleviating the suffering of vulnerable people" (Pateman and Cahoon, 2013:83).

Supply chain - "a group of independent organisations connected together through the products and services that they separately and/or jointly add value on in order to deliver them to the end customer" (Van Weele, 2006:475).

Supply chain management - "the management of all activities, information, knowledge and financial resources associated with the flow and transformation of goods and services up from the raw materials suppliers, component suppliers and other suppliers in such a way that the expectations of the end users of the company are met or surpassed" Van Weele (2006:475).

1.20 Structure of the thesis

This study is organized as follows:

Chapter 1: This chapter is the introduction to this study and sets out the foundation to subsequent chapters. It provides background information, research questions, objectives of the study, justification of the study. It also gives the assumptions, limitations and delimitations of the study.

Chapter 2: International perspective: This chapter focuses on the role of supply chains in drought induced disasters around the globe. The chapter reviews literature in the field of humanitarian supply chains. The analysis reviews gaps from previous researches on the role of supply chains in drought induced disasters.

Chapter 3: The Zimbabwe Perspective: The focus of this chapter is to provide an overview of the role of supply chain management in drought induced disasters in Zimbabwe. The chapter will seek to evaluate the influence of variables such as culture, politics, leadership attitudes and institutional bureaucracies on the performance of humanitarian supply chains. This chapter discusses the disaster management policy in Zimbabwe and other legal frameworks in place.

Chapter 4: Research Methodology: The chapter outlines the research methodology employed in this study to gather data pertaining to this study. The following aspects such as research design, sampling procedures, research instruments, data analysis and presentation procedures are presented.

Chapter 5: Data presentation and analysis: This chapter presents data in the form of tables and graphs from information gathered through questionnaires and interviews. Qualitative data from observations and interviews is reported in vignette (narrative) episodes.

Chapter 6: Discussion of the research findings: A critical analysis of the findings will be given and the significance of the findings highlighted. Study findings will be discussed with the published literature reviewed in previous chapters.

Chapter 7: Conclusion, limitations of the study, and recommendations for future researchers. Chapter two follows next and it provides a detailed review of literature. Theoretical frameworks on disaster and supply chain management are presented.

Chapter Two

The Role of Supply Chain Management in Disaster Management: An International Perspective

2.1 Introduction

This study aims to investigate 4 objectives which are; to assess the disaster management environment in Zimbabwe, to investigate current supply chain management strategies to drought disaster response in Zimbabwe, to determine the extent to which disaster supply chains performance is affected by culture, leadership attitudes, political state, economic state, legal framework and the disaster management policy in Zimbabwe, and to explore the adequacy of the national disaster policy in dealing with drought induced disaster in Zimbabwe. In that light the study follows 4 strands of literature. Firstly the study will look at literature that explains the humanitarian supply chain environment. Secondly literature that highlights supply chain strategies that are used in disaster management. Thirdly literature that examines different factors such as culture, leadership attitudes, politics and state of economy that potentially can affect the effectiveness to respond to disaster situations. Fourthly, literature that looks at the adequacy of the national disaster management policy in addressing drought disaster response will be explored. The national disaster policy however will be largely the subject of chapter three. In that undertaking the study will look at both theoretical and empirical studies.

2.2 Theoretical Framework

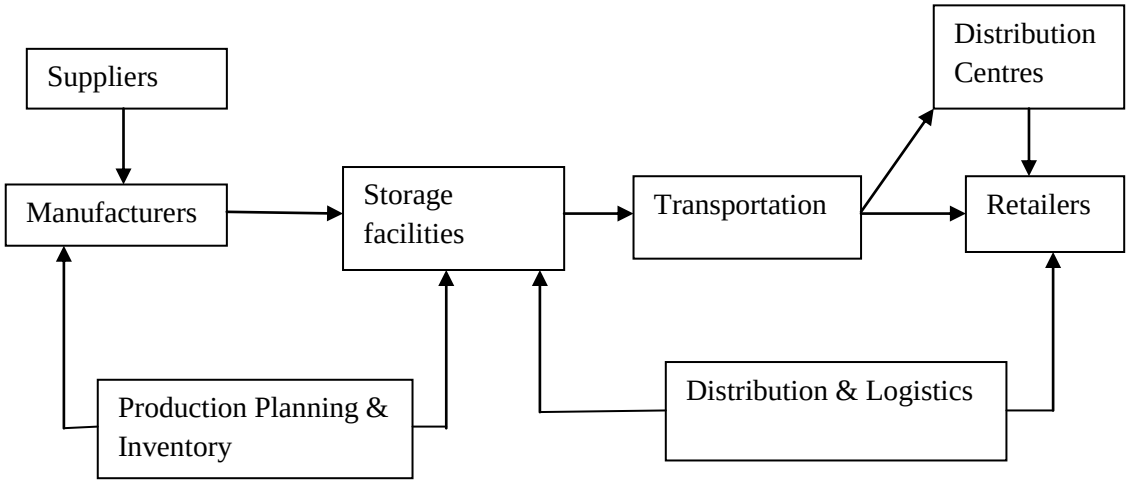
This study converges two phenomena that of Supply Chain Management with Disaster Management. In this section, the theoretical underpinnings of both disciplines are presented. The disaster management aspects will however be explained in more detail early on. The supply chain management theoretical framework is presented first followed by the disaster management cycle.

2.2.1 Supply Chain Management

Supply chain management was defined in Chapter One as essentially focusing on the management of activities in a network or organisation working to deliver value into the market. Supply chain management has emerged as a critical success factor for businesses in recent times (Lysons and Farrington, 2006; Tomasini and Van Wassenhove, 2009; Krajewski, Ritzman, and Malhotra, 2013). The Supply chain management discipline is most established

in the world of commerce. The increased competitive pressures, shortened product life cycles and subsequently shortened time to market cycles, globalisation of trade and other changes that have occurred in the wider world business environment have consolidated the strategic importance of SCM in business (Van Weele, 2006:475). The supply chain theoretical underpinning of this study was based on the model developed by Beam (2008:4).

Figure 2.1 Supply Chain Model



Source: Supply Chain Design and Analysis: Models and Methods (Beamon and Balcik, 2008)

Supply chain design ensures that an organisation maximises the use of modes of transport, the best routes and inventory storage and management. Figure 2.1 shows a model supply chain by Beamon and Balcik (2008:4-25). The supply chain model depicts the sequence of value creation for commercial business. It shows the flow of raw materials from suppliers to manufacturers. Manufacturers convert the materials into finished goods or components that will be distributed to customers through retailers. Fundamentally the models addresses the important aspects of humanitarian supply chain namely storage, suppliers, transportation, inventory planning and logistics (Tomasini and Van Wassenhove 2009; da Costa *et al.* 20012). The following section specifically looks at the humanitarian supply chain management conceptual Oloruntoba and Gray (2006).

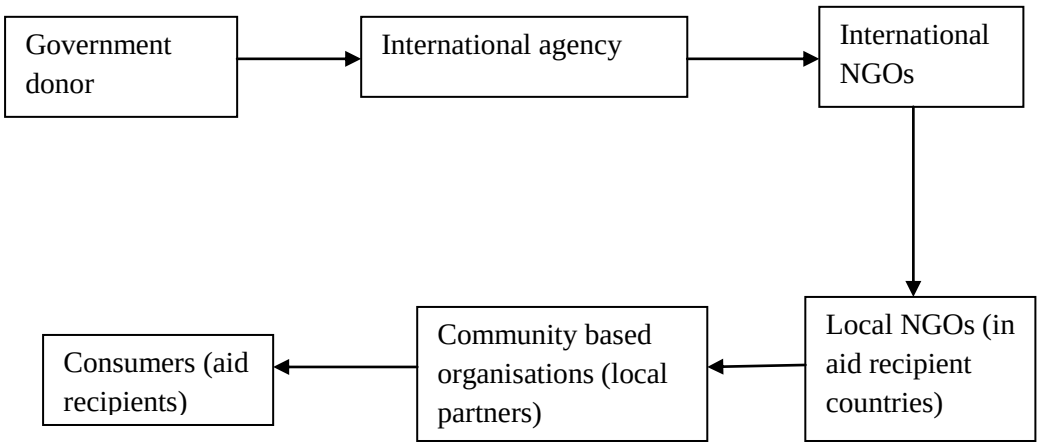
2.2.2 Humanitarian Supply Chain Management (SCM) Conceptual framework

A plethora of researchers (Cozzolino *et al*., 2012; Maon, Lindgreen and Vanhamme, 2009; Van Wassenhove, 2006) have shown that supply chain management or logistics can define

success or failure of an emergency operation. Tomasini and Van Wassenhove (2009) noted that relief supply chains must be efficient and must serve as a link between disaster preparedness and response, between procurement and distribution, and between the headquarters and the field. This is particularly true with the realisation that disaster response involves trade-offs of cost, speed and accuracy with regard to the type of goods, and their quantities, that are delivered (Davidson, 2006:4-6; Maon *et al.*, 2009).

A review of literature shows that only Oloruntoba and Gray (2006:116) have developed a typical humanitarian supply chain network. Figure 2.2 shows the humanitarian supply chain.

Figure 2.2 Model Humanitarian supply chain



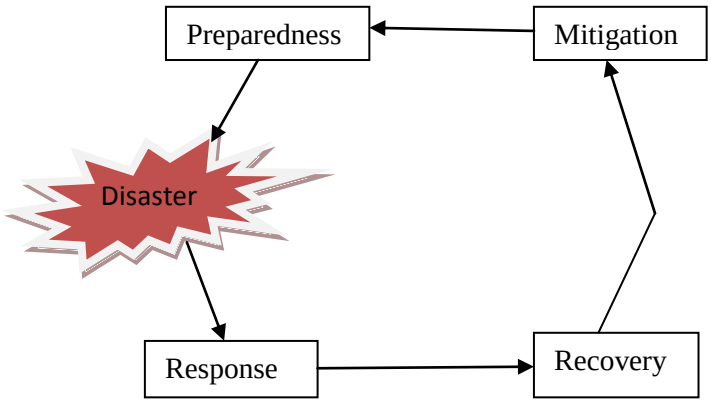
Source: Oloruntoba and Gray, (2006)

Figure 2.2 depicts the flow of aid from donor governments through various emergency relief partners to the victims of a disaster event. The model humanitarian supply chain is a very simplified presentation and provides a clear view of the flow of aid. This supply chain is based on the assumption that the host nation's resources have been overwhelmed by the impact of the disaster hence warranting international intervention. The following sections look at the disaster management cycle.

2.2.3 Disaster Management Cycle

The overarching grounding theory in disaster management is the Disaster Management Cycle. The Disaster Management Cycle was propounded by Carr (1932:208) on the study investigating disaster and the sequence-pattern concept of social change. The work of Carr (1932:208) has provided invaluable insights about the management of disasters and further development of disaster management theories. The disaster phase model is depicted in Figure 2.2 below.

Figure 2.3 Disaster Phase Model



Source: Disaster and the sequence pattern concept of social change; Carr (1932)

Figure 2.3 shows the four stages in a disaster phase cycle namely mitigation, preparedness, response and recovery stages. The underlying assumption of the model is that disaster management phases follow a sequence (i.e from one phase to another). The knowledge of the disaster management phases is very important for effective supply chain planning. The phases of the cycle are explained briefly in this section.

The disaster phase model is circular which implies that the phases precede each other (Tomasini and Van Wassenhove, 2009:44). In an ideal situation, *disaster preparedness* is the first stage in the cycle. Preparedness can be initiated by the experience of a disaster which has happened or where there are robust early warning systems that enhance disaster anticipation (Tomasini and Van Wassenhove, 2009:44). When a disaster has been anticipated, then preparedness entails forecasting and taking precautionary measures prior to the onset of a disaster threat (Tomasini and Van Wassenhove, 2009:44). Disaster preparedness is primarily concerned with ensuring that the communities are empowered to cope effectively with the adverse effects of a disaster (Yazdanipour and Yazdanipour 2012:232; Coppola, 2011:251). At the preparedness stage, effective precautionary measures are identified and implemented to ensure timely, appropriate, and efficient organization and delivery of response and relief action to minimize a hazard's adverse effects (Tomasini and Van Wassenhove, 2009:44).

Disaster preparedness can be carried out at different levels of the society. Individuals, communities, governments and the international community at large (Coppola, 2011:50) can put in place instruments and mechanisms that reduce the impact of disasters events.

Governments prepare for disasters through national disaster management policies. In addition to national policies, governments subscribe to regional, continental and international conventions on disaster management. By subscribing to international conventions, governments recognise that disasters sometimes occur with devastating effects which overwhelm the resources of an individual country hence the need for external assistance. Fundamentally, preparedness ensures that adequate resources, early warning mechanisms, and training of actors are in place well in advance before disaster strikes. Fundamentally, preparedness is aimed at reducing vulnerability and increasing the resilience of communities to disasters (Tomasini and Van Wassenhove, 2009:41). The government of Zimbabwe, through the National Policy on Drought Management strives to create resilience against drought disasters. The policy encourages and advocates for water harnessing and rehabilitation of irrigation infrastructure in order to increase agricultural output in drought prone parts of the country. In order to prepare adequately, mitigation measures should be considered.

Another important stage in the disaster phase management cycle is the *mitigation stage*. The mitigation phase is explained by Cozzolino *et al*., (2012:8) as the laws and mechanisms that reduce social vulnerability (Tomasini and Van Wassenhove, 2009:45). Countries have disaster management policies that provide guidance on dealing with exposure to, and dealing with actual disaster events. At the mitigation phase, policies, that is laws that stipulate human locations from dams or rivers, structural specifications for buildings, safety and training requirements for certain projects and disposal of hazardous materials are considered. The governments are responsible for enforcing compliance with safety regulations to individuals, communities and private organisations through various relevant pieces of legislation available. The primary objective of the mitigation phase is to reduce exposure or vulnerability to disaster risk. Vulnerability is an important principle in disaster management.

Khan, Vasilescu and Khan, (2008:43) define vulnerability as "the extent to which a community, structure, services or geographic area are likely to be damaged or disrupted by the impact of a particular disaster, on account of their nature, construction and proximity to hazardous terrains or a disaster prone area". Fundamentally, Khan *et al.* (2008:43) are concerned with those factors that expose or leave the community at the mercy of disasters. Vulnerability is caused by underlying factors that exacerbate the effects of a disaster event. In

essence, mitigation addresses the community's pro-activeness in dealing with a disaster. Mitigation efforts result in the formulation of, for example building codes and restrictions to building of homes by communities (Tomasini and Van Wassenhove, 2009:41) near flooding rivers, dams or on unstable ground.

The *disaster response stage* is a very critical stage as it represents a reaction to a disaster event. As highlighted in the earlier sections of this chapter, a disaster event can overwhelm the resources of the affected community leaving it perilously at the mercy of the disaster event. In order to save lives and minimise damage, individuals, communities, and countries work together to render assistance to affected communities (Coppola, 2011:55). At the response stage, time is life and required resources must be moved with speed to affected people. When disaster events strike, individuals, communities, and countries must initiate disaster response and mobilise emergency supplies (da Costa et al., 2012; Dolan and Krug, 2006; Oloruntoba and Gray, 2006) when capacity to cope with devastating effects of a disaster event is overwhelmed.

Khan *et al.* (2008:46) defines capacity as *"*resources, means and strengths which exist in households and communities and which enable them to cope with, withstand, prepare for, prevent, mitigate or quickly recover from a disaster". Capacity enables affected people to minimise injuries, loss of life, and damage to property and the environment during, and immediately after a hazard event. Response to a disaster event is the most complicated of the four stages of a disaster management cycle (Coppola, 2011:60).

Response is conducted during periods of very high stress, in a highly time-constrained environment, and with limited information. As a result, the actions of those involved should be meticulous as unnecessary delays directly translate to tragedy and destruction (Oloruntoba and Gray, 2006). The task of limiting injuries, loss of life, and further damage to property and the environment forms the core of emergency response. Response includes activities that directly address needs, such as first aid, search and rescue and shelter (Cozzolino *et al*., 2012:9; Coppola 2011). It also involves the rapid resumption of critical infrastructure (such as opening transportation routes, restoring communications and electricity, and ensuring food and clean water distribution). In drought disaster management, Tadesse (2016:45) defines drought response as "efforts such as the provision of assistance or intervention during or

immediately after a drought disaster to meet the life preservation and basic subsistence needs of those people affected". The interventions to provide assistance include supply chain management initiatives that form the broader aim of this study.

In Chapter One, it was pointed out that disaster response is a stage of disaster management which attracts diverse stakeholders or actors. The different actors come with their own expectations, equipment, and missions which sometimes create discord amongst the actors (Cozzolino *et al*., 2012; Van Wassenhove 2006). The presence of diverse actors during the response stage brings to the fore an important concept of *coordination* in disaster response initiatives. According to Balcik, Beamon, Krejci, Muramatsu and Ramirez, (2010:22) the discord amongst the different actors impede the effectiveness of humanitarian supply chains.

Disaster response success depends heavily upon information available and coordination of the activities of the diverse actors (Balcik et al., 2010:22). The same authors further pointed out that coordination is complicated by the fact that each disaster event is unique with regards to the participants, needs of the victims and the communities, the timing and order of events, and the actions and processes employed.

It is important to point out that the urgency of response is also determined by the type of the disaster event. Disasters such as wildfires, droughts, and cyclones may have a significant lead time (measured in hours, days, or even weeks) and they are known as slow on-setting disasters (Van Wassenhove 2006; Carr, 1932:211). Disasters such as earthquakes volcanic eruptions can strike with almost no advance notice and these are known as sudden onset (Van Wassenhove, 2006; Carr, 1932:209). Carr (1932:209) also refers to sudden on-set disaster events as instantaneous-diffused, and explained them as those events which are over before anyone could do anything about them and wreak their effects upon the entire community. There has been extensive research on the role of supply chain management on sudden on-set disasters, (da Costa *et al*, 2012; Dolan *et al*., 2006; Gatignon *et al*, 2010; Pateman and Cahoon, 2013).

As evidenced by the classification of disaster, slow onset may provide actors time to plan whereas sudden onset does not give actors a chance to plan their actions as they are 'out of the blue' in nature. This discussion has managed to reveal that disaster phases and the type of the disaster have a bearing on the effectiveness and appropriateness of a supply chain

(Tomasini and Van Wassenhove, 2009:45). A lot of effort was given to explaining the response phase of the disaster management cycle because the phase is the spine of this study. The next sub-section discusses the recovery phase of the disaster management cycle also known as the reconstruction phase.

Even with the most robust preparedness and mitigation mechanisms, disasters always strike. Regardless of best-laid emergency plans, and even the most comprehensive preparedness programs, and the most effective mitigation programs, disasters always strike. The *recovery stage* comes after the disaster event has occurred. The major thrust of the recovery stage is the different operations that are carried out in the aftermath of a disaster that are aimed at restoring the affected communities to normalcy (Cozzolino *et al*., 2012:10). The recovery phase may take a very long time depending on the severity of the damage caused by a disaster (Cozzolino *et al*., 2012:10; Kovacs and Spens, 2007). Recovery, therefore, entails the rehabilitation of roads, power systems, water supplies, health facilities and construction of homes. In order to achieve normalcy, the community will require the intervention of the government and also the international community at large. Another popular disaster management model is known as the disaster risk management framework which is discussed in the following section.

2.2.4 Disaster Risk Management (DRM) Framework

The earlier sections of this chapter examined the Crunch, and the Pressure and Release models. In this section, the Disaster Risk Management (DRM) framework is put into focus. The DRM is the brain child of Baas *et al.* (2008:5). The purpose of DRM is to reduce the underlying factors of risk and to prepare for, and initiate an immediate effective response should disaster strike.

The DRM framework distinguishes conceptually the different phases of the DRM cycle: pre-disaster, response and post-disaster. DRM actions in the pre-disaster phase are aimed at strengthening the capacities and resilience of households and communities to protect their lives and livelihoods, through measures to avoid (prevention) or limit (mitigation) adverse effects of disaster events and to provide timely and reliable disaster forecasts (Baas *et al.*, 2008:5). The DRM framework also shows that in the response phase, communities and relief agencies focus on saving lives and property. In the post-disaster phase, the focus is on

recovery and rehabilitation. The transition between these phases is supposed to be fluid and meticulous, in particular, between the stages in which communities move from rehabilitation to development, integrating aspects of hazard mitigation into their developmental activities (Tomasini and Van Wassenhove, 2009; Baas *et al.*, 2008). The understanding of the stages of disaster risk management enables the identification of the most appropriate supply chain strategy (Cozzolino *et al*., 2012:10). Table 2.1 below outlines the phases in the Disaster Risk Management model.

Table 2.1: The Disaster Risk Management Model

Disaster Phase	Activity	Examples
Pre-disaster	*ongoing development activities*	Ongoing DRM aspects in development programmes and are meant to reduce vulnerability and also enhance community resilience.
	Risk assessment	This involves diagnostic processes to identifying the risks that a community faces. It entails risk profiling for different communities depending on identifiable sources of risk.
	Prevention	These are activities that help the communities to avoid or minimise the adverse impact of hazards.
	Mitigation	this is ensuring that there are structural/non-structural measures in place to limit the adverse impact of a disaster event
	Preparedness	These are activities and measures taken in advance to ensure effective response.
Disaster response	*Evacuation*	This entails temporary mass departure and removal of people and property from threatened locations respectively.
	Saving people and livelihoods	This is the protection of people and livelihoods during the disaster event or soon after the disaster event. The objective here is to save as many lives as possible. It is therefore provision of assistance during or immediately after disaster and assessing damage
	Loss	It is very important to obtain as much information about the impact of the disaster event on human life and assets or subsequent loss of production
Post-disaster	*ongoing assistance*	This is continued assistance until a certain level of recovery
	Recovery	These are actions taken after a disaster with a view to restoring infrastructure and services.
	Reconstruction	These are actions taken after a disaster to ensure resettlement/relocation.

Source: Baas et al, (2008) Guide for DRM Systems Analysis

Table 2.1 shows a more expansive approach to disaster risk management. The DRM model identifies three important phases for disaster risk management namely pre-disaster, disaster response and post-disaster. The model goes on to apply the stages of the disaster phase model by Carr (1932:207-218) in each of the three phases. The DRM is more detailed and promotes

the building of community resilience. The disaster management elements in Table 2.1 are in line with the *Hyogo Framework for Action (HFA) 2005-2015: 'Building the Resilience of Nations and Communities to Disaster'* to which many countries are signatories. The sound analysis of DRM systems will make a crucial contribution to assessing, and strengthening the institutional capacities needed for achieving the HFA strategic goals and the five priorities for action which are all closely linked to the broader context of sustainable development. The preceding sections are devoted to supply chain management and fundamentally humanitarian supply chain management.

2.3 Humanitarian supply chain Environment

This section deals with literature on the research question on the humanitarian environment. The understanding of the humanitarian environment provides insights on the situations in which supply chains apply. A humanitarian supply chain is essentially a complex phenomenon that operates in an environment shrouded in a lot of uncertainty. Tomasini and Van Wassenhove (2009:9) identified aspects that characterise humanitarian supply chains. Humanitarian supply chains have certain features that are unique and set them apart from commercial supply chains and these features are briefly explained in this section. The major features that been identified that characterise the humanitarian environment include the following;

Ambiguous objectives - when a disaster strikes there are different actors that descend to participate in the event (da Costa et al., 2012:560). The actors include the donors, non-governmental organisations, government departments, the media and the beneficiaries. These actors approach a disaster event with diverse sets of objectives, some of them very difficult to synchronise. According to Tomasini and Van Wassenhove (2009), actions in humanitarian response are often uncoordinated, spontaneous, unsolicited and disparate. This creates a complex situation, which ultimately affects the smooth functioning of a supply chain (Balcik *et al.*, 2010:22).

Limited resources – critical resources for a humanitarian mission are human, capital and infrastructure and most importantly relief supplies such as food stuffs, medicines, clean water among other essentials. Some disasters strike at unpredictably high magnitudes that render available resources inadequate (Tomasini and Van Wassenhove, 2009). It is standard procedure for the government to prepare for disaster risks all the time; however, some disasters are 'bolt-from-blue' with so much devastating consequences that fail all damage

limitation strategies. Humanitarian supply chains depend heavily on the availability of adequate resources to perform effectively.

High uncertainty – disasters occur at random, making it difficult to accurately plan for demand of relief aid. This uncertainty sometimes results in the supply chain being under loaded or overloaded hence failure to perform optimally. As noted by da Costa *et al*. (2012:607) in the 2004 Indian Ocean earthquake which triggered a tsunami that devastated 14 countries that border with the Indian ocean, the supply chain was overloaded with excessive unnecessary goods which consequently obstructed airports, blocking ports and customs areas. Uncertainty makes it almost impossible to anticipate time and demand for food aid hence making it extremely difficult to plan for effective supply chain interventions

Urgency – humanitarian supply chains should be designed to cope with emergency situations. Urgency emphasises on the intensity of execution of tasks (Tomasini and Van Wassenhove, 2009:10).

Politicised Environment – Tomasini and Van Wassenhove (2009) observed that humanitarian operations are highly political throughout the supply chain, from donations to distribution in the field. This means that, it is very difficult for humanitarian actors to establish and protect humanitarian space where they can work independently. Humanitarian supply chains are always under scrutiny and are prone to political interference, which sometimes affects their effectiveness during disaster response operations.

Speed – in humanitarian supply chains speed is of essence. As aptly put by da Costa *et al.* (2012:599), 'delays in delivery of relief can cost lives'. Speed is of the essence in disaster management hence supply chains must react fast in order to achieve the goal of saving lives and minimising damage. It is therefore imperative that all bureaucratic tendencies and bottle necks must be eliminated to allow for speedy responses. The supply chains must be designed such that they are able to cope with the exigencies of a sudden on-sent disaster. The next section focuses on the history of disaster management and some famous disaster cases explaining the humanitarian lessons learnt. A look at some disaster management policies of developed countries will also be brought into focus.

2.4 Supply Chain Strategies

This section examines the literature of the objective on the supply chain strategies that are applied in disaster response. There are several supply chain management strategies that can be used by humanitarian actors in order to effectively respond to disaster events. Supply Chain Management involves the management and coordination of supply chain partners and information flows. Fundamentally, supply chain designing from a commercial perspective help organisations to become more competitive and effective in servicing their markets. There are many supply chain designs that organisations may employ to achieve various goals (Krajewski *et al.*, 2013; Lysons and Farrington, 2006; Oloruntoba and Gray, 2006; Lee, 2004) and identifiable supply chain designs include lean, agile, centralised and decentralised, and triple-A supply chains. Supply chain designs are explained in the preceding sections.

The business environment has become extremely competitive hence this has resulted in the development of various supply chain designs. Supply chain designs that have been developed in modern day business include Lean supply chains, Agile supply chains and Triple-A supply chains among other designs. Some of these supply chain designs are explained in the preceding sections. In order to bring forth more insights on supply chain designs and their suitability, empirical evidence will be used in the explanations.

2.4.1 Agile supply chains

Lee (2004:105) postulates that successful companies create supply chains that respond to sudden and unexpected changes in markets. Lee (2004:105) further points out that agility is critical because demand and supply fluctuate more rapidly especially in today's competitive business environment. As pointed out in the foregoing sections, the business environment has become so dynamic as a result of competition, increasing consumer power, globalisation and shortened product life cycles. The speed with which a supply chain is able to respond to changes occurring in the business environment becomes paramount (Lu, 2011:70).

In the same vein, speed is an important consideration in Humanitarian Supply Chain Management (HSCM). In HSCM, speed entails the ability to save as many lives minimising damage as much as possible. Sometimes, it is imperative to respond at all costs in order to save more lives and minimise damage (da Costa *et al.*, 2012). Agility has the potential of making humanitarian supply chains more adaptable to different disaster situations. As has

been alluded to in earlier sections, disasters can be sudden on-set or slow on-set. Sudden onset disasters are characterised by speed in occurrence hence the agile supply chains are best suited for these disasters (Oloruntoba and Gray, 2006:116). Fundamentally, an agile supply chain can be applied at the response stage of the disaster's phase management cycle (Tomasini and Van Wassenhove, 2009:7).

Agility is a supply chain capability that embraces organisational structures, value chain configurations, information systems, logistics processes and in particular, mindset and culture (Oloruntoba and Gray, 2006:116). These capabilities are the key drivers of an agile supply chain. A key characteristic of an agile supply chain is flexibility, which should be interpreted from two sides of a supply chain (Lu 2011:70). An inside look at the supply chain, emphasises on flexibility of organisational configurations and structures. A look from the outside focuses on the market and consumer perspective thus the supply chain must deliver timely products and services required by the customers (Krajewski *et al.*, 2013; Lee, 2004; Oloruntoba and Gray, 2006).

Oloruntoba and Gray (2006:116), however, contextualise the agility of humanitarian supply chains in dealing with unstable nature of funding. Indeed, funding remains a crucial component of a successful disaster response. Empirical evidence has shown that funding and other donations if not properly coordinated, may result in supply chain overload which adversely affects the smooth flow of a supply chain (da Costa *et al.*, 2012:604). In the tsunami disaster in 2004, supply chains were actually overwhelmed by donations resulting in some of the goods deteriorating in the weather due to unavailability of proper warehousing space (da Costa, 2012:602).

2.4.2 The triple-A supply chain model

The triple-A supply chain design is the brain child of Lee (2004:104). Lee (2004:104) points out that supply chains must foster agility, adaptability and alignment over and above cost efficiency and speed. This supply chain model was developed after the realisation that lean or agile supply chains could not offer sustainable competitive advantage to organisations. Lee (2004:104) also observed that only those companies that build agile, adaptable and aligned supply chains get ahead of competition. The triple-A model makes companies grow better and faster than their rivals.

Tomasini and Van Wassenhove, (2009:7) explain that *agility* is the ability to quickly respond to short term changes in demand or supply to handle external disruptions. This feature is in agreement with a key characteristic of humanitarian supply chains namely *uncertainty*. Humanitarian supply chains operate in an uncertain environment hence agility is a critical capability. *Adaptability* is the ability to adjust the structural design of the supply chain in line with changes occurring in the market place (Tomasini and Van Wassenhove, 2009:8). This may entail the modification of the supply chain network strategy, processes, products, alliances and technologies. This capability enables supply chains to be able to transition through the stages of the disaster cycle. Supply chain strategies applied during the preparedness stage should be easily adaptable when a disaster event strikes to the response stage. Lastly, *alignment* is a supply chain capability which creates conditions that allow for the free exchange of information between supply chain partners.

2.4.3 Centralised and Decentralised supply chains

One of the important considerations in commercial and humanitarian supply chains is the structural design of a supply chain. The structural design of the supply chain can either be centralised or decentralised. The selection of a structural design impacts one way or another on the success of a humanitarian mission (Gatignon, Gatignon et al 2010 2010:103). Gatignon *et al*, (2010:103) studied the operations of the International Federation of the Red Cross (IFRC)'s transition from a centralised structure to a decentralised one. They noted that up to 2006, the IFRC's humanitarian supply chain was centralised. They postulate that the process for IFRC intervention was very slow and was mostly managed from the headquarters in Geneva in Switzerland.

In a centralised structure the first step of the process was for the IFRC to send a Field Assessment Coordination team (FACT) to assess the needs of beneficiaries. The IFRC then coordinated disaster responses by centralising information on the needs in the field in a Relief Mobilisation Table (RMT) at its Geneva headquarters before transferring this information to its suppliers, the National Societies and other donors. This kind of structural design does not suit emergency response operations as it is too slow and expensive as it also resulted in unsolicited goods being received (Gatignon *et al.*, 2010:103). However, a centralised structure may be suitable when dealing with slow on-set disaster situations (Van Wassenhove, 2006:478). Disasters such as drought do not immediately put the lives of

affected people at risk. From this perspective a centralised structure may be best suited for slow onset disasters. However, this should be well supported by an efficient early warning mechanism. Where there is poor or nonexistent early warning mechanism, a slow onset disaster can be as devastating as a sudden onset disaster event.

As a result of the poor performance of the supply chain design, the IFRC changed from centralised to a more decentralised organisation. According to Gatignon *et al.* (2010:104); the IFRC established three regional logistics units (RLU) across the globe. The three RLUs were responsible for mobilising goods, procurement, stocking, warehousing and fleet services within their respective geographical regions. The critical success factors of a decentralised supply chain are coordination, knowledge sharing, monitoring and evaluation, and advocacy and communication. A decentralised supply chain was implemented by the IFRC in the Yogyakarta earthquake in 2006. This view is also supported by Jobe (2011:2) in the Haiti earthquake which occurred in 2010. Humanitarian response achieved much more following a decentralised structure. The following sections are dedicated to explaining important element of a supply chain, supply chain performance measurement metrics, coordination and relationship management.

2.4.4 Elements of a Supply Chain

In this sub section some important supply chain management elements are explained. Understanding supply chain management is very important as each and every requires different attention. The different supply chain management elements each can separately provide an opportunity to maximise (Lysons and Farrington, 2006:26). The definition of a supply chain management was given in Chapter One and the definition insinuates on a number of aspects that need to be managed. Important aspects of a supply chain include suppliers, transport, storage and handling, distribution and performance evaluation (da Costa *el at.*, 2012; Krajewski *et al.*, 2013). Suppliers are those that supply the organisation with critical materials and services to enable production to take place. In humanitarian supply chain management (HSCM), suppliers also include donors of goods, services and funds required by affected communities. The goods that are usually sourced are food (maize, wheat, beans, sorghum and others), shelter construction materials, blankets clothes and medical supplies.

When these items have been sourced, they are transported to warehouses where they will be stored for onward dispatch to the victims (da Costa *el at.*, 2012:605). Depending on the sizes of the loads and the urgency of the requirements, transportation can either be by sea, rail, air, or road. Handling and storage of supplies is a very important aspect of HSCM. Relief supplies must be stored appropriately, free from theft, damage and deterioration. Medical supplies require special handling and storage to preserve their quality (da Costa et al., 2012:605). Food supplies such as maize, wheat, beans and other food stuffs require spacious and dry storage because of their bulky nature. Important aspects of SCM such as performance evaluation, supply chain coordination, supply relationship and risk management are examined in detail in the preceding sections. Supply chain performance appraisal is discussed in the following section.

2.4.5 SCM Performance Metrics

According Van Weele, (2006:54) if supply chain can be effectively management it is paramount to understand the supply chain management performance measurement metrics. Supply chain performance measure is an area which has drawn the attention of many researchers (Beamon and Balcik, 2008:8). In commercial supply chains, costs (of supplies, distribution, and inventory), quality and time are important parameters on which supply chains are appraised. Essential transportation of relief aid at the right cost, right quantity and speed are some of the key determinants of an effective drought relief operation. This entails the use of the most common modes of transport which are road, sea, air and railway (da Costa *et al.,* 2012). The modes of transport can be used in combination depending on the type of the supply chain. The major aim of the study was to evaluate the role of SCM in effective disaster response. It is, therefore, fundamental to identify performance metrics which can be used to determine the effectiveness of HSCM in disaster response. Beamon and Balcik (2008:14) identified three major HSCM performance metrics namely; resource performance metrics, output performance metrics and flexibility metrics.

Beamon and Balcik, (2008:14) postulate that, "*Resource performance metrics* measure the level of resources used to meet the system's objectives. Resources are generally measured in terms of the minimum requirements (quantity) or a composite efficiency metric (resource utilization), and are explicitly tied to flexibility and (usually) output. Examples of resource

performance metrics include the number of person-hours required for an activity, inventory holding costs, and heating and air conditioning costs.

Output performance metrics measure the effectiveness with which supply chains are able to supply. Ideally, output performance metrics correspond to an organization's strategic goals and to its customers' goals and values. Examples of output metrics include sales (dollars or units), % on-time deliveries, and customer responsiveness, manufacturing lead time, number of back-orders or stock-outs per cycle, quality, and the quantity of final product produced.

Flexibility metrics, as applied to supply chain analysis, describe the range of possible operating conditions that are profitably achievable by the chain. Examples of flexibility metrics include the number of automobiles that a plant can profitably produce in six hours and the shortest delivery lead time that the distribution centre can profitably achieve.

2.4.6 Coordination in Humanitarian Supply Chains

In the foregoing chapter, it was pointed out that disaster response attracts the attention of many different stakeholders who have divergent ambitions, resources and knowledge (Balcik *et al*, 2010:22). The stakeholder diversity creates serious coordination problems, some of which may infringe on the effectiveness of a supply chain. Stakeholders such as the government, international community, suppliers, volunteers, the victims and many more need to be coordinated to make sure the primary and common goal is realised. Balcik *et al.*, (2010:23) explain coordination to refer to "resource and information sharing; centralised decision making, conducting joint projects, regional division of tasks, or a cluster-based system in which each cluster represents a different sector area". Failure in coordination in HSCM has serious repercussions such as over and under loading of the supply chain, congestions at ports of entry, damages and loss of goods meant for relief purposes, and supply of goods not required for a relief operation.

Identifiable factors that affect coordination include, number and diversity of actors, donor expectations, funding structure, competition for funding, resource scarcity. The big question is who should be charged with coordination of HSCM actors? Most countries have disaster management policies that form a disaster management framework. The administering of a policy lies with a relevant government department. Such a government department should be

charged with the coordinating function without creating unnecessary bottle necks. Where a disaster is of such devastating effect, United Nations agencies may take over the role of coordinating relief operations (Coppola, 2012:85).

The primary objective of humanitarian supply changes is to save lives and to ensure that the victims of a disaster situation receive provisions as soon as possible to minimise suffering. This, however, does not imply that response to disasters should be done in a haphazard and expensive manner in order to save lives. According to Van Wassenhove (2006:10), there is now need for a paradigm shift in focus from speed to cost reduction in terms of operational performance. In essence, lives should be saved in a manner which observes efficient and effective operational methods. Optimising the performance of humanitarian supply chains requires that all the relationships among the actors involved be managed through an integrated approach to efficiently and effectively coordinate inter-organisational performance, eliminate redundancy, and maximise efficiency along the entire emergency supply chain (Van Wassenhove, 2006:6). The success of a coordinating initiative also depends on the relationships that exist amongst the actors, the subject of the following section.

2.4.6 Relationships in humanitarian supply chains

In order to have an effective and efficient disaster supply chain, there is a fundamental requirement that all the relationships among the actors involved are managed through an integrated approach in order to efficiently and effectively coordinate inter-organisational performance, hence eliminating redundancy, and maximizing efficiency along the entire emergency supply chain (Cozzolino *et al*., 2012:6). Good relationships among the actors, foster trust and free flow of information. Disaster relief supply chains engage different players who have a high degree of heterogeneity in terms of culture, purposes, interests, mandates, capacity and logistics expertise (Balcik *et al.*, 2010:23). As already been pointed out, important players in a disaster operation include governments, United Nations agencies, the military, private donors, private companies (these include logistics companies), and non-governmental organisations (NGOs). The relationships of these actors can determine the success of a humanitarian mission.

According to Cozzolino *et al*., (2012:9), governments or host governments, neighbouring country governments, and other country governments within the international community are

the activators of humanitarian logistics stream after a disaster strikes since they have the power to authorise operations and mobilize resources. Without the permission of the host government, there is no other player that can render assistance to the needy in a disaster situation. As such, host government authorisation is a fundamental requirement in inviting other players to render assistance. The engagement of other countries is a delicate issue since it can be facilitated or blocked as a result of the relationship quality between the host government and the international community.

The host government may also turn down assistance deemed to be coming from hostile governments or assistance that is viewed as a ploy to undermine the host government (Tomasini and Van Wassenhove, 2009:10). This was the major case with Zimbabwe as it declined help from Western Governments and also banned participation of certain NGOs that were viewed to further the interests of perceived hostile governments. There are also situations in which governments do not purposely try to restrict activities of relief organizations, but are simply not willing to facilitate the humanitarian work by adapting their regulations (Akhtar, Marr and Garnevska 2012:85). Chang *et al*. (2010) found out that market regulations imposed by the Chinese government on supplies needed for reconstruction activities created disincentives for companies to engage in reconstruction tasks. Such restrictions curtail the participation of more players in humanitarian missions.

Supply chain relationship management becomes more complicated especially in countries that have dysfunctional governments. In most African countries, there are weak political structures; hence the governments may take a hostile attitude towards certain countries and humanitarian organisations for fear of political influence (Tomasini and Van Wassenhove, 2009:10). Balcik *et al.* (2010:27) notes that dysfunctional governments do not often play their coordinating role during disasters, which leads to an unclear definition of the roles of the different relief organizations. Resistance from governments justified or unjustified the principle should be to put the victims of a disaster first. However, this does not mean all governments are hostile to assistance coming from other countries and humanitarian organisations. Despite the rather pessimistic examples depicted above, governments play an important and positive role in relief supply chains.

The major role of governments is to coordinate activities of relief organizations (Balcik *et al*., 2010; Tomasini and Van Wassenhove, 2003), support the relief effort through the military forces (Kovács and Spens 2007:101), or regulate NGOs' participation. Governments can also

regulate relationships of the various actors through legislation which defines the mandates of each actor in disaster missions (Day, Melnyk, Larson, Davis and Whybark, 2012:32). Clarity of mandates ensures there is no overlapping of duties, hence, making a supply chain more effective. Regulations can also limit the flow of unsolicited donations that strongly disturb relief supply chains by creating unnecessary bottlenecks (Holguín-Veras *et al*., 2012:1-12). It is important that supplies to a disaster situation should be those that are helpful to the victims. In a disaster situation, there is likely to be a lot of unsolicited supplies that may result in overloading the supply chain which may cause problems in responding to the needs of the victims.

Kusaba, Moser and Rodrigues (2011:73-93) point out the high risks of supply chain disruptions caused by political and governmental risks. Similarly, Kamann and Van Nieulande (2010:64-79) outline supply chain risks related to political instability, unknown power distribution and unforeseen power shifts in developing countries. They also point out the longer lead times observed when delivering to developing countries due to administrative requirements imposed by the governments on the importation process. Customs duties and nontariff barriers increasing costs of shipping goods across international borders have been recognized as impediments to efficient global supply chain management (Mann, 2012:7-14).

These bureaucratic tendencies slow down the movement of supplies destined to affected communities hence causing delays in disaster response (Kusaba et al. 2011:73-93). Delays in humanitarian supplies can have an adverse effect especially in disasters where there is a disease outbreak which needs to be contained such as Ebola, cholera and malaria. In such instances, relationship management between key humanitarian stakeholders must be good to ensure there are no delays in the delivery of aid. The arguments presented above that affect the smooth function of a supply chain include relationship based issues and the notion that partners to a supply chain must work together to improve the efficiency of the supply chain.

Another important role in the humanitarian aid process is played by international agreements to which governments subscribe to, for example the Southern Africa Development Community (SADC), African Union (AU) and many more. Countries such as the Democratic Republic of Congo, Nigeria and Senegal have enlisted the intervention of the AU to deal with armed conflicts. Bilateral and multi-lateral agreements enhance relations amongst member

states hence encouraging intervention by other member states when disaster strikes (Coppola, 2012).

Other important players in disaster management are United Nation aid agencies (for example WFP, UNICEF, WHO UNDP and many more). Aid agencies are actors through which governments are able to alleviate the suffering caused by disasters. Donors provide the bulk of funding for major relief activities. Donations consist of giving financial means to support humanitarian operations or provide goods and or services for free while also performing logistics operations. It is also important that governments create sound relations with United Nations donor agencies. World Food Program (WFP) has a huge presence in Southern Africa where its activity is involved with food aid.

In recent times there has been increasing participation by private companies in relief operations (Cozzolino *et al*., (2012:14). Private companies play an important role as they can act as donors, collectors and providers of logistics services. Companies are capable of providing technological support and logistics staff and managers to assist in disaster relief operations. Private companies must be encouraged to participate in relief operations through the promulgation of an enabling regulatory framework.

Private companies play a very important role in disaster management as they are the source of all supplies required in emergency situations. The management of relationships in a humanitarian operation is very critical to the success of a humanitarian operation. Where there exists a sound relationship between the participants in an operation, coordination of the activities of the supply chain partners becomes easy. According to Cozzolino *et al*., (2012) the key assumption here is that HSCM can contribute to effective disaster management if the activities of actors in a disaster situation can be coordinated. The effectiveness of HSCM can also be determined by risk that is inherent within the supply chains.

2.4.7 Supply chain risk management in disaster management

The effectiveness of supply chains can be affected by risks inherent within supply chains themselves. An appetite to identify supply chain risk and its treatment thereof help minimise supply chain disruptions. A study at Michigan State University found that supply chain disruptions and supply chain risk are among the most critical issues facing supply chain managers. Waters (2011:20) defines supply chain risk as "an event that might disrupt the planned smooth flow of materials". Supply chains have become increasingly global and, therefore, face risks of supply interruptions, financial and exchange rate fluctuations, lead

time variability, and security and protection of intellectual property rights, to name only a few. Understanding supply chain risk is very important as this may reduce the adverse affects they may cause on the performance of humanitarian supply chains.

In recent times, the trend to single sourcing has gained momentum as organisations move towards leaner supply chains. This however, can create supply disruptions if the single source fails to deliver (Lysons and Farrington, 2006). In HSCM, similar risk can be experienced if a community or government is dependent on one donor. In the event that the donor fails to deliver, this may have serious repercussions on the victims depending on the nature of the disaster. Supply managers need to continually assess risks in the supply chain and balance risk/ reward opportunities when making supply decisions.

The Supply chain council (SCC) (2008) defines supply chain risk management as "the systematic identification, assessment, and quantification of potential supply chain disruptions with the objective to control exposure to risk or reduce its negative impact on supply chain performance". Supply chain disruptions can be as a result of failure in the supply chain such as supply of poor quality, unreliable suppliers, strikes, company closures and breakdown of equipment. Supply chains can also fall victim to natural disasters such as earthquakes, floods, volcanoes, landslides and snow storms. These risks can incapacitate the supply chain partners and infrastructure to function effectively (Chopra and Sodhi, 2004; Dittmann, 2014). The overwhelmed infrastructure will not be able to move food, medical, and shelter supplies and human resources with speed to save lives and curb further damage. Waters (2011:45) agrees with Chopra and Sodhi (2004:53-61) who identify two types of risks namely internal risk (that which management can control) and external risk (that which the organisation has no control over).

The SCC (2008) proposed a supply chain risk management framework that is shown in Table 2.2 below;

Table 2.2: Supply Chain Risk Management Model

Phase	Description
Phase 1	Risk. identification; which tries to find out what can go wrong
Phase 2	Risk assessment; which tries to establish the likelihood of the risk occurring and its impact
Phase 3	Risk mitigation; which tries to identify strategies to avoid the risk or reduce its impact.

Source: Supply chain council (2008)

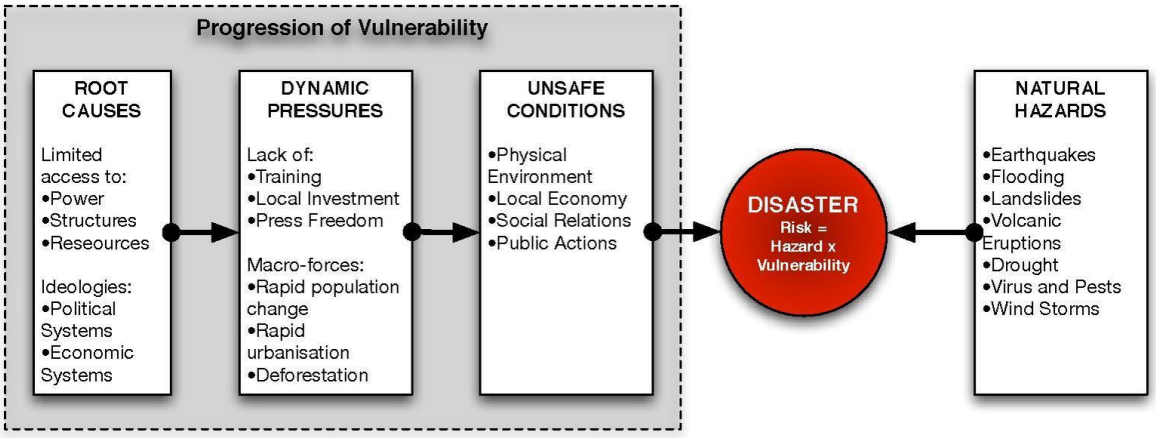
Table 2.2 provides a framework for managing risk within the supply chain. The framework provides guidelines on identifying risk inherent within supply chains. The supply chain risk management framework is important in planning for risk. Supply chain risk appetite ensures that supply chain actors are vigilant to the possibility of a disruption; hence the need to put in place mitigating measures to deal with the risk. Managing supply chain risk in disaster situations is very important because the success of a humanitarian operation depends on an uninterrupted supply chain. In some cases, disaster supply chains are supposed to respond spontaneously when a disaster strikes, hence supply chain risk must be treated before it causes disruptions. The major focus of this study was humanitarian supply chains. The following section examines the humanitarian supply chain management framework.

2.5 Factors Affecting Humanitarian Supply Chains

In chapter one it was highlighted that humanitarian supply chains are exposed to a number of factors that affect their effectiveness. In this section the Crunch model is used to identify and explain that affects the humanitarian supply chain.

The crunch disaster management model has the objective to test disaster management plans for sufficiency and adequacy in dealing with vulnerabilities and resilience of communities. The crunch model is the brain child of O'Keefe *et al.,* (1976). Figure 2.2 shows the schematic presentation of the Crunch model.

Figure 2.4 The Crunch Model



Source: Taking the naturalness out of natural disasters O'Keefe et al (1976)

Figure 2.4 shows the combination of underlying factors that result in a community being exposed to the effects of a disaster. The model identifies root causes coupled with dynamic pressures and unsafe conditions that exacerbate community vulnerability when disaster strikes. In simple terms, the summation of vulnerability and a hazard trigger event results in a disaster.

The crunch model identifies three fundamental ingredients for the occurrence of disasters namely underlying causes, unsafe conditions and trigger events. As discussed in the foregoing sections, vulnerability is inherent in poor physical, social, economic and environmental conditions (ISDR, 2007). McEntire (2001:191) also identified vulnerability as a function of physical, social, cultural, political, economic and technological factors that can result in the community being exposed to a disaster event. Coppola (2012:87) and McEntire (2001:191) are in agreement on the factors that cause communities to be vulnerable.

2.5.1 Physical Vulnerability

Physical vulnerability is brought about by people building their properties in the proximity of a triggering agent such as a dam or a river, improper construction of buildings and degradation of the environment (McEntire, 2001:191). In drought disaster management terms Tadesse, (2016:45) defined drought vulnerability as "the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a drought". In Zimbabwe, communities that live in ecological regions IV and V are exposed to drought disaster because they live in regions that receive the least annual rainfall that do not sustain meaningful crop farming.

2.5.2 Social Vulnerability

Social vulnerability is as a result of a community having limited education including insufficient knowledge about disasters, inadequate routine and emergency health care, massive and unplanned migration to urban areas and marginalisation of specific groups and individuals (McEntire, 2001:191). Social vulnerability is determined by the demographic profile of a society (for example, number of female and child headed households, number of aging people in the society, number of orphans) (Carr, 1932:215)

2.5.3 Cultural Vulnerability

Cultural vulnerability can be brought about by public apathy towards disasters, defiance of safety precautions and regulations, loss of traditional coping measures and dependency and an absence of personal responsibility (McEntire, 2001:191). Cultural vulnerability can frustrate disaster response at every stage of the disaster phase model as the people may be reluctant to abandon their cultural beliefs, values and norms. The reluctance by communities to embrace disaster awareness is further exacerbated by religious beliefs which compel followers to behave in certain prescribed religious ways at the expense of safety (Schwartz, 1992). The power of cultural beliefs was demonstrated in Indonesia during the Merapi volcanic eruption of 2006. The Jevanese community refused to heed warning about the impending volcanic eruption by the government but only vacated the area after they got instruction from their traditional leaders (Lavigne, De Coster, Juvin, Flohic, Gaillard, Texier, Morin and Sartohadi, 2008:273).

2.5.4 Political Vulnerability

Political vulnerability is also a result of minimal support for disaster programs among elected officials, inability to enforce or encourage steps for mitigation, over centralisation of decision making and isolated or weak disaster institutions (McEntire, 2001:192). In other words, the communities are exposed as a result of lack of political will power to advocate for strong disaster management structures. Tomasini and Van Wassenhove (2009:10) also point to how humanitarian supply chains are heavily politicised. Aid assistance from donors who are presumed to harbour hidden agents may be rejected by governments. In some cases, political leaders use aid assistance in order to further their political careers at the expense of the victims.

2.5.5 Economic Vulnerability

Economic vulnerability manifests as a result of growing divergence in the distribution of wealth which may result in poverty, the pursuit of profit with little regard for adverse consequences thus wasting away resources for disaster prevention, planning and management (McEntire, 2001:192). Impoverished communities are inherently exposed to diseases and starvation (Khan *et al.* (2008). In cases of sudden onset disasters, poverty stricken communities are usually the hardest hit (ISDR, 2007) because of lack of capacity to mitigate and respond to disasters.

2.6.6 Technological Vulnerability

Technological vulnerability is caused by lack of structural mitigation devices, over reliance upon or ineffective warning systems, carelessness in industrial production and lack of foresight regarding computer equipment (McEntire, 2001:192). The development of effective early warning systems is fundamental. Tadesse (2016:45) defined drought early warning systems as "the set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organisations, threatened by a drought to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss". Government and communities are exposed to hazards if they are not up to date with technologies to anticipate disasters and manage the effective flow of disaster information.

2.6 A Historical and Empirical review

This section looks at some historical of disasters and supply chain principles have been applied to some of them. A historical and empirical review of disasters provides important lessons for present and future response. Disasters have afflicted mankind from the time of Noah's ark in the Old Testament as can be read in the bible. In Genesis 6 from verse 11 to 13 we read; "Now the earth was very corrupt in God's sight and full of violence. God saw how corrupt the earth had become, for all the people on earth had corrupted their ways. So God said to Noah, I am going to put an end to all people, for the earth is filled with violence because of them". Indeed, God kept his promise to Noah and wiped out the whole generation. Again in the book of Genesis Chapter 19 of the bible, fire decimated the cities of Sodom and Gomorrah, killing every living creature in them.

Back then in biblical times, sin was the source of major calamities to befall mankind. Hence, living according to God's principles was an assured source of protection against disease,

famine, floods and wars. The source of protection from calamities is corroborated in 2 Chronicles 7:14 that says; " If my people which are called by name, shall humble themselves, and pray, and seek my face, and turn from their wicked ways; then will I hear from heaven, and will forgive their sins, and will heal their land".

The bible in Genesis Chapter 41 provides a typical model for modern day drought disasters management. Joseph interpreted Pharaoh's dream that there will be seven years of plenty and seven years of severe famine. Joseph was tasked with ensuring that infrastructure to harness all the produce of the seven years of plenty in preparation for the seven years of severe famine is put in place. Joseph's success was largely premised on his astuteness to devising an effective supply chain management mechanism. This supply chain comprised of buying grain from farmers, storing it away in the seven years and most importantly the grain was effectively transported from all over Egypt. The Egyptian illustration of drought disaster management clearly reveals the need for a well coordinated supply chain in order to be effective in dealing with a disaster situation. Even since then, disasters continued to brutalise mankind in unimaginable proportions as shown in table 2.3 below.

Table 2.3 Disasters in the history of mankind

Disaster	Year	Number killed
Mediterranean earthquake (Egypt and Syria)	1201	1,100,000
Shaanzi earthquake (China)	1556	830,000
Calcutta typhoon (India)	1737	300,000
Caribbean hurricane (Martinique, St Eustatius, Barbados)	1780	22,000
Tamboro volcano (Indonesia)	1815	80,000
Influenza epidemic (world)	1917	20,000,000
Yangtze River flood (China)	1931	3,000,000
Famine (Russia)	1932	5,000,000
Bangladesh cyclone (Bangladesh)	1970	300,000
Tangshan earthquake (China)	1976	655,000

Source: Coppola (2011): Introduction to International disaster management.

As can be seen on table 2.3 above, disasters struck in various forms and also in different parts of the world. While this may seem to be in history, disasters are still wrecking even in this day and era. The World Bank (2013) reported that from 1980 to 2012, disaster-related losses

amounted to US$3,800 billion worldwide. It reported that during the same period, extreme weather related disasters accounted for 18200 events which resulted in losses amounting to US$2,800 billion and a total of 1.4 million deaths. The report goes on further to paint a gloomy picture of the future by forecasting that, due to global climate change, developing countries face mounting losses from severe floods, droughts, and storms. It also states that, by 2030, there could be 325 million people trapped in poverty and vulnerable to weather-related events in sub-Saharan Africa and South Asia. The history of disasters is very important for the present generation as it provides lessons to be learnt. Understanding the history and also keeping an eye on the future of disasters, helps to build resilience against disaster events. Most importantly historical information sets precedents that can be applied for future supply chain response to disasters. The global occurrence of disasters has called for a global approach to disaster management. The global approach has resulted in the international community developing an integrated approach to disaster management.

2.6.1 Disaster Management: a perspective from developing countries

This is an overview of countries situated in Africa, Asia and South America. According to Yazdanipour and Yazdanipour (2012:231), Asia accounts for more than half of the world's disasters. The disasters range from earth quakes, floods, mud slides and volcanoes. The African continent is ravaged by disease epidemics, droughts, floods and civil unrest. As pointed out in the foregoing section, the World Bank predicted that Africa will be the hardest hit by weather induced disasters. This is why it is imperative for developing countries to be signatories to the United Nations and United Nations Agencies charged with disaster management. In addition to membership of the UN, most countries have their own disaster management policies frameworks that endeavour to deal with disasters.

Chhetri (2001) noted that lack of resources is the major cause of vulnerability in most African countries. Save for a few countries like South Africa, Egypt and Morocco, to mention just a few, most developing countries lack resources to put in place robust disaster risk reduction structures (Chhetri, 2001). Chhetri (2001:63) points out that resource constraint, a lack of public awareness, low literacy rate, the absence of modern technology, undeveloped early warning systems and many other factors incapacitate developing countries to cope with disasters. To compound disaster awareness in developing countries, Yazdanipour and Yazdanipour (2012:2300) observed that information that reaches the public on disasters has

tended to focus on disasters of large magnitudes, involving tremendous loss of life, property and infrastructure. This has created the public perception that disasters are completely rare hence lack of disaster awareness. Chhetri (2001) also found out that in most Asian countries disasters are viewed as acts of God hence making it almost impossible to implement any meaningful disaster risk reduction measures.

The African Continent is also faced with many challenges that range from armed conflicts, epidemics, famines to floods, which bring a lot of suffering and death to many people. The International Medical Corp (2014) reported that the Ebola pandemic wrecked West Africa. Ebola is a severe acute viral illness that is often characterised by sudden onset of fever, intense body weakness, muscle pain, headache, and swollen throat. This is followed by vomiting, diarrhoea, rash, impaired kidney and liver function and in some cases both internal and external bleeding (WHO, 2014). Since its outbreak on April 1, 2014 in Guinea, the epidemic has spread throughout West Africa and counties such as Liberia and Sierra Leone are the most affected. The International Medical Corp (2014) reported over 16000 cases of Ebola and over 6000 deaths in Liberia, Sierra Leone and Guinea.

The horn of Africa remains vulnerable to persistent famines. According to the United Nations, a famine is failure of food production, failure of people's ability to access food and failure of political response by governments and international donors. Ethiopia has experienced some of the deadliest famines in world history. According to Kloos and Lindtjorn (1990:121-136), it is estimated that over 250,000 died between 1973 and 1974 as a result of a severe famine and a million people died between 1984 to 1985 (Kidane, 1986). The OXFAM (2012) in their report entitled 'The food crisis in the horn of Africa indicated that famines remain a serious threat to the well being of millions of people in Somalia, Ethiopia and Kenya'.

Another disaster peculiar to Africa is armed conflict, which has dragged some parts of continent into turmoil and left scores of people in serious poverty. During the past 15 years, almost US$300 billion has been used to finance armed conflicts in Africa, money which could have been used to lift the continent out of poverty and to prevent the onset of disease epidemics (International Action Network on Small Arms, 2014). According to OXFAM (2005) between 1990 and 2005, 23 African nations have been involved in armed conflict; namely Algeria, Angola, Burundi, Central Africa Republic, Chad, Democratic Republic of Congo and Ivory Coast among others. These armed conflicts have left thousands of people

dead and thousands more displaced, infrastructure severely damaged and economies of these nations devastated. All these disasters have resulted in the need to perfect the art of humanitarian disaster response in Africa. In this section disaster management has been discussed in general. The following section takes a closer look at some specific drought disaster management cases in a few selected African countries.

2.6.2 World disaster cases and the SCM lessons learnt

This section looks at a few selected disasters that shock the world because of their resultant destruction magnitudes. These disasters are examined in light of the supply chain management issues that can be learned. Disasters bring about destruction of varying proportions. These disasters have resulted in loss of life and destruction running into billions of dollars. The disasters also cause displacement of hundreds of thousands of people. According to Park, Hong and Roh (2013), the World Bank estimated that the cost of damage of the Japan earthquake was $235 billion, Hurricane Katrina $81.2 billion, Haiti earth quake $8 billion and the 2004 tsunami 9.5 billion. Pettit *et al.*, (2011) submits that the tsunami provided evidence that the effectiveness of the emergency aid response hinges on logistic speed and efficiency. There is need to increase the awareness of the crucial role of logistics in humanitarian relief operations (Christopher and Tatham, 2011). When partners in a humanitarian supply chain become increasingly aware of the value of logistics, coordination and planning becomes easy.

The Indian Ocean earthquake that occurred in 2004 and subsequently triggered a tsunami caused serious destruction to 14 countries with Indonesia, Sri Lanka, Maldives, India and Thailand the hardest hit. The disaster affected an estimated 1.7 million people and also an estimated 227 thousand people perished as a result. The catastrophe caused a lot of damage to infrastructure and left millions of people homeless. As a consequence, the economies of the 14 countries took a huge knock, leaving millions of people out of jobs. This disaster event provided insightful lessons that could be learnt from a supply chain point of view. As noted by da Costa *et al*. (2012:602) discord in supply chain coordination resulted in the overloading of the supply with unnecessary goods. The Indian Ocean tsunami was characterised by low quality of humanitarian operations and excess donations as unnecessary goods caused a supply chain overload (da Costa *et al.*, 2012:602). Also, as observed by da Costa *et al.* (2012), the resultant effects were airports obstructions, blocked ports and customs areas by excess container, saturated warehouses, and expensive materials and equipment deteriorated

in the sun and rain. These goods congested airports, sea ports and storage spaces. This affected the effective distribution of necessities to the affected communities. Another important issue coming out of this disaster case is that of coordination (Beamon and Balicik, 2008; Krejci *et al.*, 2010:22). The chaos at airports and sea ports showed lack of coordination, hence congesting the supply chain.

In another disaster case, the northern regions of Pakistan and Indian Kashmir were hit by a 7.6 earthquake on the Richter scale in 2005. The earthquake affected an estimated 3.5 million and left about 73 thousand dead. According to da Costa *et al.* (2012), the tragedy was further exacerbated by an extremely rugged topology leading to the affected areas, armed conflict in the region and an impending winter that endangered the homeless. As a result, the greatest challenge humanitarian action faced was to speedily evacuate the wounded, control the damage and to supply medical and food products. In order to move supplies the operation had to rely on road and helicopters to reach about 200 distribution points.

The major challenge with this disaster was risks that were supply chain related. Destruction of the road network, which in some cases were very ragged, posed serious challenges to the delivery of food and medical supplies. In the Pakistan earthquake, disaster transport capacity prevented the effective dispatch of goods to deprived areas (da Costa *et al*., 2012:602). This resulted in some affected regions failing to receive the major groups of supplies, namely food and medical supplies, water, shelter, clothing, construction materials and tools. This was caused by poor transport infrastructure and lack of transport capacity. Helicopters were used to reach cut off communities. However, considering the quantities to be ferried and also the number of people needing evacuation, it was always going to be a difficult mission.

Another disaster case was the mountainous region of Rio de Janeiro which was under siege from torrential rain fall which resulted in floods in 2011. The floods were followed by landslides that were ranked by the United Nations as the 8th largest landslides in world history (da Costa *et al.*, 2012:603). The flooding and the pursuant landslides affected about 36,000 people leaving about 900 dead. Humanitarian supply chain issues were aptly articulated by da Costa *et al*. (2012:603) who submitted that; ‘the initial constrains such as lack of information about the real extent of the disaster, looting and insecurity in some areas affected, lack of adequate transport for the operation, difficulties in the use of communication systems available due to topography of the region, poor quality maps of the region available, lack of

floating equipment, reduced amount of equipment for restoration of traffic, and great destruction of access to affected areas'. Such a disaster situation creates an almost impossible humanitarian supply chain environment.

Lastly, according to the World Health Organisation (2011), Japan was hit by an earth quake that was followed by more than 50 aftershocks, seven of which measured 6.3 magnitudes on the Richter scale. Subsequently, a tsunami struck a stretch of 500 km of coastal areas. The tsunami also triggered the Fukushima nuclear power plant disaster which reached level 7 on the International Nuclear Events Scale. The knock-on effect of the disasters resulted in a multiple challenges being faced, leaving about 16 thousand people dead and 400 thousand affected. In the Japanese earthquake, infrastructure was severely destroyed, interrupting fuel, water, electricity and food supplies (da Costa *et al*., 2012:602). The disaster paralysed the transport, communication and logistical support, limiting all response activities.

There are many other cases of disasters such as the Haiti earth quake in 2010, Hurricane Katrina in 2005 and many other disasters that have left nations reeling from the devastating effects of these calamities. In all these disaster situations, humanitarian supply chain challenges emanated from poor coordination, poor communication, poor road networks and infrastructure. In the aftermath of Hurricane Katrina in 2005, Dolan and Krug (2006:59) observed that there was role confusion, lack of coordination, and communication failures amongst the participants who responded to the disaster. da Costa *et al.* (2012:601) also observed that in many disaster cases there was a wide mismatch between needs assessment and what is delivered to victims. This ultimately resulted in overloading the supply chains with goods that were not relevant to the needs of the affected people.

In conclusion, it is apparent that responding to disasters should not be based on intuition, but should be a carefully planned process that should not only be efficient but also very effective. A lot of time and money is lost when goods that are not required are delivered to affected communities. As observed by Oloruntoba and Gray (2006:116), "there is evidence of a lack of planning in humanitarian supply chains, resulting in inefficiencies, for example overuse of expensive and unsafe air charter, failure to pre-plan stocks, congestion caused by unplanned deliveries, and a lack of inter-organisational collaboration for information systems". The observation points to the fact that, there is less emphasis on optimising, given the limited resources available in humanitarian supply chains

There are many players that are involved in a humanitarian supply chain. Therefore, humanitarian relief operation management must engage every player, some who may have a high degree of heterogeneity in terms of culture, purposes, interests, mandates, capacity, and logistics expertise.

2.7 An Integrated international approach to disaster management

The massive danger posed by disasters has led to international concerted efforts to disaster management (Coppola (2011). The report by the World Bank in the year 2013 served as a wakeup call to nations and the international community at large to brace as the worst is yet to come. There is need for a paradigm shift where disaster management ceases to be the responsibility of individual nations but a collective responsibility of the international community. There is no single nation that has sufficient capacity to deal with disasters. As such, this has resulted in the United Nations adopting the Yokohama strategy on Global Recognition of the need for disaster management of 1987.

This resolution was a follow up to the Yokohama strategy on Global Recognition of the need for disaster management of 1994. These actions were taken to promote internationally coordinated efforts to reduce material losses and social and economic disruption caused by natural disasters, especially in developing countries (Coppola, 2011). In order to achieve this objective, the United Nations (UN) declared a resolution in 1990 called the International Decade for Disaster Reduction (IDNDR). The stated mission of the IDNDR was to improve each United Nations member country's capacity to prevent or diminish adverse effects of natural disasters and to establish guidelines for applying existing science and technology to reduce the impact of natural disasters. The following section presents an Africa perspective to disaster management.

2.8 An Overview of some Drought Disaster Management frameworks in Africa

African countries, especially those situated in the south of the Sahara and those in the Sahel region, are prone to drought disasters. Drought-prone countries in Africa have found it necessary to develop national strategies and policies to manage droughts more effectively. A few examples of African countries' drought disaster initiatives as well as those of regional, continental, and international efforts are briefly discussed below.

2.8.1 Ethiopia

Ethiopia experienced severe drought since the 1970s, with the most serious being experienced between 1972-73 and 1984-85, and more recently in 2006, 2011, and 2015. The 1972- 73 droughts degenerated into a famine. According to Tadesse (2016:8), during the 1970s droughts Ethiopia did not have a disaster management system. However, the drought disaster experiences resulted in the formation of the Relief & Rehabilitation Commission (RRC) in 1973, which in 1995 evolved into the Disaster Prevention and Preparedness Commission (DPPC) (Hillier and Dempsey, 2012:34). In 2004, the DPPC was split into two which saw the formation of the Disaster Prevention and Preparedness Agency (DPPA) and the Food Security Coordination Bureau (FSCB). Because of chronic drought disasters in Ethiopia, the mandate of the FSCB was to focus on responding to chronic food insecurity. In 2008, the Disaster Risk Management and Food Security Sector (DRMFSS) was established under the Ministry of Agriculture, with a primary mandate of establishing proactive disaster risk management initiatives (IGAD, 2013; UNISDR-AF, 2012; Hillier and Dempsey, 2012:34). Tadesse (2016:9) points out that Ethiopia has formalized disaster risk management and is in the process of revising its disaster prevention and management policy to improve preparedness and response systems. To this day a framework for disaster management in Ethiopia is the National Policy and Strategy on Disaster Risk Management (NPSDRM) of 2009. However like many other national drought disaster management policies supply chain management is never provided for. The WFP (2016) reported that Ethiopia was a priority for food aid. The report also identified lack of transport and warehousing capacity, congestion at few available storage facilities and accessibility challenges due to a poor transport network where the major impediments to effective relief operations.

2.8.2 Kenya

According to Tadesse (2016:9), Kenya has experienced more than 10 recurrent severe droughts since the 1970s. The author goes on to state that 80 % of Kenya’s landmass is classified as arid and semi-arid lands. Due to frequent droughts, Kenya drafted a drought contingency plan in 1985. In 1992, the Emergency Drought Recovery Project was established and later succeeded by the Arid Lands Resource Management Project (ALRMP). These were, however, short-term project-based interventions which were being carried out when drought periods were becoming increasingly frequent and intense, and directly affecting the household food security and livelihoods of Kenyan communities. Because of the recurrent

droughts the Kenyan government established initiatives aimed at proactive thinking on drought management and the need for increased coordination in long-term and short-term efforts to build community resilience (Hillier and Dempsey, 2012:34). As part of its efforts to building resilience, the Kenyan government established a "Country Programming Framework" aimed at ending recurrent drought emergencies (EDE) in the country. The framework mobilised the efforts of the local communities, the Government, civil society, private sector, countries in the Horn of Africa, and development partners (WFP, 2012). In 2016, the Kenyan government established the National Drought Management Authority (NDMA) to provide a sustainable framework for drought disaster management (Tadesse, 2016:9). In the Kenyan situation, effective drought relief operations were affected by lack of adequate warehousing capacity and how to get food aid to pastoralists (Eastern Africa Grain Council, 2009).

2.8.3 Namibia

In 1995, the Namibian government established a national multi-sectorial drought task force to draft a national emergency and long-term drought management policy proposing long-term and short-term drought relief measures. The drought task force initiative paved the way for the promulgation of the national drought policy by the government in 2005. The national drought policy was conceived after the realisation that declaring drought frequently resulted in high costs, creation of dependency among aid recipients and promotion of degradation of resources through inappropriate assistance (Tadesse, 2016:10). The National policy was established to ensure development of an efficient, equitable, and sustainable approach to drought management. However, according to UNICEF (2103) report on the drought situation in Namibia, there are challenges in identifying and quantifying the number of affected people. Accurate information is imperative for effective drought relief planning.

2.8.4 South Africa

Lessons learned from the 1930s drought disaster, followed by other droughts in 1960, 1980 and early 1990s and coupled with the great depression, spurred South Africa early on to start thinking in terms of drought disaster management (Tadesse, 2016:10). South Africa is one of the countries that have invested a great deal into developing a cohesive national drought policy (Tadesse, 2016:10). The broad aims of the policy are to encourage risk management, assist farmers financially, protect natural resources, promote the best use of resources for

individual farmers, and help farmers maintain a nucleus breeding herd during a drought. With this policy, farmers must adopt specific resource conservation and long-term sustainability measures, such as adherence to established grazing capacities, to be eligible for financial aid. The following section looks at disaster management frameworks from some developed countries and how the frameworks have performed in disaster situations. In comparison to other drought disaster management policies there are no identifiable supply chain challenges for South Africa. The progression of economic development of South Africa is higher than many African countries hence no major supply chain issues identified.

2.9 Disaster Management Policies; a perspective of some developed countries

Countries have national disaster strategies that are normally encapsulated in a national disaster management policy. These national policies provide a framework or guidelines for dealing with disaster situations at different levels in the society. Disaster policies differ country by country depending on the disaster risk profile of each country (Coppola, 2011). The United Nations in 2005, through the Hyogo Declaration, called upon member states to have the primary responsibility to protect the people and property on their territory from hazards, and thus, it is vital to give high priority to disaster risk reduction in national policy, consistent with their capacities and the resources available to them (UNISDR 2005a, 1-3). The declaration by the United Nation placed emphasis on member states to move away from reactive policies in favour of those that work towards disaster risk reduction (i.e disaster mitigation and preparedness).

2.9.1 The United States of America (USA) Disaster Management Policy review

In the United States of America disaster activities are primarily regulated by the Robert T. Stafford Disaster Relief and Emergency Assistance Act (1988). The Stafford Act defines a disaster as "Any natural catastrophe (including hurricane, tornado, storm, high water, wind driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm or drought), or regardless of cause, any fire, flood or explosion, in any part of the United States, which in the determination of the president causes damage of sufficient severity and magnitude to warrant major disaster assistance under this Act to supplement the efforts and available resources of states, local governments, and disaster relief organisations, in alleviating the damage, loss, hardship, or suffering caused thereby". From this definition it is very clear that the USA is faced with a plethora of disasters.

The Federal Management Agency (FEMA) is responsible for operationalising the Stafford Act and its primary mission is to "To reduce the loss of life and property and protect the Nation from all hazards, including natural disasters, acts of terrorism, and other manmade disasters, by leading and supporting the Nation in a risk-based, comprehensive emergency management system of preparedness, protection, response, recovery, and mitigation" (FEMA, 2008). In essence FEMA's primary objectives are preparedness and response. At the core of its operations is a robust supply chain management structure.

FEMA has permanent logistics centres that receive, store, ship, and recover disaster commodities. These centres are spread all over the USA. While the USA disaster policy places emphasis on preparedness, structural weaknesses in the policy were exposed in the aftermath of hurricanes Katrina and Rita. According to Henstra and Mcbean (2005:303), in the case of hurricane Katrina, reductions in finding or poor administration might be blamed for the failure of the local flood infrastructure in New Orleans, the event's impacts also illustrate the limits of structural controls and need for broader thinking about the root causes of disasters. Further to this thinking, Von Meding (2012:921) posed the question; "How did New Orleans develop into a major US city considering it is situated in such vulnerable location?"

This essentially points to the issues of vulnerability. The planning of cities should be such that there is no construction of building structures in low lying areas that are vulnerable to flooding. Even though the USA policy on disaster management addresses issues of disaster reduction, on the ground the situation can be totally different as hurricane Katrina exposed that there were no adequate disaster mitigation measures in place prior to the storm (Von Mending, 2012:921).

2.9.2 The United Kingdom (UK) disaster management Policy review

According to Henstra and Mcbean (2005:306) disaster management policy in the UK was based on the Civil Defence Act of 1948. The review of the Civil Defence Act led to the enactment of the Civil Contingencies Act of 2004. The new Act was fundamentally built around the concept of resilience. The Act defined resilience as "the ability at every level, National, regional and local to detect, prevent and, if necessary, handle disruptive challenges"

(Von Mending (2012:920). Most importantly, the Act places disaster mitigation and risk reduction at the core of community resilience. In 2007 the city of Hull was hit by floods and again this exposed the authorities in as far as disaster mitigation is concerned. According to Von Mending (2012:920), Hull City has a Victorian era drainage system which suffered from effects of age and neglect. The lessons to be learnt are that disaster risk management is an ongoing process. Vulnerability assessments must be carried out at regular intervals in order to have an accurate risk profile of the place where communities live.

2.9.3 Australia Disaster Management Policy review

In 2002 the Council of Australian Governments (COAG) recommended that there be a shift from the response and recovery orientation to anticipation and loss reduction (Henstra and Mcbean, 2005). The COAG identified that there was limited resourcing on the implementation of mitigation measures identified in disaster risk management studies. In response to these recommendations, the Australian government availed approximately $45 million for approved mitigation projects that included the purchase of land and/or buildings in high risk areas, disaster proofing prone buildings, installing disaster warning systems and implementing engineering works (Local Government Association of South Australia, 2004). Fundamentally the Australian government's efforts are to treat disaster risk before its manifestation (Henstra and Mcbean, 2005). By purchasing land and buildings in areas that are prone to disaster risk, the government effectively avoided the hustles of responding to emergency situations. This is an example of a robust forward looking disaster policy with the potential to yield phenomenal results. Effectiveness in responding to disaster events is always desirable but effectiveness in anticipation and loss reduction is phenomenal.

The disaster policies review from USA, UK and Australia provide some invaluable lessons. Policies provide guiding frameworks but executing these policies is of paramount importance (Henstra and Mcbean, 2005). With robust polices and rich resources, it has been revealed in the Hull City flooding and the hurricane Katrina disaster in 2005 which caused deadly floods in New Orleans, that policies are not an end in themselves, but that building resilience is an ongoing process.

2.10 Conclusion

This chapter has explored the relevant theories in Disaster management and Supply chain management. The disaster management cycle was explained, which is very important as it forms the basis on which disaster management literature is anchored. Supply chain theories were also explained from a humanitarian perspective, revealing the supply chain performance metrics relevant for effective disaster response. Landmark disaster cases were highlighted with a view to explaining the supply chain issues arising from these cases. Chapter 3 focused on Zimbabwe.

Chapter 3

Disasters: the Zimbabwean perspective

3.1 Introduction

This chapter focuses on the Zimbabwean situation on disaster management. The chapter begins by giving an overview of the Zimbabwean situation. It also looks at the traditional community based food security known as Zunde raMambo or Isiphala seNkosi (the chief's granary). The national disaster management framework is also discussed. The chapter outlines and explains the variables deemed peculiar to the Zimbabwean context, such as culture, politics and leadership attitudes that can enable or hinder the role of supply chain in responding to drought induced disasters. In keeping with the objectives of the study, the disaster management environment is examined and the structures of disaster management in Zimbabwe explored from a policy perspective.

3.2 Overview

Zimbabwe is afflicted by many types of disasters, namely droughts, floods and epidemic disease outbreaks. The Table 3.1, compiled from data extracted from the International disaster database, relates to Zimbabwe from the year 2000 to January 2014.

Table 3.1 Types of common disasters in Zimbabwe

Disaster type	Cause	Number of events	Total number killed	Total number affected	Damage US$(000)
Drought	Drought	6	0	14,800,000	51,000
Epidemics	Bacterial, Parasitic, Viral infections	21	6,337	622,778	Unspecified
Floods	Weather	9	273	341,520	276,500
Storms	Weather	3	19	Unspecified	1,800

Source: EM-DAT: The OFDA/CRED International Disaster Database.

As depicted on Table 3.1 above, in a period of 14 years Zimbabwe experienced a total of 39 disaster events, 6629 people died and over 15 million people were affected. There was no

death recorded as a result of drought in the same period. During the 14 year period more people were affected by droughts, numbering up to 14.8 million cumulatively (EM-DAT, 2014). The number of droughts and that of affected people will continue to increase hence the country should be prepared to respond to these impending disasters. The International Bank for reconstruction and development, in conjunction with the World Bank in 2013, in a paper entitled Building Resilience: integrating climate and disaster risk into development, reported that; "As the global climate continues to change, developing countries face mounting losses from severe floods, droughts and storms. By 2030, there could be 325 million people trapped in poverty and vulnerable to weather related events in sub-Saharan Africa and South Asia".

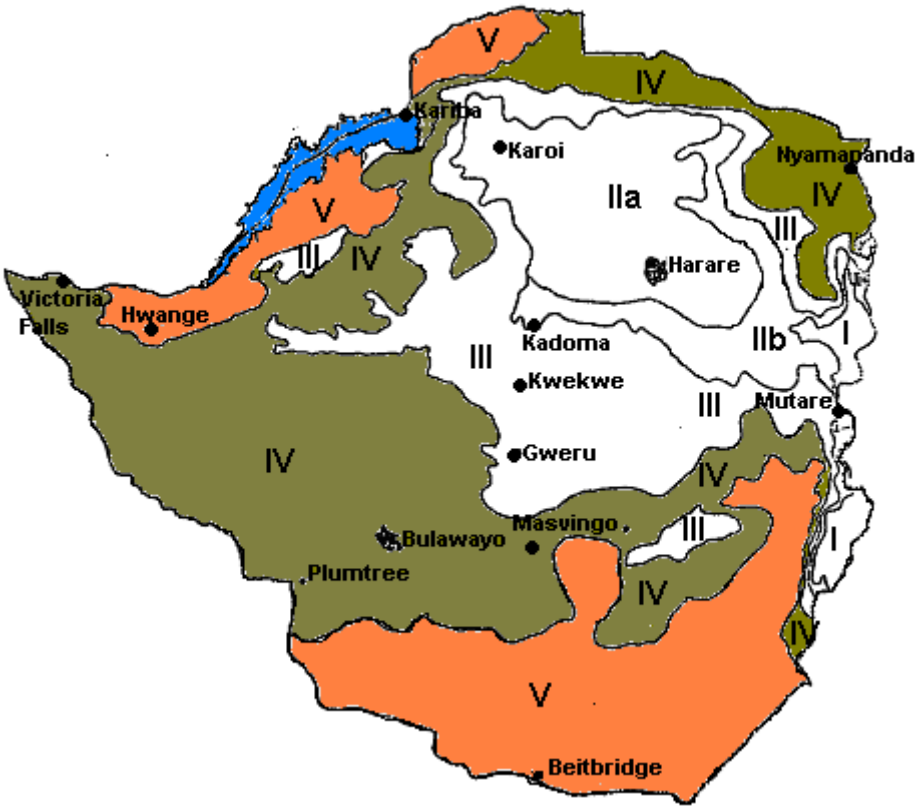
The report by the International Bank for Reconstruction and Development is testament to the fact that disasters that are related to weather will increase. In chapter one of this study it was indicated that Zimbabwe is situated in the Sub-Saharan Africa, which is prone to the El-Niño effect. The El-Niño effect results in significant reduction in precipitation over the country. Consequently, the country experiences acute food shortages that leave communities in need of food aid.

3.2 Drought in Zimbabwe

Zimbabwe was once referred to as the bread basket of Southern Africa. The country had a blooming agricultural sector that was contributing significantly to the country's gross domestic product (GDP). The thriving agricultural activities in Zimbabwe got recognition even at the international stage. The regional block, SADC, gave Zimbabwe the chairmanship for the agricultural portfolio in recognition of its excelling agricultural industry. However, from the late 1980s, the country started losing this status as a result of persistent droughts. Drought is the most common hazard and accounted for six out of 10 top disasters in the country between 1982 and 2013 as shown on Table3.1 above. Drought in Zimbabwe is linked to the warm El-Niño-Southern Oscillation (ENSO) in the Pacific Ocean, which has worsened since the 1980s. According to Patt, Suarez and Gwata (2005:12623), the El-Niño-Southern Oscillation is caused by the rising temperatures over the Eastern Equatorial Pacific Ocean. The on-set of the El-Niño results in significant precipitation reduction in most parts of Zimbabwe. The frequent occurrence of the El-Niño phenomenon in recent times has exposed the country to drought disasters than ever before.

The droughts have resulted in certain parts of the country experiencing acute food shortages. Pickering and Owen (1994) defined drought as "periods of increased dryness due to precipitation falling far below the expected amount of rainfall expected for a particular region". Zimbabwe is divided into five ecological regions which are based on the amount of precipitation expected for each region. The ecological regions are I, II, III, IV and V. Regions IV and V receive minimum annual rain fall and are not suitable for crop farming. Regions I to III receive normal rain fall suitable to sustain meaningful crop farming. The rainfall patterns in recent times, however, have shown that regions I to III have been receiving below normal rainfall. In Zimbabwe, drought occurs countrywide, almost once in every two years as noted in the world disasters database (EM-DAT, 2014). However, drought is chronic in semi-arid agro-ecological regions IV and V. Drought incidences are lowly spreading to the rest of the country because of seasonal shifts and increased dryness (Patt *et al.*, 2005; Masendeke and Shoko, 2014; Mararike, 2001:53-65). Figure 3.1 below is a map showing the ecological regions in Zimbabwe.

Figure 3.1 Map showing the five ecological regions in Zimbabwe



Source: http://www.fao.org/ Ecological regions in Zimbabwe: Accessed 15/03 2015

As can be seen in Figure 3.1 above, ecological regions IV and V are prone to droughts and the two regions make up approximately two thirds of the country. The major farming activity in the semi-arid regions IV and V is cattle ranging. Crop farming is largely carried out in regions I, II and III. However, the El-Niño conditions being experienced frequently have resulted in significant reduction in precipitation over the prime crop farming regions.

3.3 Success and failed drought relief operation stories in Zimbabwe

It has been pointed out in chapter one that droughts have increased in frequency and intensity in Zimbabwe over the years. The droughts have affected millions of people leaving many in dare need of food assistance. The government and its partners have been obliged to providing food aid to alleviate the suffering of communities from the effects of drought. In section 3.2 it was indicated that no deaths were recorded in the past due drought disasters, however this does not mean that food aid distribution in Zimbabwe is without glitches. In chapter one it has been pointed out that the ZHRC (2016) expressed serious concerns in the politicisation of food aid in Zimbabwe. The primary objective of a drought supply chain is to ensure that food aid reach all the people in need of food aid, however over the years there have been reports to

the contrary. The New Zimbabwe issue on the 14th of February 2012 reported that the government banned 29 NGOs on suspected grounds of working to remove the ruling party Zanu PF from power. This move saw a number of NGOs involved in drought relief operations such as the Zimbabwe Community Development Programme (ZCDP), Masvingo Plan of Hope, Fact Mutare, Chiredzi Christian Village and Care International-Bikita among others being banned. In the same year, the NGO News Africa (2012) reported that as a result of the ban, communities had to resort to edible wild roots and leaves in order to survive in Masvingo province. On June 4, 2008 after Zanu PF lost the first round of elections, the government banned all NGOs except for those involved with HIV/AIDS aid operations. On 30 May 2013 the Financial Gazette the Zanu PF lead government was enacting a law to give it swiping powers to interfere with the operations of all NGOs in the country. The Gazette further stated that among other restrictions, all NGOs were prohibited from receiving foreign funding. The banning of NGOs and the restrictions placed by government on food aid distribution seriously affected the livelihoods of millions of people. This resulted in the drought relief supply chains being incapacitated to effectively respond to drought disasters in the country. It is against this background that this research was carried out to explore the effectiveness of supply chain interventions in Zimbabwe. The preceding sections look at the history of food security in the country, the disaster management framework and the disaster management environment in Zimbabwe.

3.4 The History of food security in Zimbabwe

The concept of food security has a history that dates back to the time of Joseph in the bible, where he mobilised food in preparation for impending seven years of famine in Egypt. Zimbabwe had a traditional community food security model, which sustained the communities during times of food shortages as a result of drought and it was known as the Zunde raMambo or Isiphala seNkosi. The Zunde raMambo concept is explained in detail in the section below.

3.4.1 Community Based food security

As part of the Zimbabwean culture and traditions, communities participated in community based food security known as the Zunde raMambo (Shona) or Isiphala seNkosi (Ndebele) which simply means the Chief's granary (Masendeke and Shoko, 2014:137-150). The primary objective of the Chief's granary was to ensure that there were no food shortages at

village level (Mararike, 2001:53-65). The chief's granary concept was spearheaded by the chiefs. The chiefs were responsible for identifying pieces of land that community members would voluntarily work on, on a decreed day. The produce from the land would be deposited into the Chiefs granary for storage. The stored food would be used to feed orphans, widows and other less privileged members of the community as the Chief deems fit (Mararike, 2001:53-65). In old times this concept yielded phenomenal results with regards to village level food security.

The Chief's granary village food security concept has practically disappeared in modern times. Efforts to resuscitate the concept have been made to no avail. The failure of the chief's granary has been largely attributed to the changing roles and functions of the chiefs. As aptly put by Mararike (2001:53-65) "...the source of power and authority has changed. Chiefs no longer command the same respect and authority as they used to do. They have no control over assets that can be distributed to their subjects, such as land". Masendeke and Shoko, (2014:137-150) concur with Mararike when they postulate that; "very few people benefit from its (granary) meagre food reserves. The effectiveness of Zunde raMambo is compromised by delayed, and at times by unavailability of farming inputs. This situation is made worse by failure of Kraal Heads to organise their own people to work in the Zunde raMambo plots".

The views of Mararike (2001:53-65) and Masendeke and Shoko, (2014:137-150) are indeed true. The chief's granary has been overtaken by time and as a consequence it has become insufficient to act as an effective food security measure at village level. The chiefs have lost a measure of their influence on community, but also the frequent droughts have seen the number of beneficiaries increasing drastically, rendering the concept unsustainable. The failure of the Zunde raMambo to close the food shortages gap has meant that government and humanitarian organisations' intervention was necessary.

3.5 Drought management strategies in Zimbabwe

The recent drought periods experienced in Zimbabwe, the response by the Government and local communities as well as donors, have focused on mainly short-term emergency response. According to FAO (2013), most local government authorities lacked the capacity to react to these disasters, let alone prepare for them in an effort to mitigate the possible impact of drought. The Government realized the need to develop appropriate action plans to counter the short-term and long-term effects of drought, by developing institutional capacity, and

investing more resources in order to address the needs of drought vulnerable population groups (Government of Zimbabwe, 2000).

In 1999 the Government of Zimbabwe developed the National Policy on Drought Management (NPDM). The NPDM fundamentally discusses drought management issues and reviews government capacity and structures to deal with drought preparedness, mitigation and response issues. The policy's major emphasis was placed on the development of sustainable livelihoods for the populations most at risk of drought-induced shocks (Government of Zimbabwe, 2000). The policy also states that the sustainable livelihoods activities should be integrated with other developmental programs and projects. These sustainable initiatives should be incorporated and should form an integral part of all district, provincial and national-level development policy and planning processes.

The NPDM's major emphasis is on long-term drought mitigation measures such as;

- Water harvesting and efficient utilization of water
- Increased agricultural productivity in both commercial and communal areas
- Land use planning and proper management of national resources and the environment.

This paradigm shift from short term response initiatives to emphasis on forward planning, preparedness, prevention, mitigation response, recovery and rehabilitation is a clear statement of intent by the government to finding lasting solutions to drought disasters. The policy is aimed at facilitating the sharing of risk between government and farmers, at the same time building capacity for individuals and communities at household level to promote activities that utilise resources efficiently and effectively (Government of Zimbabwe, 2000). Sustainable Livelihoods are premised on a balance between efficient economic and ecologically sound options for households to make a living and cope with the short- and long-term impacts of drought.

Therefore, in order to achieve these objectives, the NPDM pursued the following drought mitigation strategies;

- Facilitating sustainable management of natural resources;
- Encouraging crop production only in those areas that are climatically and topographically suitable for particular crops, proper mechanical and biological

precautions versus soil loss, good land use practices through educational awareness campaign, and research into promotion of drought-tolerant food crops;

- Ensuring correct stocking rates of domestic livestock and establishment of grazing schemes;
- Supporting current policies and programmes on reforestation;
- Ensuring and enforcing correct protection and management of water catchment areas, construction of more dams, and sustainable exploitation of underground water;
- Accelerating rural industrialization;
- Promotion of small-scale enterprises;
- Reducing land pressure through resettlement and proper land use practices;
- Introducing appropriate water resources management and irrigation development schemes.

Zimbabwe's policy on agriculture recognizes the susceptibility of the country to recurrent droughts. The Ministries tasked with coordination and the development of policies and strategies to minimize the effects of drought are ministry of Lands and Agriculture, Ministry of Public Service, Labour and Social Welfare and the Ministry of Local Government. The government's agriculture policy's thrust is to reduce the current emphasis on the provision of food aid in favour of the development of sound strategies and schemes that help families to be resilient to the effects of drought (Kinsey, Burger and Gunning, 1998:95). The strategies include;

- Improvement in water availability through the expansion of irrigation schemes
- Water harnessing by construction of dams, and
- The equitable distribution of water for irrigation.

The policy also emphasises on the need for intensive research on improving the tolerance of staple food crops to drought and diseases (Government of Zimbabwe, 2000). The National Drought policy advocates for drought mitigation and nothing on responding to current droughts. It was pointed out in chapter one that drought disaster will increase in frequency and intensity hence the need for the country to devise supply chain coping strategies. The following section examines the legal framework for disaster management in Zimbabwe.

3.6 The Legal Framework for Disaster Management in Zimbabwe

The supreme law in Zimbabwe that regulates the practice of disaster management is the Civil Protection Act (Chapter 10:06) of 2001. The Act provides the guiding legal framework for disaster management. In this section focus is on some key terms and how they are defined by the Civil Protection Act. The term disaster is defined in terms of the civil protection Act (Chapter 10:06) section 2 and it reads; "disaster" means any— (a) natural disaster, major accident or other event howsoever caused; or (b) destruction, pollution or scarcity of essential supplies; or (c) disruption of essential services; or (d) influx of refugees; or (e) plague or epidemic of disease; that threatens the life or well-being of the community.

In chapter one various definitions were provided from an academic perspective. The above definition is very consistent with the other definitions outlined in this study. Most importantly, it recognises that scarcity of essential supplies is disastrous and these include food shortages, which is the core of this study.

The Act stipulates processes and considerations for an event to qualify to be a disaster. Declaring a state of disaster is the prerogative of the President of Zimbabwe. When a state of disaster is declared, it calls for the intervention of the government and other humanitarian organisations depending on the type of the disaster. The declaration of a state of disaster is done in recognition of the fact that the affected people's capacity to deal with the event is overwhelmed.

A declaration of a state of disaster in Zimbabwe is pronounced in terms of section 27 of the Act as follows; (1) If at any time it appears to the President that any disaster is of such a nature and extent that extraordinary measures are necessary to assist and protect the persons affected or likely to be affected by the disaster in any area within Zimbabwe, or that circumstances are likely to arise making such measures necessary, the President may in such manner as he considers fit declare that, with effect from a date specified by him in the declaration, a state of disaster exists within an area defined by him in the declaration: Provided that where such declaration has been made in any manner other than by statutory instrument, the President shall, as soon as possible after making it, cause it to be published in a statutory instrument. (2) The declaration of a state of disaster in terms of subsection (1) shall remain in force for a period of three months from the date that is specified in the declaration as the commencement of the state of disaster, unless the President, in a statutory

instrument, withdraws such declaration before the expiry of such period: Provided that the President may, from time to time, by statutory instrument, extend such declaration before the expiry of such period or any such extension thereof. There have been a number of events that have been declared a state of disaster in the country in the recent past. These ranged from road accidents, epidemic diseases, floods and droughts. Drought disasters were declared in the 1981/82, 1991/92, 2002/3 and recently the 2015/16 agricultural seasons. The droughts were declared disasters because of severity of food shortages countrywide. The 2015/16 drought is estimated to have affected over 4 million people (Zimbabwe Vulnerability Committee, 2016). The latest declaration of a state of disaster by the President was on March 1, 2017 with regards to floods that affected mostly the Southern parts of the country (The Herald, 2017; March 1). The disaster left more than 240 people dead and thousands homeless and certain communities inaccessible as access bridges were swept away and roads rendered impassable (The Herald, 2017: March 6; Dhaka Tribune, 2017: March 3).

The Act also defines the term civil protection as "all humanitarian measures aimed at protecting; populations, their environment and their natural inheritance against accidents and disasters of every kind". It is the national policy of Civil Protection and it compels that every citizen of this country should assist where possible to avert or limit the effects of disaster. The central government initiates hazard reduction measures through relevant sector ministries, with the local administration taking the responsibility of implementing and administering the Civil Protection Act.

3.7 Structural Model of the Civil Protection System in Zimbabwe

Because all states of disaster are declared by the President in Zimbabwe, the President is the head of the Civil Protection Department. Under the President is the parliament, which is responsible for debating and passing decrees on disasters by the President into law. When a bill on disasters is passed in parliament it goes to cabinet where the bill is passed into a disaster policy or simply a statutory instrument. The minister of Local Government, Public Works and Urban Development (MLG, PW & UD) is responsible for administering the civil protection policy. Within the MLG, PW & UD there is the Department of Civil Protection (DCP) which is responsible for operationalising the Civil Protection Act. The DCP is headed by the Director of Civil Protection. The Director works with the National Civil Protection

Committee (NCPC). From the NCPC the structure decentralises into Civil Protection Provinces (CPP). From the CPP it decentralise into districts.

In order to be able to respond effectively, the DCP enlists the services of sister ministries, government departments, parastatals, Non Governmental Organisations (NGOs) and United Nations Agencies. The system uses the existing government, private and NGO organizations whose regular activities contain elements of prevention and community development. These organizations are structurally, materially and technically adaptable to speedily render assistance by undertaking protective, relief and rehabilitation measures in times of disasters.

3.8 Operational Framework

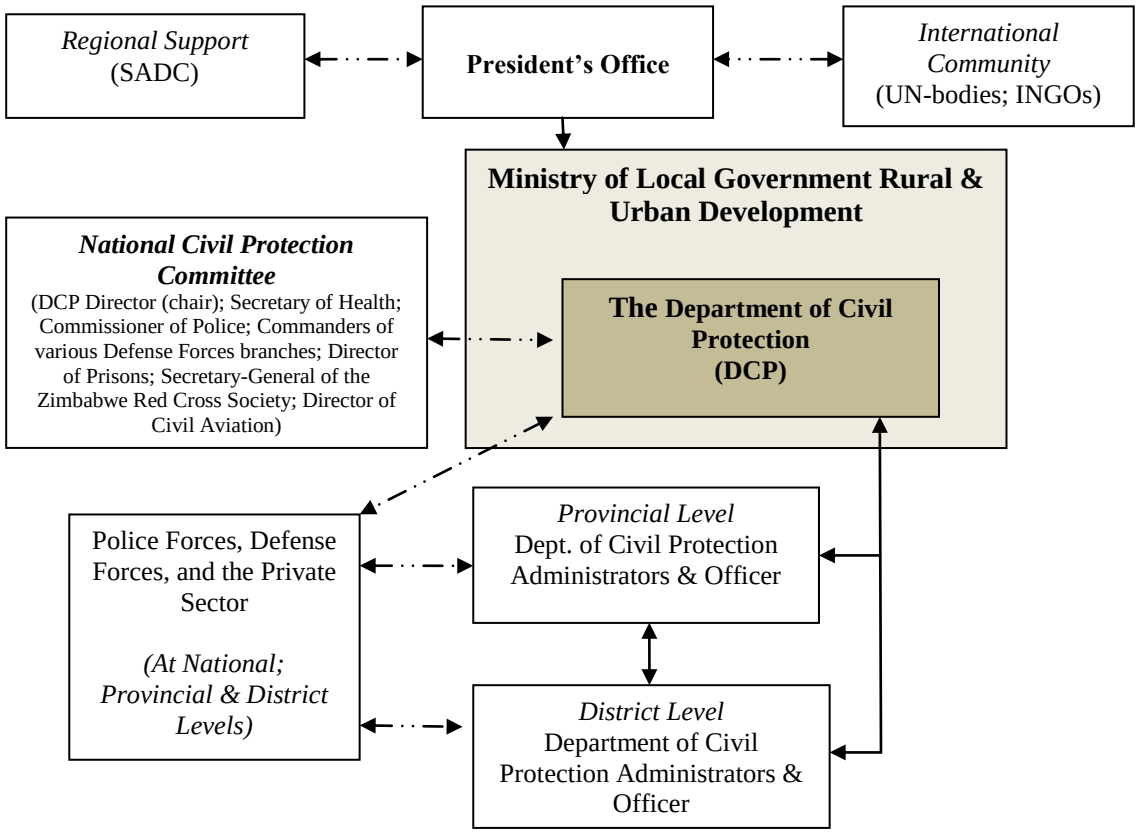
The Minister of Local Government, Public Works and Urban Development (MLG, PW & UD) is charged with the coordination role as empowered by the Civil Protection Act (Cap 10:06). The Act provides for; firstly, the establishment of the Civil Protection Directorate whose responsibilities are to establish, promote and direct the civil protection organizations in civil protection provinces and civil protection districts. The minister is tasked with establishing planning committees in provinces and districts.

These planning committees are responsible for drafting civil protection measures to be submitted to the Director and then to the Minister for approval. Furthermore, the minister assists institutions, ministries, departments, private and non-governmental organizations to come up with plans for emergency preparedness and disaster prevention. He also consults and in turn contacts the President to declare and gazette a state of disaster. He is supposed to maintain regular contact with International Disaster Management and Disaster Relief organisations. Most importantly, the minister is responsible for overseeing the development of public awareness programs on emergency preparedness and response and promoting research and training into matters relating to disaster management.

Secondly, the minister is granted special powers designed to establish, coordinate and direct the activities of both the public and private emergency services. Thirdly, he determines the guidelines for action and maximum use of resources since disaster mitigation requires a multi-sectoral and interdisciplinary approach. Further, the minister is charged with the establishment of a National Civil Protection Fund that receives money from both Government

and the public. The fund is applied to the development and promotion of Civil Protection activities throughout the country. The earlier sections of this chapter point to the fact that response involves multi-sectorial players. Figure 3.2 below is a schematic presentation of the structure of disaster management in Zimbabwe.

Figure 3.2 The Structure of Zimbabwe's Emergency Management System



Source: Zimbabwe's Emergency Management System: A Promising Development (Chikoto and Sadiq 2012)

Figure 3.2 above shows that the DCP has dual reporting. The department reports to the MLG, PW & UD and the Office of the President and Cabinet. The solid lines represent direct reporting while the broken lines represent partners.

3.9 Zimbabwe National Contingency Planning

Zimbabwe has a National Contingency plan in place to help the country cope with disasters. The plan is regularly updated in order to capture changes in the disaster risk profile of the country. The primary role of protecting its citizens' life during disasters lies with the Government all the times. The Government executes this mandate through the Ministry of Local government, Rural and Urban Planning's Department of Civil Protection (DCP).

Government ministries, UN Agencies and various Non-Governmental Organisations (NGOs) are actively involved in protecting the country's citizens.

As a result, all these stakeholders help to develop a National Contingency Plan that is updated annually to reflect the evolving hazard profile of the country. The inaugural national contingency plan was developed in 2012. This plan is part of an important disaster preparedness process which allows Government and its partners to plan for disasters with the aim of enhancing resilience in Zimbabwean communities (Government of Zimbabwe, 2013).

Zimbabwe is signatory to the Hyogo Framework for Action of 2005. The Hyogo Framework for Action priorities requires Governments to strengthen Disaster Risk Management (DRM) governance. Through the National contingency plan the government aims to reduce disaster risk through the development of an early warning mechanism, disaster education, preparedness and response plans. Zimbabwe is committed to these priorities and related actions of the Hyogo Framework and the Southern African Development Community (SADC) DRM Strategy of 2012-2015 both of which prioritise contingency planning.

The Contingency Planning convention which was held in 2012 identified and prioritised hazards that are likely to require contingency measures. The prioritised hazards included hydro-meteorological hazards (floods and droughts), biological hazards (Gastro Intestinal Infections) and technological hazards (Road Traffic Accidents - RTAs). It is anticipated that floods and drought have a high probability of occurring in the future. Flood disasters will most likely affect low laying areas such as Muzarabani and the Kariba basin (Government of Zimbabwe, 2013). At the same time, the convention envisages the occurrence of droughts in the southern and western parts of the country which are predominantly in the ecological regions IV and V. As a result, communities residing in the identified areas will be affected and in both cases may require food and shelter assistance for stipulated periods of time.
The development of contingency plans has become a priority for many countries to ensure that communities are effectively prepared for disasters in order to reduce the number of casualties caused by catastrophes (Government of Zimbabwe, 2013). Contingency plans have helped to establish and report a system of notification and response for disasters to ensure that no lives are lost as a result. Personal assets are also protected from destruction or damage when community members are better prepared to respond to a disaster event.

Zimbabwe has experienced an increase in hazardous events including disease outbreaks, floods, droughts and storms. These hazards, which have both natural and human induced origins, have often triggered food, nutrition and health insecurity, environmental degradation, and gender disparities. The contingency plan also seeks to protect infrastructure which includes roads, public buildings and dwelling houses, which are also often damaged (Government of Zimbabwe, 2013).

Evidence continues to show that disasters are likely to increase in Zimbabwe, particularly those that are weather-related. Over the last several decades, Zimbabwe has experienced warming of over 10 degrees and there is evidence that the country is now experiencing more hot days than cold days. In addition, the amount of rainfall Zimbabwe received has deviated from the normal rainfall mean of the country (Turnbull, Sterret and Hilleboe, 2013:7) which has often resulted in the country frequently receiving far below normal rain falls. The following section looks at the Humanitarian Environment in Zimbabwe.

3.10 Humanitarian Environment in Zimbabwe

The earlier sections of this chapter have outlined the structure and legal framework for disaster management in Zimbabwe. Notwithstanding other factors that influence the disaster management environment in Zimbabwe, the legal framework remains a crucial aspect of the environment. The principal law which governs disaster management in Zimbabwe being the Civil Protection Act Chapter 10:06. The Act sets out the structure of how disasters are managed and provides guidelines for responding to emergency situations. All participants in disaster response are expected to act in accordance with the dictates of the Act. There is also the Private Voluntary Organisation (PVO) Act (Chapter 17:05), which spells out how NGOs are registered in Zimbabwe. According to Banks and Hulme (2012), the Government of Zimbabwe is very intolerant with regards to registration of NGOs. As will be explained in the sections below, organisations that are considered to harbour ulterior motives are frowned upon. The PVO Act stipulates that any private voluntary organisation (PVO) that intends to operate in Zimbabwe must apply for registration in terms of the PVO Act.

Banks and Hulme (2012) postulate that in the Zimbabwean context there are four models of NGO advocacy: entryist; complementary; passive resistance and oppositional. These are in line with Clark (1991) who suggested that NGOs are bound to act in one of three general

ways with respect to the state: reforming the state, complementing the state or opposing the state. The Government of Zimbabwe or perhaps many governments are always inclined to registering those NGOs that are complementary to its efforts and frown on those NGOs that adopt a passive resistance and oppositional posture.

There is a significant amount of NGO collaboration with government agencies in fields relevant to the environment such as indigenous seed research, policy on drought alleviation and rural food security (Wellard and Copestake 1993). According to Banks and Hulme (2012) NGOs in Zimbabwe have also been active in national consultations on environmental policy, including the National Conservation Strategy in the mid-1980s and, more recently, policy on Environmental Impact Assessments (EIAs). Banks and Hulme (2012), however, noted that the space afforded to NGOs in Zimbabwe comes largely from the fact that the government does not have the capacity to regulate their activities and indeed needs the resources they bring in and the projects they carry out. This is true particularly of welfare organisations. This research is grounded on the belief that the disaster management environment in Zimbabwe is unique hence other researches carried elsewhere can not apply to Zimbabwe. It is therefore imperative to briefly explain culture, political environment, economic environment, and leadership attitudes as these can influence the effectiveness of drought relief supply chains.

3.10.1 Culture

Zimbabwe has got its own traditions and culture. Traditional leaders such as Chiefs play an important role in the society. The administrative role of Chiefs is still being recognised in the constitution of the country as they maintain peace and order in their area of jurisdiction. Chiefs are empowered to settle disputes in communities depending on the seriousness of the disputes. According to Kroeber & Kluckhohn (1952:181), culture consists of patterns, explicit and implicit, of and for behaviour acquired and transmitted by symbols, constituting the distinctive achievements of human groups, including their embodiment in artefacts.

Despite the diminished role of the chiefs in influencing the community food security concept, chiefs remain influential community points of reference. The chief is the interface of a particular community with the outside world. Government officials and those of NGOs report to the chief first before they can embark on any community developmental projects. Culture is a strong bonding fibre of a society which forms the basis of its survival. Schwartz (1992)

defined culture as consisting of the derivatives of experience, more or less organized, learned or created by the individuals of a population, including those images or encodements and their interpretations (meanings) transmitted from past generations, from contemporaries, or formed by individuals themselves'. There are many cultural groups in Zimbabwe. The two major groups are the Shona and the Ndebele people. These groups have different cultural beliefs. The chiefs, however, have the same influence as they are part of the local government administration.

The more complex a population is organized on sociological grounds (class, region, ethnicity, and so on), the more complex will its cultural mappings appear. As a result there are "subculture(s)" within the communities, ethnic groups or religious groups. According to Avruch (1998: 17) within the main stream literature on disaster risk reduction (DRR), there is evidence that cultural elements are neglected when planning and implementing DRR strategies (Hoffman 1999; Wisner *et al*. 2004). As asserted by Nunn *et al.* (2007) and Oliver-Smith and Hoffman (1999), failure to address cultural aspects could lead to increased vulnerabilities of communities towards disasters and the development of unsuccessful DRR strategies.

Similarly, Huntington (2000) asserts that the role of cultural values and attitudes as obstacles to or facilitators to progress of DRR activities has been ignored by governments and aid agencies. The impact of culture towards DRR is an important consideration if effective resilience mechanisms are to be identified and implemented. This study attempts to evaluate the impact of cultural elements of the community on the performance of drought relief supply chains. In Zimbabwe, the role of the chiefs cannot be ignored as they are the ones who inform the government about the need for assistance. They also play an important role in food distribution as they are the ones who identify the most deserving members of their communities. Also, the Chiefs Council appoints members that sit in Senate for each electoral term and these are approved and endorsed by the President. It can therefore be hypothesised that chiefs play an important role in the effectiveness of disaster response.

3.10.2 Political Environment

Although NGOs provide a legitimate form of autonomous organisations, the political system in Zimbabwe is extremely intolerant to such autonomy and there are increasing restrictions on NGOs with new legislation to control them and exclude them from anything that could be regarded as political activities (Bongo, Chipangura, Sithole and Moyo, 2013; Collier,

2008:68). Zimbabwe has experienced a downward trend on the political scene as evidenced by the country being slapped with sanctions by major economies. The land redistribution program was the catalyst to Zimbabwe being isolated by mostly western economies (Maphosa, 1994:55). It is also imperative to point out that some NGOs played a huge part in discrediting Zimbabwe's democratic structures, hence the government's taking of a strong position regarding NGOs viewed to be peddling an agenda against the government. While drought is seen as the major cause of food shortages in the country, sections of the society believe that the manner in which the land redistribution was done exacerbated the problem.

Since attaining independence in 1980, Zanu PF has been in power under the leadership of President Mugabe. In recent years Zanu PF has been faced with serious opposition, which has left the international community questioning the democratic processes in the country. The mixed views by the international community of the country's democratic processes created a lot of uncertainty (Raftopoulos and Phimister, 2003:355-382). This has lead to strained relations with western economies and multi-lateral institutions. Companies with roots in western economies closed and the country has not been able to attract meaningful foreign direct investment. The country's Indigenisation Policy has added another dimension to investment uncertainty. The policy requires that foreign owned businesses cede 51 % of ownership to local or indigenous investors. This has resulted in the performance of the economy taking a down trend.

3.10.3 Attitudes of Leaders

Attitudes also influence disaster response in the same way culture does. Aibarracin, Johnson and Zanna (2005) defined attitude as 'a psychological tendency to view a particular object or behaviour with a degree of favour or disfavour'. There is empirical evidence showing that leadership attitudes can influence positively or negatively in DRR. The government has frequently been at logger heads with certain sects of religious groups that do not believe in child immunisation. Amongst these religious sects, infant mortality rate is very high. A typical example of the impact of attitude was witnessed in South Africa where the former president Thabo Mbeki refused to accept antiretroviral drugs donated by the Global Fund because he did not believe HIV was the cause of AIDS (Chigwedere, Seage, Gruskin, Lee and Essex, 2008). As a result of the former president's attitude towards the pandemic, over 300 thousand lives were lost during this period of denial. It is therefore appropriate to

hypothesise that leadership attitudes can play an influential role in as far as drought relief is concerned in Zimbabwe.

3.10.4 Institutional bureaucracies

Goodsten and Velamuri (2009:489) wrote that the state has the power to command or control the behaviour of others, and has the prerogatives to allocate resources, impose taxes, enforce regulatory rights determining ownership and control. The state, from time to time, makes interventions to deal with pertinent issues through relevant departments and ministries. In the drought period of 1990 to 1992 the government recommended the deduction of drought levy on individual salaries to raise money to mitigate the effects of drought. The intervention was aimed at raising money to fund the procurement of grain in order to feed millions of people. Such interventions are very positive and progressive. There is evidence also that may not be progressive and are meant to protect the interest of the government.

To this day Zimbabwe has a single television station and about 5 radio stations despite wide spread calls to open up the air waves. According to Goodsten and Velamuri (2009:489), the government tried in vain to block the establishment of a privately owned mobile telecommunications company Econet Wireless in an effort to preserve the monopoly status of the Post and Telecommunications of the country, then run by a parastatal.

Another aspect at the centre of institutional bureaucracy is corruption (Makumbe, 1994:47). The high levels of corruption that are exposed almost on a daily basis in the media are a cause for concern. Corruption creates operational inefficiencies that lead to dire consequences affecting business and the community at large (Makumbe, 1994:47). Weakened institutional structure creates serious vulnerabilities to the society and disaster risk reduction initiatives may be completely non-existent.

3.10.5 Economic environment

Since 2013 real GDP growth has decelerated by an estimated 9 % (Reserve Bank report, 2016). The report forecasted the economy to continue on a similar decelerating trajectory into the foreseeable future. The Reserve Bank of Zimbabwe report (2016) indicated that growth contraction was evidenced through the performance of the following high frequency economic indicators:

- Increasing number of company closures and scaling down of operations, particularly in the manufacturing industries, accompanied by significant job losses in all sectors. This was exacerbated by growing discord in labour markets especially with regards to the enforcement of labour laws that require reforms and harmonisation to improve the labour relations environment and stimulate more job creation and retention (Reserve Bank of Zimbabwe, 2016).
- Underperformance of revenues, which were consistently falling below targets.
- Decline of exports accompanied by increase in imports

The country's revised 2013-2017 National Gender Policy notes that women's economic empowerment is key to the country's economic growth and that many of the gender disparities persist in the economic sector. According to the UN-Zimbabwe report 2016, the women's share in the labour force continues to increase, the gap between the %age of women in paid employment and that of men is still very wide. According to the Zimbabwe Statistical Authority, 31 % of the economically active men were in paid employment, compared to only 14 % of women in 2016.

3.11 Conclusion

This chapter examined the disaster management environment in Zimbabwe. The legal framework that governs the practice of disaster management was taken into context. In order to bring out more insights, cultural and political aspects were looked into from a Zimbabwean perspective. Most importantly, the chapter explained the Zimbabwean environment focusing on aspects that are unique to Zimbabwe.

Chapter 4

Methodological Approach

4.1 Introduction

This chapter describes the research methodology adopted throughout this research to meet the research aims and objectives and to address the research questions. The chapter also provides an overview of research philosophies and approaches. The research strategies and methods of data collection are also discussed in this chapter. The rationale behind the choices made on the research approaches and strategies, and data collection methods is presented.

4.2 Research objectives

The major aim of this study was to explore the role of supply chain management in drought disaster management. In order to achieve the aim of the study, the following objectives were addressed:

- To assess the disaster management environment in Zimbabwe
- To investigate current supply chain management strategies of drought disaster response in Zimbabwe.
- To determine the extent to which disaster supply chains performance is affected by culture, leadership attitudes, political state, economic state, legal framework and the disaster management policy in Zimbabwe, and
- To explore the adequacy of the national disaster policy in dealing with drought induced disasters in Zimbabwe.

4.3 Research questions

- How is the disaster management environment like in Zimbabwe?
- What are the current supply chain management strategies to drought disaster response in Zimbabwe?
- To what extent are supply chains affected by culture, leadership attitudes, political state, economic state, legal framework and the disaster management policy in Zimbabwe?
- Does the national disaster policy provide an effective disaster management framework?

4.4 Research Design

Research design can be defined as a blue print for the collection, measurement and analysis of data (Cooper and Schindler, 1998). This research adopted an exploratory research design as it explored the role of supply chain interventions in drought disaster response. Sekaran (2003:417) defined exploratory research as a research study where very little knowledge or information is available on the subject under investigation. As explained in chapter one of the current study, drought disaster supply chains have not attracted significant research interest as compared to research on supply chains of other types of disaster especially those that are sudden on-set in nature.

An exploratory approach was used because it utilises primary and secondary data gathering techniques (Sekaran, 2003:119). Primary data was obtained through questionnaires and interviews. Secondary data was obtained by examining policy documents and reports from organisations such the World Bank, World Food Program and other organisations in drought relief operations. The advantage of the exploratory strategy is that it is flexible and can easily change direction as new data appears (Sekaran, 2003; Stake, 1995; Saunders, 2009).

The case study research strategy was employed. The case study approach was used so that the study focused on Zimbabwe rather than on countries that are in the Sub-Saharan region, which are also prone to drought disasters. The study focused on contemporary events or a phenomenon in a natural setting hence a case study was clearly advantageous (Saunders, 2009). The study utilised both qualitative and quantitative research procedures in addressing the aims and research questions of the study. The use of both qualitative and quantitative research procedures is known as triangulation (Walliman, 2011:73). The reason a qualitative approach was chosen is due to the fact that the research is of an exploratory nature hence the study requires access to profound expert information on the topic of the role of supply chains on drought disaster response. In addition to using qualitative techniques, quantitative procedures were applied in order to measure, make comparisons and to examine relationships among variables of interest. The case study strategy is explained in the following sub-section.

4.2.1 Case Study

In the above section it was indicated that the Case study approach was selected for this research study. The study focused on Zimbabwe. Zimbabwe is situated in Sub-Saharan

Africa. Being a sub- Saharan country it is prone to drought disaster because of the exposure to the El-Nino effect. The case study as a research design method has been explored by a number of authors (Cavaye, 1996; Darke *et al.*, 1998; Jensen and Rodgers, 2001; Stake, 1995; Yin, 1994). Yin (2003: 13), defined a case study as "*an empirical inquiry that investigates a contemporary phenomenon within its real-life context using a variety of sources of evidence"*.

According to Walliman (2011:93) the features of a case study are as follows;

- It allows for the selection of a single case of a situation, individual or group; of which Zimbabwe is selected as a case of a situation in respect of drought disasters;
- Study of the case is carried out in its natural context;
- It allows for the collection of information through a wide range of data collection techniques such as observation, interviews or documentary analyses; and
- It is a systematic but flexible research strategy which provides detailed prescriptions for data analyses and theory generation.

The above features of a case study make it suitable for this research. Stake (1995), who is a strong proponent of the case study approach states that, "a case study is intended to catch the complexity of a single case." The author goes on to point out that, a "case study is the study of the particularity and complexity of a single case, coming to understand its activity within important circumstances," and that, "the time we spend concentrating on the one may be a day or a year, but while we so concentrate we are engaged in case study" (Stake 1995:2). As pointed out in section 4.2, there are many countries in Sub-Saharan Africa that are prone to drought disasters. The strategy afforded the researcher the opportunity to concentrate on Zimbabwe to unravel the role supply chain management plays in supply chain in drought disaster relief response. The case study helped to enrich the understanding of the context of the research and was a viable approach for three reasons namely; it allowed for the study of the phenomenon in its natural setting, the researcher was able to ask questions relating to how and why, so as to understand the nature and complexity of the process taking place, and the research was conducted in an area where few, if any, previous studies have been undertaken.

According to Sekaran (2003:119), the major weakness of a case study approach is that it targets the study of a particular group, the selection of which is based on unique characteristics of the group. Generalisation of results may not be possible for other groups due to differences in situations and characteristics. This study however was not weighed down by this weakness as it is partly the basis for using the case of Zimbabwe. Zimbabwe was regarded as unique and has a different drought disaster management environment from other Sub-Saharan countries. The culture, political and economic environment makes it difficult to generalise for other countries.

4.3 Research Philosophy

There are two main research philosophies namely positivist, which is also known as scientific investigation and interpretivist, which is also known as phenomenologist (Walliman, 2011; Galliers, 1991). A research philosophy is a belief about the way in which data about a phenomenon should be collected, analysed and used (Saunders, Lewis and Thornhill, 2009). In essence, positivism is concerned with quantitative researches and interpretivism is about qualitative researches. The study borrowed from both research philosophies. As aptly put by Walliman (2011), "critical reasoning can be seen as a reconciliatory approach, which recognises, like positivists, the existence of a natural order in social events and discourse, but claims that this order cannot be detected by merely observing a pattern of events. The underlying order must be discovered through the process of interpretation while doing theoretical and practical work particularly in the social sciences". The best research outcomes can be obtained where the two philosophies complement each other. Easterby-Smith, Thorpe and Lowe (2004:783) argue that it is not possible to identify any philosopher who subscribes to all aspects of both positions. Easterby-Smith *et al* (2004:783) emphasise the importance of understanding the philosophical issues in clarifying research design.

According to Walliman (2011:25), positivists assume that reality is fixed, directly measurable, and knowable and that there is just one truth, one external reality. The argument is that the physical sciences only deal with objects which are outside 'us', whereas the social sciences deal with actions and behaviour which is generated from within 'us', the human mind (Collis & Hussey, 2003). The post-positivist stance became known as phenomenology or interpretivism, which is the science of phenomena. According to Galliers (1991:55-64) interpretivist researchers assume that reality constantly changes and can be known only

indirectly, through the interpretations of people. They accept the possibility that there are multiple versions of reality.

The opinion of Interpretivists is that only through the subjective interpretation of, and intervention, in reality can reality be fully understood. The study of phenomena in their natural environment is the key to the interpretivist philosophy, together with the acknowledgement that scientists cannot avoid affecting those phenomena they study. The phenomenologists argue that social reality is dependent on the mind and that there is no reality independent of the mind, unlike the positivist stance (Walliman, 2011:25). In that respect, the phenomenological philosophy advocates an attempt to understand social reality as it has been grounded in people's experiences throughout the years of life and employment within organisations and nations. Therefore, phenomenology generally attempts to understand specific phenomena by establishing the meanings that people assign to them (Walsham, 1993) and, as a result, unlike positivism, does not view 'reality' as objective, measurable and external.

Walliman (2011:22) summarised the distinction between positivist and phenomenological philosophies as shown in Table 4.1 below. It is very clear from the table that the two philosophies are distinct and on extremes.

Table 4.1 Comparison of positivist and interpretivist approaches

Issue	*Positivist*	*Interpretivist/ phenomenologist*
Philosophical basis	Realism: the world exists and is knowable as it really is.	Idealism: the world exists but different people construe it in very different ways.
The role of research	To discover universal laws and generalisations	To reveal different interpretations of the world as made by people.
Theoretical approach	Rational, using inductive and scientific methods and value free data.	Subjective, using inductive methods and value laden data.
Methods	Experiments or mathematical models and quantitative analysis to validate, reject or refine hypotheses.	Surveys and observations with qualitative analysis to seek meaningful relationships and the consequences of their interactions. Analysis of language and meaning.
Role of researcher	Neutral observer.	Part of the research process.
Analysis of society	Search for order. Society is governed by a uniform set of values and made possible only by acceptance of these values.	Search for dynamics. Multitude of values leading to complex interactions. Society made possible by negotiation.

Source: Research Methods: the basics (Walliman, 2011)

As mentioned earlier, and in view of the extremist position of positivist and interpretivist philosophies as revealed in table 4.1, it is very clear that by combining good aspects of both worlds yielded the best results for this study (Easterby-Smith *et al.*, 2004).

4.4 Research tradition

The extent to which one is clear about the theory at the early stages of a research project raises the issue of 'approach' or tradition. Research tradition is the reasoning behind the empirical and rationalist approaches to gaining knowledge (Walliman, 2011:17). There are two extreme reasoning approaches, namely deductive and inductive reasoning (Walliman, 2011; Sekaran, 2003). The two reasoning approaches support the two philosophies discussed in earlier sections. This study used both deductive and inductive reasoning. Deductive reasoning was applied to give meaning to quantitative data. Inductive reasoning was applied on qualitative data to generate descriptive insights. Walliman (2011:17) conceded that it is impossible to use one of the two reasoning on its own. This view led to the development of the middle of the two extreme reasoning traditions known as the hypothetico-deductive approach (Walliman, 2011; Sekaran 2003).

According to Walliman (2011:17), hypothetico-deductive method is a more practical approach that goes a long way to overcome the short comings of the deductive and inductive methods. *Deduction* is the process by which researchers arrive at a reasoned conclusion by logical generalization of a known fact where as *Induction,* is a process where researchers observe certain phenomena and on this basis arrive at conclusions (Walliman, 2011; Sekaran, 2003). In other words, in induction reasoning a researcher logically established a general proposition based on observed facts. The method of starting with a theoretical framework, formulating hypotheses, and logically deducing from the results of the study is the hypothetico-deductive method. This study, however, did not make use of hypothesis formulation but used research questions.

4.5 Population

The Population for this research was 200. The population was comprised of the categories shown in table 4.2;

Table 4.2 Population elements

Category	size
Government officers	26
NGO logistics officers	35
NGO Project coordinators	13
NGO project officers	126
Total	**200**

This population was drawn from 13 districts that are drought prone namely Chiredzi, Bikita, Chivi, Chipinge, Binga, Buhera, Tsholotsho, Kariba, Mwenezi, Bulilima, Mangwe and Hwange. The study targeted government officials and Non-governmental staff that are engaged in drought relief operations.

4.6 Sampling

Sampling is the *process* of selecting a sufficient number of elements from the population, so that a study of the sample and an understanding of its properties or characteristics would make it possible for us to generalize such properties or characteristics to the population elements. The sample size of this study was 174. The sample for this study was comprised as follows;

Table 4.3 Sample Elements

Detail	Population	Sample	% Representation
Government Officials	26	26	100
NGO Logistics Officers	35	35	100
NGO Project Officers	13	13	100
NGO Field Officers	126	100	79
Total	**200**	**174**	**87**

Table 4.2 above depicts the elements of the population. A total of 10 respondents were purposively sampled from each district. The sample size of 174 was deemed sufficient as it exceeds the sample size of 132 prescribed by Krejcie and Morgan (1970:607-610) for a population size of 200. Because of the nature of the phenomenon under study, the sampling procedures that were employed are explained in the following sections.

4.6.1 Probability and Non-probability Sampling

There are two major types of sampling designs namely probability and non-probability sampling. In probability sampling, the elements in the population have some known chance or probability of being selected as sample subjects (Sekaran, 2003). In non-probability sampling, the elements do not have a known or predetermined chance of being selected as subjects. This study used non-probability sampling. The rationale behind the selection of a non-probability process was based on the fact that this research is largely qualitative in nature hence the need to involve only those subjects involved with drought relief operations.

4.6.2 Non-Probability Sampling

In non-probability sampling designs, the elements in the population do not have any probabilities attached to their being chosen as sample subjects. According to Sekaran (2003), non-probability sampling plans are more dependable than others and could offer some important leads to potentially useful information with regard to the population. There are three recognised non-probability sampling techniques namely, purposive, convenience and judgemental.

4.6.2.1 Purposive Sampling

The study employs the purposive sampling technique. Purposive sampling entails obtaining information from specific target groups (Sekaran, 2003). The sampling here is confined to specific types of people who can provide the desired information because they are involved directly with disaster management. For the purpose of this study, Government officials, NGO logistics officers, NGO project coordinators and Field officers were targeted because of their involvement in drought relief operations. This type of sampling design is called purposive sampling, and the two major types of purposive sampling are judgment sampling and quota sampling.

Judgment sampling involves the choice of subjects who are most advantageously placed or in the best position to provide the information required. Thus, the judgment sampling design is used when a limited number or category of people have the information that is sought. In such cases, any type of probability sampling across a cross-section of the entire population is purposeless and not useful. Quota sampling, a second type of purposive sampling, ensures that certain groups are adequately represented in the study through the assignment of a quota (Walliman, 2011; Sekaran, 2003). As can be seen in table 4.3, Government officials, Logistics officers and NGO Project officers were sampled at 100 % because of the small number of the subjects. However, for field officers, quota sampling was applied and 100 out of 126 were targeted. The following sections discuss data collection methods that were used.

4.6 Data collection methods

The study made use of primary and secondary data to address the research aim and research questions. Collis and Hussey (2007:160) defined data as "known facts or things used as a basis for interference of reckoning". Primary data is the information collected at source such as survey data, or experimental data, interviews or focus groups, whereas secondary data is data which already exists such as reports, archives, laws, annual reports, etc. Primary data was collected using questionnaires and in-depth interviews. Secondary data was obtained from various reports from government and United Nations agencies such as WFP, UNICEF, WHO and many others. Both sets of data can either be quantitative or qualitative in nature (Collis and Hussey, 2007; Saunders *et al*., 2009). The following sub-sections explain the data collection techniques in detail.

4.6.1 Survey Questionnaire

A survey questionnaire was used to collect the majority of primary data that was used in this study. A total of 174 Survey questionnaires were sent out to the targeted respondents. According to Marshall and Rossman (2006), questionnaires typically entail several questions that have structured response categories. Sekaran (2003:236) defines a survey questionnaire as "a preformulated written set of questions to which respondents record their answers, usually within rather closely defined alternatives". Questionnaires are an efficient data collection mechanism when the researcher knows exactly what is required and how to measure the variables of interest. For this study personally administered questionnaires were used for all the respondents. The questionnaire was structured as follows;

Section A solicited for general information which included background characteristics of the respondents and his or her organisation. Section B contained questions that solicited data of objective 1 which related to the Zimbabwean drought disaster management environment. Section B questions relate to objective 2, which sought to establish supply chain management strategies currently being employed by drought relief organisations. Section C comprised of questions for objective 3 which sought to determine the impact of culture, politics and the disaster policy on the effectiveness of drought supply chains. Lastly, Section D contained questions on the adequacy of the disaster policy in Zimbabwe.

The questions were structured in such a manner that some of the questions were open ended while others were closed. The closed questions were likert scaled to allow for the application of quantitative data procedures. Open ended questions provided an opportunity for the respondents to express their views in detail. The questionnaire provided spaces for respondents to write detailed responses. The responses obtained from open ended questions formed the majority of descriptive findings of the study. Section 4.6.2 explains interviews and how they were used in this study.

4.6.2 Interviews

An interview is a 'purposeful discussion between two or more people' (Kahn & Canell, 1958 as cited by Saunders *et al.,* 2009:310). There are three categories of interviews namely structured, semi-structured and unstructured (Walliman 2011:99; Saunders *et al.,* 2007). According to Walliman (2011), structured interviews use standardised questions read out by the interviewer according to an interview schedule. This study used a structured interview to gather primary data. An interview schedule was used on all the targeted respondents. Identical set of questions was used for all interviewees for the purpose of collecting quantifiable data. The resultant answers were expected to follow a closed format, just as when a questionnaire is used. The interviews targeted 12 Government officials, 12 NGO Logistics officers and 12 NGO project coordinators. The interviewees were selected on the basis of their strategic involvement in drought relief operations. The diverse composition of the interviewees was aimed at obtaining useful data from three perspectives namely, government perspective, management perspective and operational perspective. The level of involvement of the interviewees resulted in the generation of rich data.

4.7 Unit of analysis

The major objective of this research was to evaluate the role of supply chain management in effective drought induced disaster response in Zimbabwe. The units of measurement can be identified as;

- Cost of procurement of supplies
- Cost of transportation of supplies
- Speed of response
- Cost of warehousing

The research also measured the impact of the following variables as enablers or impediments of effective supply chain management;

- Culture in many drought prone parts of Zimbabwe.
- Humanitarian environment in Zimbabwe as defined by the legal framework and also political environment.
- Institutional bureaucracies especially considering the level of corruption in Zimbabwe.
- The attitudes of leadership.

4.8 Validity and Reliability

A pilot test was carried out to test for validity of each of the research instruments that were used (Saunders, Lewis and Thornhill 2009:146). Saunders *et al*. (2009) defines a pilot test as: 'A small-scale study to test a questionnaire, interview checklist or direct observation schedule, to minimise the likelihood of respondents having problems in answering the questions and of data recording problems as well as to allow some assessment of the questions' validity and the reliability of the data that will be collected' (Saunders *et al*., 2009). This was done to ensure that the questionnaire captured as much data required to address the research questions as well as testing the perceived validity and reliability of the questionnaire. The Cronbach Alpha Test was applied to test the reliability of the questionnaire. Cronbach Alpha is a reliability test conducted in order to measure internal consistency of the measuring instrument. The test was most suitable on multiple likert questions in the questionnaire. The results of the test were 0.856 and satisfied the minimum required reliability threshold at $\alpha \geq 0.8$. Cronbach Alpha reliability coefficients are given in Table 4.4.

Table 4.4: Cronbach instrument reliability thresholds

Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.9 \geq \alpha \geq 0.8$	Good
$0.8 \geq \alpha \geq 0.7$	Acceptable
$0.7 \geq \alpha \geq 0.6$	Questionable
$0.6 \geq \alpha \geq 0.5$	Poor
$0.5 \geq \alpha$	Unacceptable

Source: Coefficient alpha and the internal structure of tests: Cronbach, (1951).

Table 4.4 depicts the various α coefficients that are used to determine the internal consistency of a research instrument. The internal consistency of the questionnaire that was used was, therefore, regarded as good according to Table 4.4. According to Sekaran, (2003:205) the higher the alpha coefficient, the reliable the research instrument is. Robson (2002) states that, validity and reliability are two factors that should concern a qualitative researcher when designing a research and analysing the results.

4.5 Quantitative Research Design

While there are numerous strategies that can be used in management research, some of which have a positivist posture and some a phenomenological one, the choice of strategy for this study was guided by the research questions, objectives, the extent of existing knowledge, the amount of time and other resources available (Saunders et *al*., 2009). Yin (2003) states that there are three conditions that relate to the choice of research strategy: firstly, the type of research questions posed. Robson (2002) also mentions that the research strategy and the methods or techniques employed in a research must be appropriate for the questions one wants to answer. Secondly, the extent of control the researcher has over actual behavioural events and thirdly, the degree of focus on contemporary, as opposed to historical, events.

This section outlines the research procedures for Research Questions 3 and 4. Research Question 3 interrogates the impact of culture, on the supply chain effectiveness. The independent regressors can be termed enablers. Supply chain effectiveness is proxied by transport costs, warehouse costs and so on. Since the dependent variable is continuous and

non-censored Research Question 3 can be estimated using Ordinary Least Squares (OLS) (Wooldridge, 2002; Cameroon and Trivedi, 2005) as follows:

$$Y_i = \alpha + \beta Enabler_i + \mathbf{X}_i'\gamma + \varepsilon_i \quad (1)$$

where; Y_i is supply chain parameter [transport cost, warehouse cost, quantity delivered, or number of people affected].

$Enabler_i$ *is* the individual *i*'s proxy of supply chain enablers [culture, leadership attitudes, political state, and economic state] and $\mathbf{X}_i$ is the vector of the background characteristics of the respondents and the organisations they belonged to. The researcher estimated equation (1) using OLS procedure and presents the results in Tables 6.1 to 6.4

Research question 4 assesses the effectiveness of the National Disaster policy in promoting the effective disaster response. Equation 2 is, therefore, specified as follows:

$$Y_i = \alpha + \beta DP_i + \mathbf{X}_i'\gamma + \varepsilon_i \quad (2)$$

where; Y_i is the country's national disaster policy,

DP_i represents perception of the importance of the national disaster policy on supply chain effectiveness and $\mathbf{X}_i$ is the vector of background characteristics of the respondents and the organisations they belong to. The researcher estimated Equation (2) using OLS procedure and presented the results in Table 6.5.

A non-parametric test called the sign test was also used to establish the statistical significance of the perceived supply chain enablers on the effectiveness of drought relief response. The sign test is a non parametric test based on the sign of ranking of particular preferences into an ordinal scale Anderson, Sweeney and Williams (2008:815). In this study, agreement with the claim that an enabler influence drought response is assigned 1 while disagreement is assigned 0.

4.9 Data Analysis

The data generated using the questionnaire was analysed statistically using Stata 3. Statistical analysis was fundamental in bringing to the fore meaning from the data and revealing relationships between variables. Stata 13 also allowed for descriptive and inferential statistics to measure and organise quantitative data. For quantitative data Ordinary Least Squire model was used.

4.10 Data Presentation

Data presentation is an important procedure in research. Data was presented in the form of tables, pie charts and other form of graphs. This was crucial in order to present organised and summarised information which is easy to understand.

4.11 Ethical Considerations

Research ethics are a critical consideration for any research study. In order to successfully carry out the study, the researcher was required to interact with organisations and individuals for the purpose of data collection, analysis and reporting. This researcher was honest and straight forward throughout the research process to give credibility to the outcomes of this study (Walliman: 2011:42). All sources of ideas, concepts and theories, used in the thesis, were acknowledged. This researcher also sought informed consent from participants so that they could choose freely whether or not to participate in the survey (Walliman: 2011; Sekaran: 2003). The information given by participants was treated as confidential to guard the privacy of the participants (Sekaran: 2003:51). Due care was also taken to ensure that respondents were not embarrassed, harmed or made to experience any form of discomfort.

4.10 Conclusion

This chapter has provided an in-depth account of the research methodology employed in this study. Based on the aim, objectives and research questions, the phenomenological philosophy was chosen as the most appropriate research approach. The approach was selected because it is inductive. A case study was used as a vehicle to realising the research aims and objectives. The data was collected by using face-to-face interviews and questionnaires as the main sources of primary evidence. The primary data was also triangulated with document review, direct observations and archival records. The following chapter presents a descriptive analysis of the findings of this study.

Chapter 5

Descriptive Data Presentation

5.1 Introduction

This chapter provides descriptive findings of the study. The analysis is structured in a way that attempts to answer the research questions presented in chapter one. The units of measurement were culture, leadership attitudes, political state of the country, economic state, legal framework and the national disaster policy and how they influence supply chain drought disaster response in Zimbabwe. Notwithstanding, the study also set out to assess current supply chain strategies being applied by the government and NGOs in drought relief response. This data presentation is intertwined with data analysis and the discussion. Literature cited in Chapters 2 and 3 was used to support, confirm or reject the findings.

5.2 Response Rate

The response rates for survey questionnaires are shown in Table 5.1.

5.1 Response Rates

Group	Number of questionnaires sent out	Number of questionnaires received	% response rate
Government officers	26	20	76.9
NGO Logistics officers	35	29	82.9
NGO Projects officers	13	13	100
NGO field officers	100	68	68
Total	**174**	**130**	**74.7**

Table 5.1 is showing the sample categories to which questionnaires were sent and their corresponding response rates. The response rate for each category was deemed satisfactory as they exceeded overwhelmingly the minimum threshold of 60 % expected for external survey questionnaires (Draugalis, Coons, and Plaza, 2008).

5.3 Background Characteristics of Respondents

Table 5.2 below provides the biographical data of the respondents. Biographical data of the respondents are fundamental as they form the bases for some of the responses obtained, hence, there is need for control in order to reduce the effect of confounding variables in regression analysis (Cameron and Trivedi, 2005; Wooldridge, 2002).

Table 5.2: Biographical Data

Variable	Frequency	%age
Gender		
Male	96	74
Female	34	26
Total	**130**	**100**
Age of respondents		
18-24	0	0
25-34	66	51
35-44	58	45
45-54	5	4
55-64	1	1
65 and above	0	
Total	**130**	**100**
Education		
O' Level	10	8
A' Level	9	7
Certificate	16	12
Diploma	71	55
Degree	24	19
Total	**130**	**100**

Notes: Sample size is 130

As can be seen in Table 5.2, the male respondents were 74 % of the sample while 26% were females. Employment in the formal sectors in Zimbabwe is skewed towards males as reported in the UN-Zimbabwe report of 2016. Fifty one (51) % of the respondents were aged between 25 and 34 years, 45 % were aged between 35 and 44 years where as 1% was aged over 55 years. The qualifications of respondents were varied from O' Level being the minimum to University Degrees being the maximum qualification. Table 5.2 also reveals that respondents with O' Level education were 8%, A' level were 7%, Certificate 12%, Diplomas 55% and Degree 19%.

5.4 Region of Operations

The study also revealed in figure 5.1 that most drought relief operations are carried out in ecological regions IV and V. In chapter three it was pointed out that regions IV and V receive the least annual rain fall which does not sustain crop farming.

Figure 5.1 Regions of Drought Relief operations

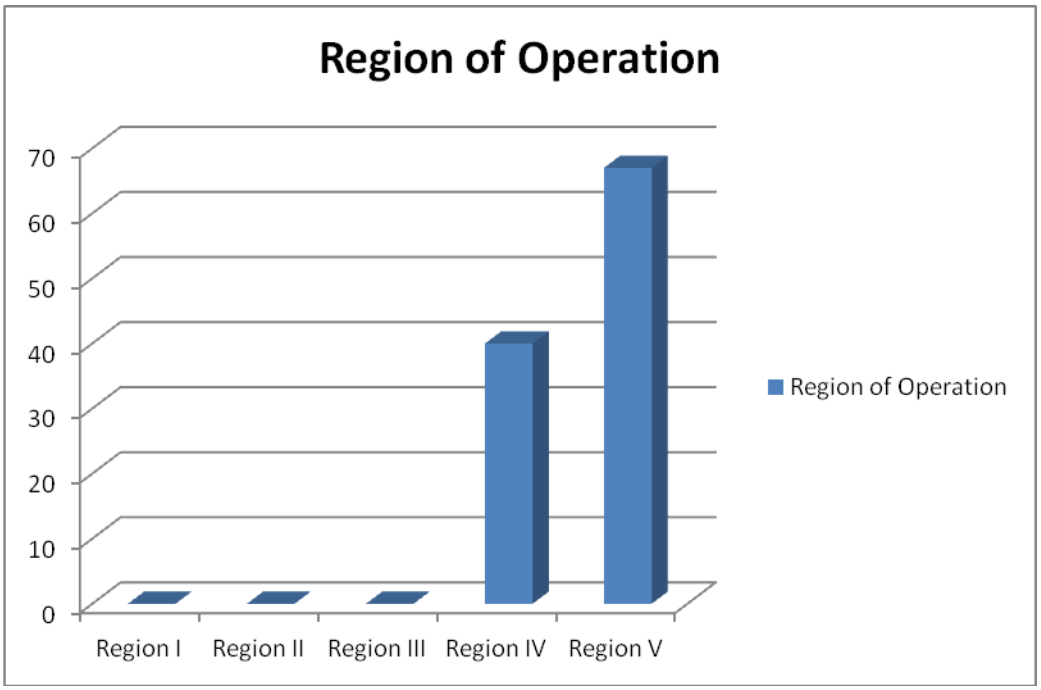
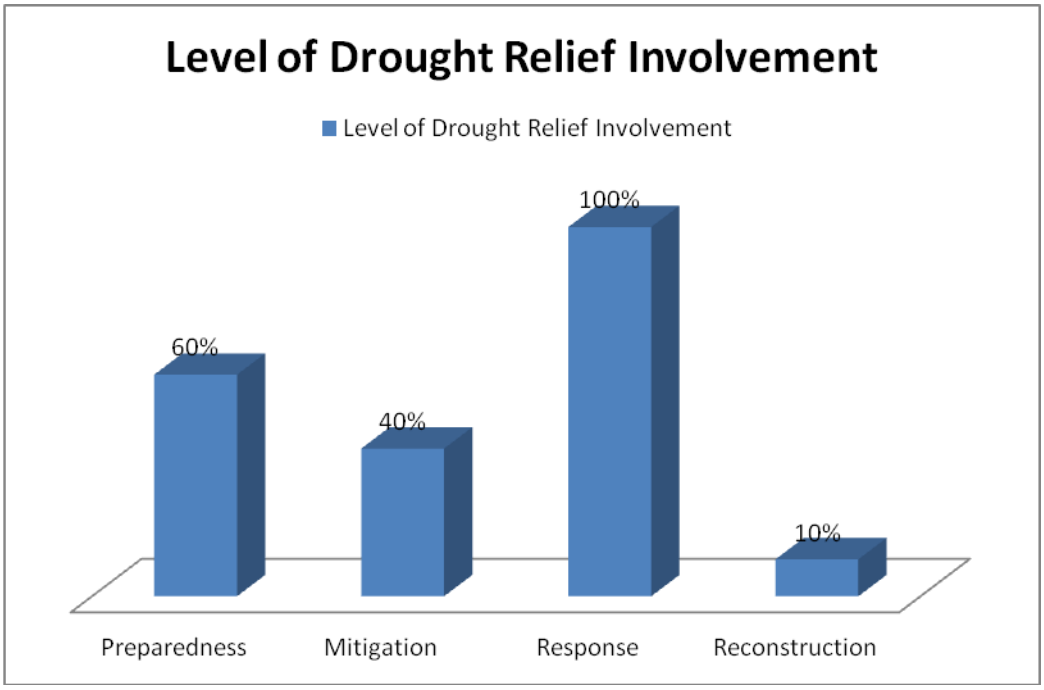


Figure 5.1 shows that 100 % of drought relief activity is concentrated in Regions IV and V with region V accounting for over 60%. Figure 5.2 reveals the level at which the respondents' organisations operate at in the disaster management cycle. Also 36 interview respondents revealed that the drought situation in regions IV and V was a cause for concern. The respondents particularly highlighted severe food shortages in Chiredzi, Chivi, Buhera and Binga. These regions therefore attract the attention of the government and its partners to provide food aid. Humanitarian supply chain operations are very active in these drought stricken areas.

Figure 5.2 Level of operations of organisation



The major focus was on the role supply chain management in drought relief response. the study deliberately targeted those organisations involved in drought relief operations hence all the targeted organisation were involved 100% at the response stage of the disaster management cycle. However figure 5.2 further revealed that 60 % of the organisations were also involved at the preparedness stage, 40% at mitigation stage and 10% at reconstruction. Fundamentally supply chain management make up to 80% of humanitarian operations (da Costa *et al*, 2012; Tomasini and Van Wassenhove, 2009; Oloruntoba and Gray 2006). The 100% involvement of the different organisations selected for this study was in line with the major aims of the study to evaluate the role of supply chain management in drought disaster response.

5.5 The Zimbabwe Disaster Management Environment

Figure 5.3 Interview Responses on the Disaster Management Environment

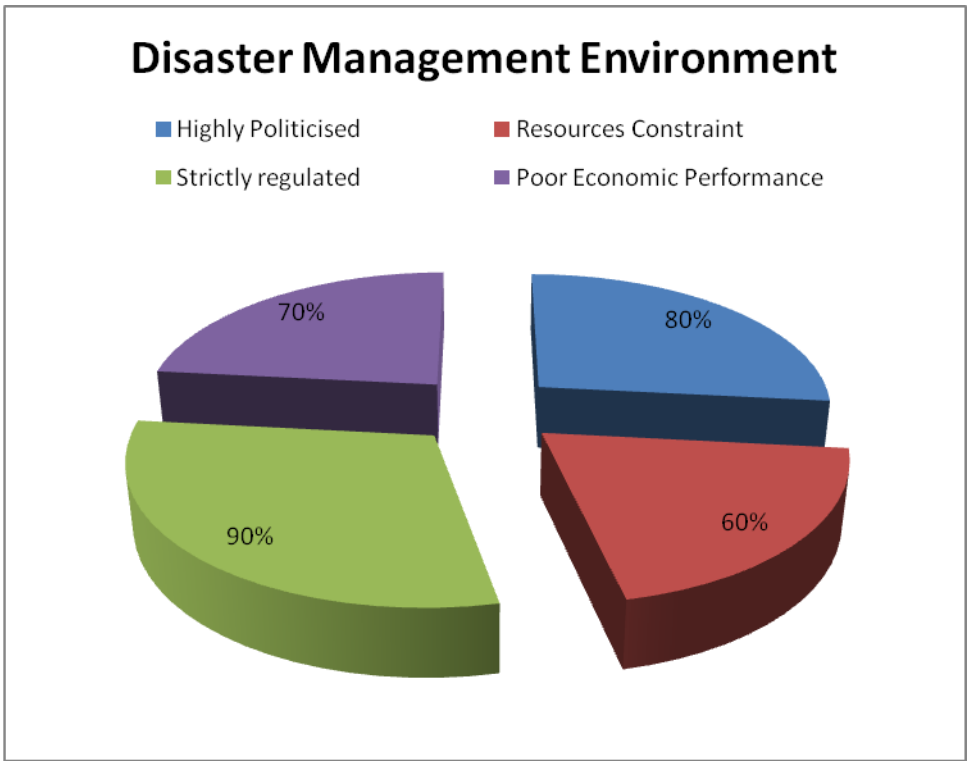


Figure 5.3 shows the views of the interviewed respondents on what charecterised the disaster management enviroment in Zimbabwe. Figure 5.3 revealed that 90% of the respondents percieved the enviroment to be strictly regulated, 80% felt it was highly politicised, while 70% believe the economic situation exercabated response efforts and 60% viewing resources constraint as a major challenge. The findings from the interviews were consitant with supply chain issues raised through questionnaire responses. These observations are discussed in detail in the following sections in this chapter.

5.6 Enablers of Relief Supply Chains

5.3 Sign Test Results on Drought relief Enablers

Variable	Perception	Number	Z-Stat
Culture	Yes	22	
	No	107***	7.484
Leadership	Yes	22	
Attitudes	No	107***	7.484
Political State	Yes	22	
	No	108***	7.016
Economic State	Yes	129***	11.358
	No	0	
Legal	Yes	129***	11.358
Framework	No	0	
Disaster Policy	Yes	23	
	No	105***	7.248

Sample size is 130. The second column shows results of the two-tailed *t*-test for the difference in the means. ***, **, and * indicate the 1, 5, and 10 % levels of significance.

Table 5.3 shows the perceptions of respondents on the influence of culture, leadership attitudes, political state, economic state, legal framework and disaster policy on effectiveness of drought relief supply chains in Zimbabwe. The perceptions were analysed using the non parametric sign test as suggested by Anderson, Sweeney and Williams (2008:815). The sign test leads to a statistical significance conclusion in favour of the most supported of the two perceptions. One hundred and seven (107) respondents indicated that culture and leadership attitudes have no influence on drought relief supply chain effectiveness against 22 who suggested that each had effect. The sign test suggests that culture and leadership attitudes have no influence on drought relief supply chains at the 1% level of significance.

Table 5.3 also reveals that 108 of the respondents did not view political state as an enabler of drought relief supply chain against 22 respondents. this suggests that the political state of the country does not influence the effectiveness of drought supply chains in Zimbabwe at the 1% level of significance. However, Table 5.3 also shows that 129 respondents perceived economic state and the legal framework as enablers of drought supply chains in Zimbabwe.

The sign test statistical conclusion is that economic state and legal framework influence the effectiveness of drought supply chains in Zimbabwe at the 1% level of significance.
Furthermore, 105 respondents did not view the disaster management policy as an enabler of drought supply chains in Zimbabwe against 23 who viewed it as having an influence. The sign test statistical conclusion is that disaster policy does not influence drought relief supply chains in Zimbabwe, at the 1% level of significance. The following sections discuss these findings citing relevant literature for each variable.

Table 5.4 illustrates the findings on the perceptions of respondents on culture, leadership attitudes, political state, economic state, legal framework and the country's disaster management policy; as well as showing whether these play an enabling role for drought relief supply chains. The role played by educational background in influencing the perceptions of respondents was also tested and illustrated.

Table 5.4 Enablers of effective drought relief response by level of education of respondents

Variable	**Tertiary** [T]	**Non-Tertiary** [N]	**Difference** [T-N]	**Total**
Culture	1.53	2.63	-1.100**	1.69
Leadership Attitudes	1.58	2.58	-1.002**	1.72
Political State	1.59	2.53	-0.932**	1.73
Economic State in the Country	4.65	4.42	0.228*	4.62
Legal Framework	4.68	4.37	0.307**	4.63
The Country's disaster Policy	1.68	2.95	-1.272***	1.86

Notes: Sample size is 130. The third column shows results of the two-tailed *t*-test for the difference in the means. ***, **, and * indicate the 1, 5, and 10 % levels of significance.

Table 5.4 relates to respondents' perceptions on whether culture, leadership attitudes, political state, economic state, legal framework and the country's policy on disaster management are enablers of drought relief supply chains in Zimbabwe based on their educational background. The differences in the means for those with a tertiary qualification and those without are very marginal ranging from -1.2 to 0.9. A two-tailed *t*-test 1, 5 and 10%

levels of significance was carried out on the differences on the means. The finding was found to be statistically significant at 1, 5 and 10% levels of significance. The attitudes on perceptions were measured on a likert scale of 1 to 5 where 1 represented strong disagreement and 5 strong agreement. The overall results revealed that culture, leadership attitudes, political state and the country's policy on disaster are not viewed as enablers of drought relief supply chains. The economic state and the legal framework of the country were, however, viewed as enablers of drought relief supply chains.

Based on whether the respondent had a tertiary qualification or not the means for culture (1.53), leadership attitudes (1.58), political state (1.58) and the policy for disaster management (1.68) increase slightly to 2.63, 2.58, 2.53 and 2.95 for those with tertiary and non-tertiary education respectively. The findings suggested that the level of education of the respondents did not influence perceptions. In order to bring out more insights, the descriptive statistics are presented on each enabler.

5.6.1 Culture

Figure 5.1 shows the perceptions of respondents on culture as an enabler in drought relief supply chains

Figure 5.4: Perceptions on Culture as an enabler

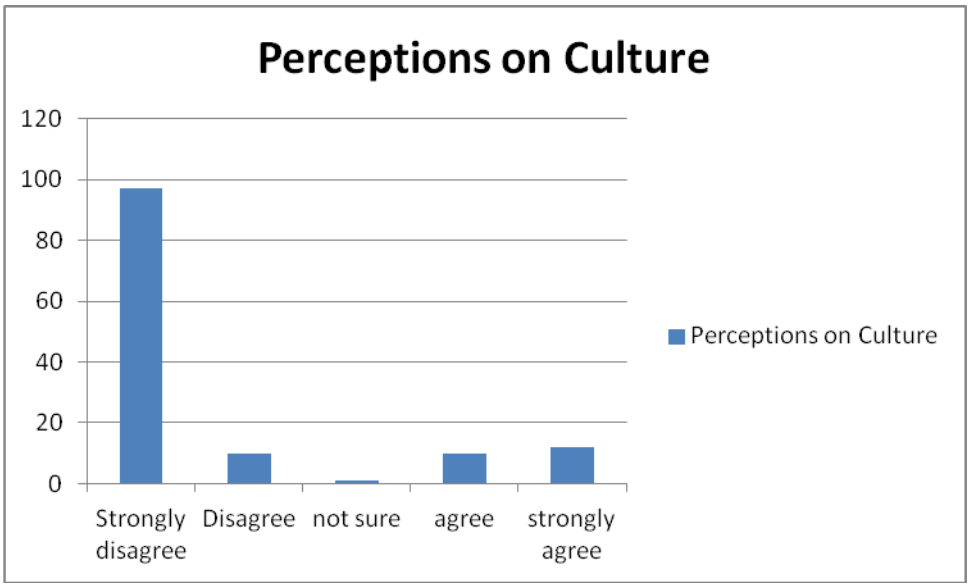
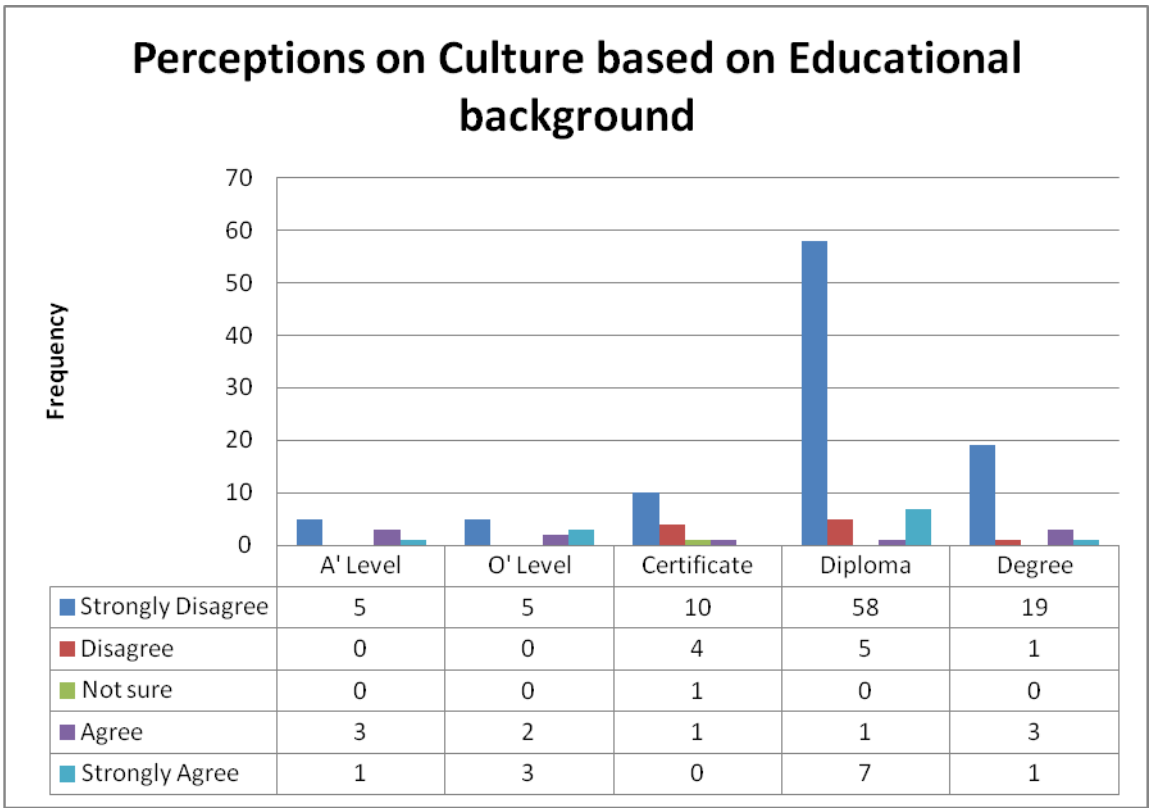


Figure 5.4 shows that 97 respondents strongly disagreed with the hypothesis that culture is an enabler to drought relief supply chains. A total of 10 respondents disagreed with the hypothesis that culture is an enabler. Those who agreed that culture is an enabler were only 22 in total. The finding suggests that culture does not have any positive impact on the

effectiveness of drought relief supply chains in Zimbabwe. To further validate this finding, Table 5.2 goes to analysis if the educational backgrounds of the respondents influence the perception of the respondents on culture. Figure 5.5 presents the perceptions of respondents on culture based on their educational background.

Figure 5.5 Perceptions on Culture based on Education



	A' Level	O' Level	Certificate	Diploma	Degree
Strongly Disagree	5	5	10	58	19
Disagree	0	0	4	5	1
Not sure	0	0	1	0	0
Agree	3	2	1	1	3
Strongly Agree	1	3	0	7	1

Figure 5.5 shows that 107 of the respondents affirmed based on educational background that culture is not viewed as an enabler across all educational categories. This finding is consistent with previous researches (Lavigne *et al*, 2008; Schein, 2004; De Coster, 2002; Haviland, 1993; Rapoport, 1987; Koentjaraningrat, 1985) which did not find culture as making positive impacts in disaster response. The lack of positive impact from a cultural perspective on drought relief in Zimbabwe can be explained by Mararike, (2001) and, Masendeke and Shoko, (2014:137-150) who agreed that the role of the traditional leaders in Zimbabwe has diminished over the years. This, therefore, means traditional leaders have no influence over the drought supply chains in Zimbabwe. The implications of this finding are that the progression in intensity of drought disasters in Zimbabwe requires more than cultural and traditional measures to minimise the impacts of drought disasters on communities.

5.6.2 Leadership Attitudes

Research evidence shows that the attitudes of community leaders affect disaster risk management (Chigwedere *et al*. 2008).

Figure 5.6 Perception on Leadership Attitudes

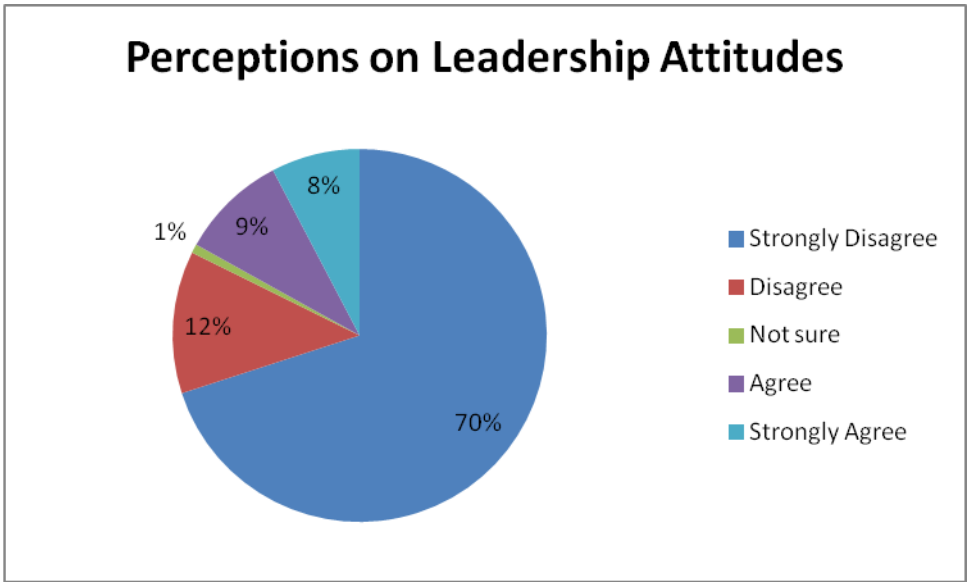
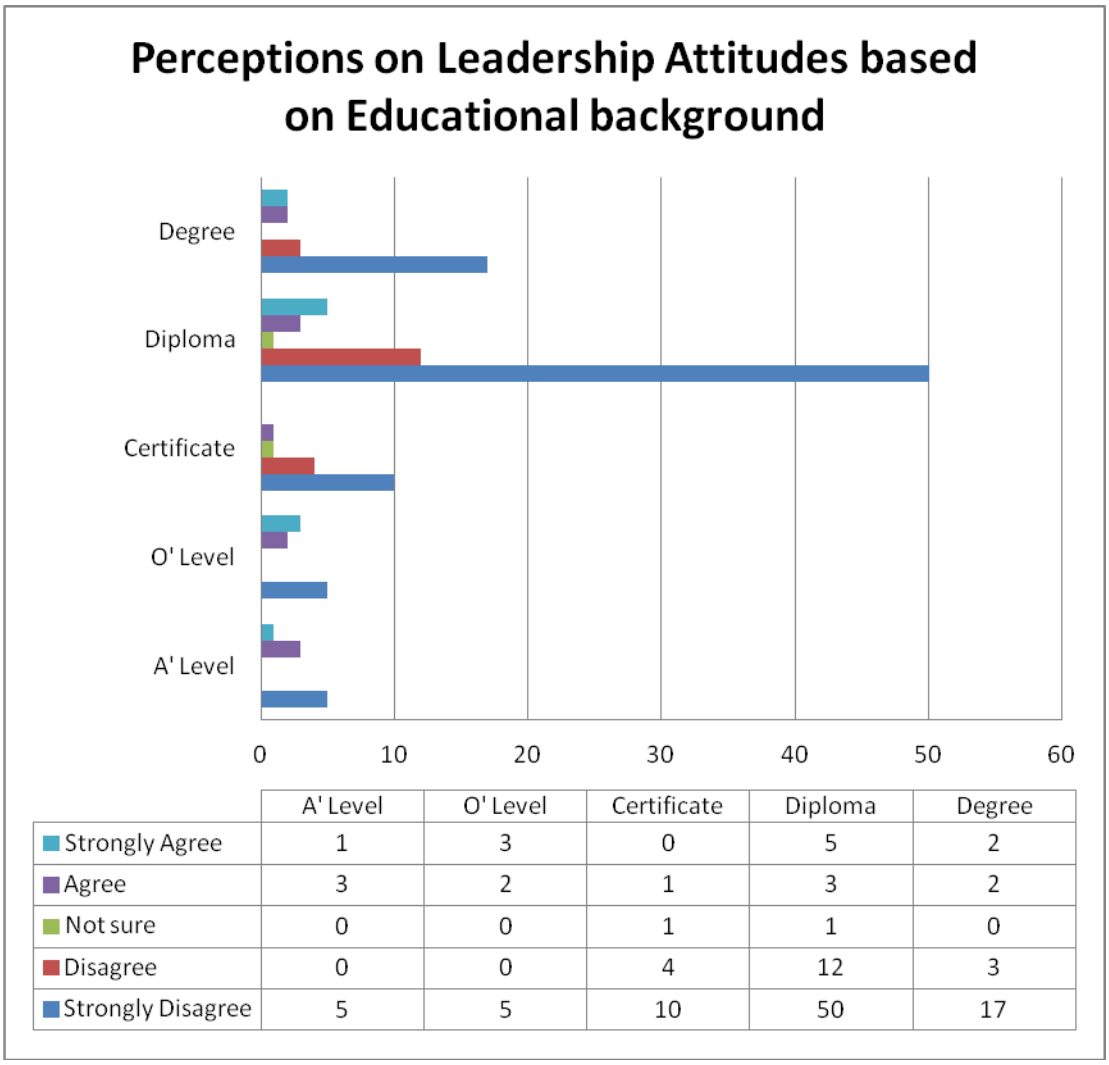


Figure 5.6 illustrates that 70 % of respondents strongly disagree with the hypothesis that leadership attitudes enable effective drought relief response. Community leaders include chiefs, kraal heads, Counsellors, Members of Parliament, and District administration officers among others. These leaders influence the community in different ways. The multiplicity of leaders with divergent motivations defeats the principle of *'unit of purpose'*. The leaders pursue individual interests as aptly put by one respondent during an interview *"...the member of parliament only comes back to us when its election time...after winning he disappears and never engages us on challenges ... look at the state of our roads..."*. This finding implies that community leadership attitudes did not influence the effectiveness of drought relief supply chains. Figure 5.7 provides further more findings and discussion on leaders attitudes and analysed the influence of educational backgrounds of respondents on their perceptions.

Figure 5.7 Perceptions of Leadership Attitudes based on Educational Background



	A' Level	O' Level	Certificate	Diploma	Degree
Strongly Agree	1	3	0	5	2
Agree	3	2	1	3	2
Not sure	0	0	1	1	0
Disagree	0	0	4	12	3
Strongly Disagree	5	5	10	50	17

Figure 5.7 show that 107 respondents making 82 % of all educational categories strongly disagree with the assertion that leadership attitudes influence drought relief response in a positive way. This finding is in line with the findings of Chigwedere et al. 2008). The research finding also implies that the educational background influenced the perceptions of respondents. To further explain this phenomenon, the involvement of diverse leaders causes coordination problems. Rey (2001:305-318) reckons that there have been very few coordination success stories in humanitarian supply chains and that coordination remains the weakest link. Discord among community leaders results in adverse impact on drought supply chains.

5.6.3 Political State

The political state of the country was another variable which was analysed to determine if it had an impact on the effectiveness of drought supply chains.

Figure 5.8 Perception on Political State

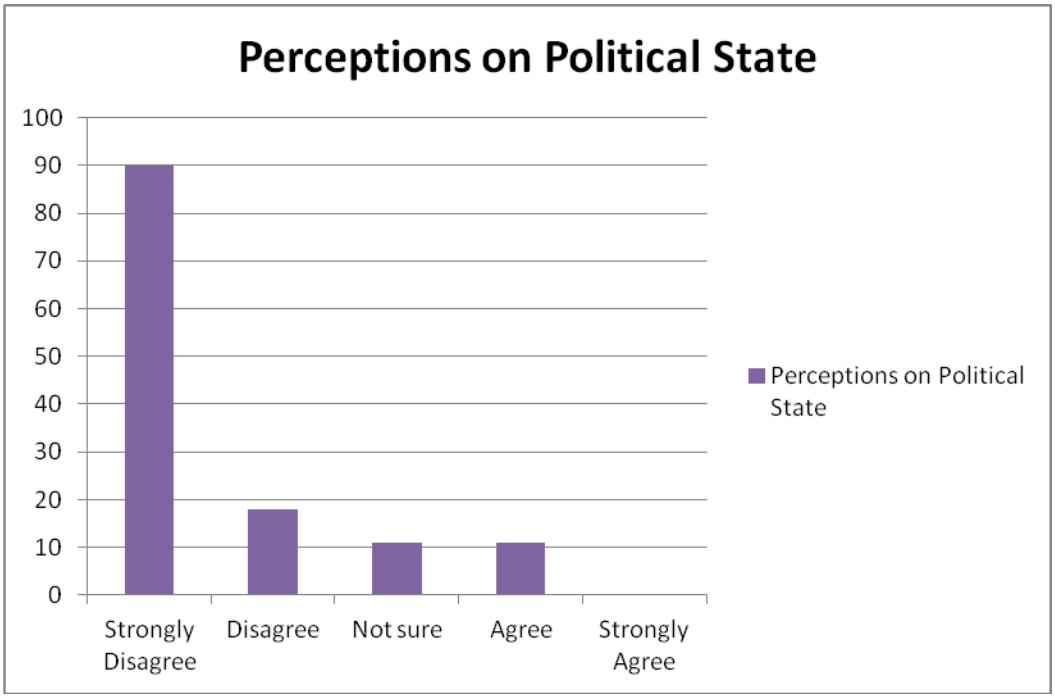
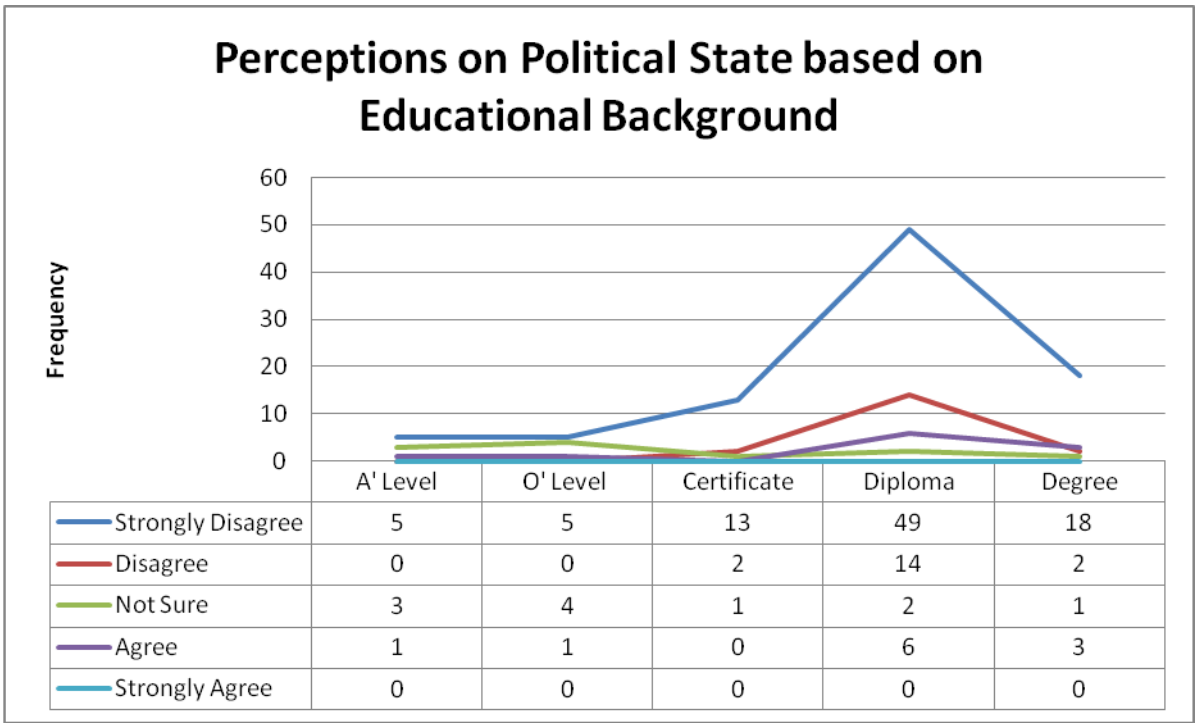


Figure 5.8 illustrates that 108 respondents strongly disagreed with the view that political state is an enabler of drought relief supply chains in Zimbabwe. Only 10 respondents agreed that political state is an enabler of drought relief supply chains. This finding implies that the state of politics in the country does not enhance the effectiveness of drought relief supply chains. This finding is in line with the findings of Tomasini and Van Wassenhove (2009:10). Indeed, the political situation of the country is far from being perfect. Sanctions imposed on the country by western economies have had a knock down effect on the economy. There have been accusations of partisan distribution of food relief. In 2016, the Zimbabwe Human Rights Commission implored politicians to stop using food relief aid to further their political aspirations at the expense of the communities. One respondent revealed in an interview that "*...sometimes we are stopped from distributing food aid to needy people waiting for local area politicians to come and give a speech even if they did not participate in the sourcing of the food supplies ...*". Figure 5.9 provides further analysis on the perceptions of respondents based on their educational background.

Figure 5.9 Perceptions on Political State based on educational background



	A' Level	O' Level	Certificate	Diploma	Degree
Strongly Disagree	5	5	13	49	18
Disagree	0	0	2	14	2
Not Sure	3	4	1	2	1
Agree	1	1	0	6	3
Strongly Agree	0	0	0	0	0

Figure 5.9 shows that 20 respondents with degrees and 63 with diplomas disagreed with the view that political state is an enabler in drought relief supply chains. It is important to note that even though politics is not an enabler, it is, however, very active in humanitarian supply chains (McEntire, 2001:192). Tomasini and Van Wassenhove, (2009:10) concluded that humanitarian supply chains operate in highly politicised environments and that it is impossible to separate them from politics.

5.6.4 Economic State

Figure 5.10 Perceptions on the economic state

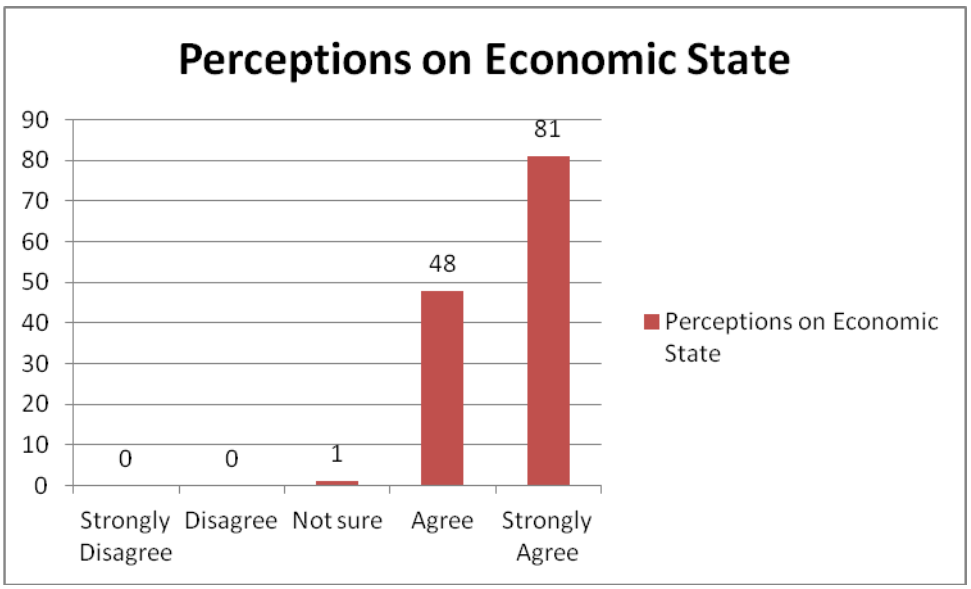
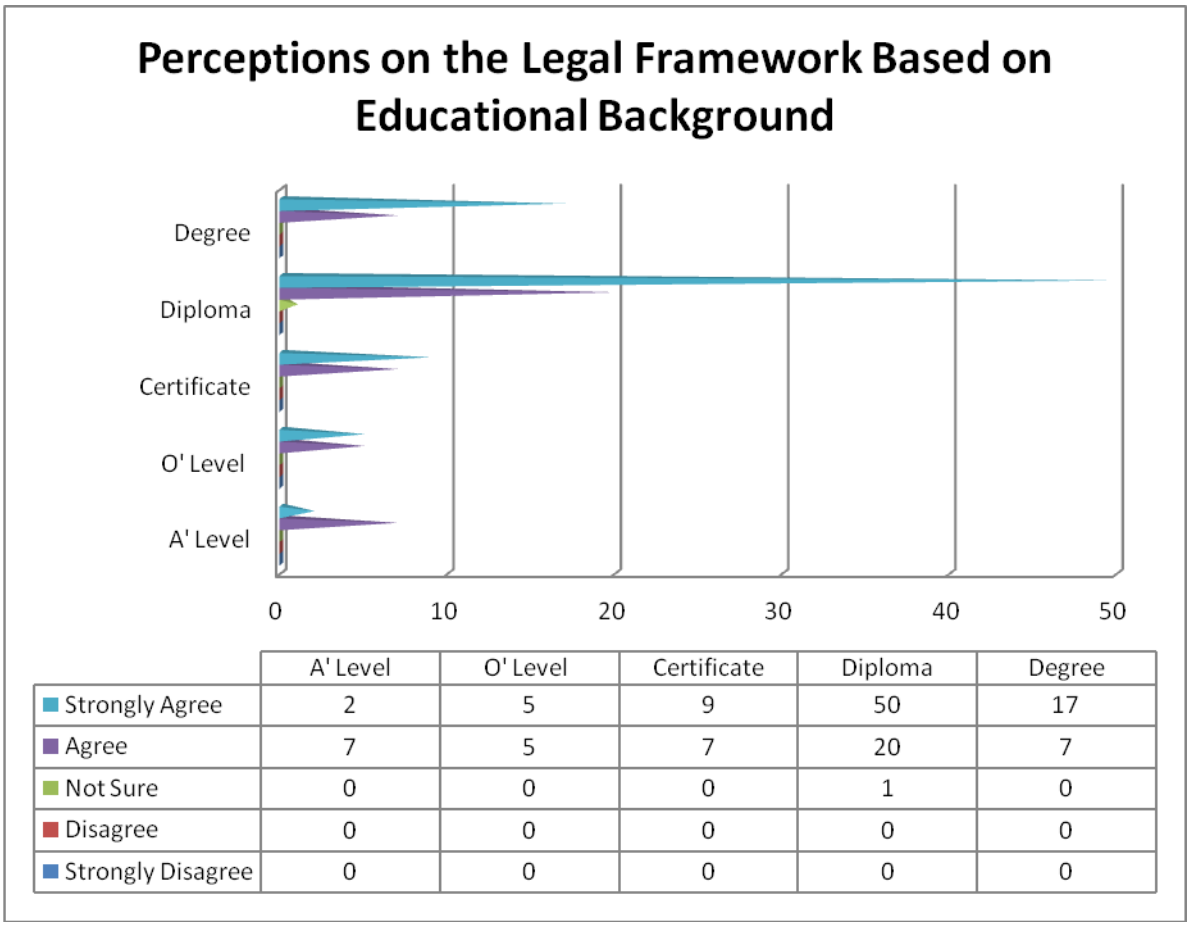


Figure 5.10 illustrate that 129 respondents agreed with the assertion that the economic state is an enabler of drought relief response. Only 1 respondent was not sure and there was no respondent against the claim that economic state influenced the effectiveness of drought relief supply chains in Zimbabwe. The implication of this finding is that the economic state influenced the effectiveness of drought relief supply chains in Zimbabwe. This finding is an interesting one given that the economy is not in a good state. There is high level of unemployment which currently stands at 80 % in the formal economic sectors according to the Zimbabwe Statistical Office (2016). Poor economic performance was identified by McEntire (2001:192) in a study on disaster prevention and management as one of the underlying factors that are a source of vulnerability. The major assumption of McEntire (2001:192), is that a well performing economy is a source of resilience against disasters for individuals and the communities. The Zimbabwe Statistical Office (2016) also reports that over 60 % of the population is employed in the informal sector. The balance of trade between Zimbabwe and its major trading partner South Africa is negative adding to the woes of the country. However, it is important to point out that Zimbabwe has exported human capital abroad which results in remittance of foreign currency into the country. These remittances and incomes generated by formal and informal activities help buy time for food relief providers to plan and distribute aid. According to ZIMSTAT (2017), the informal sector in Zimbabwe is worth over US$1.7 billion.

5.6.5 Legal Framework

Figure 5.11 Perceptions of the legal framework based on Educational background

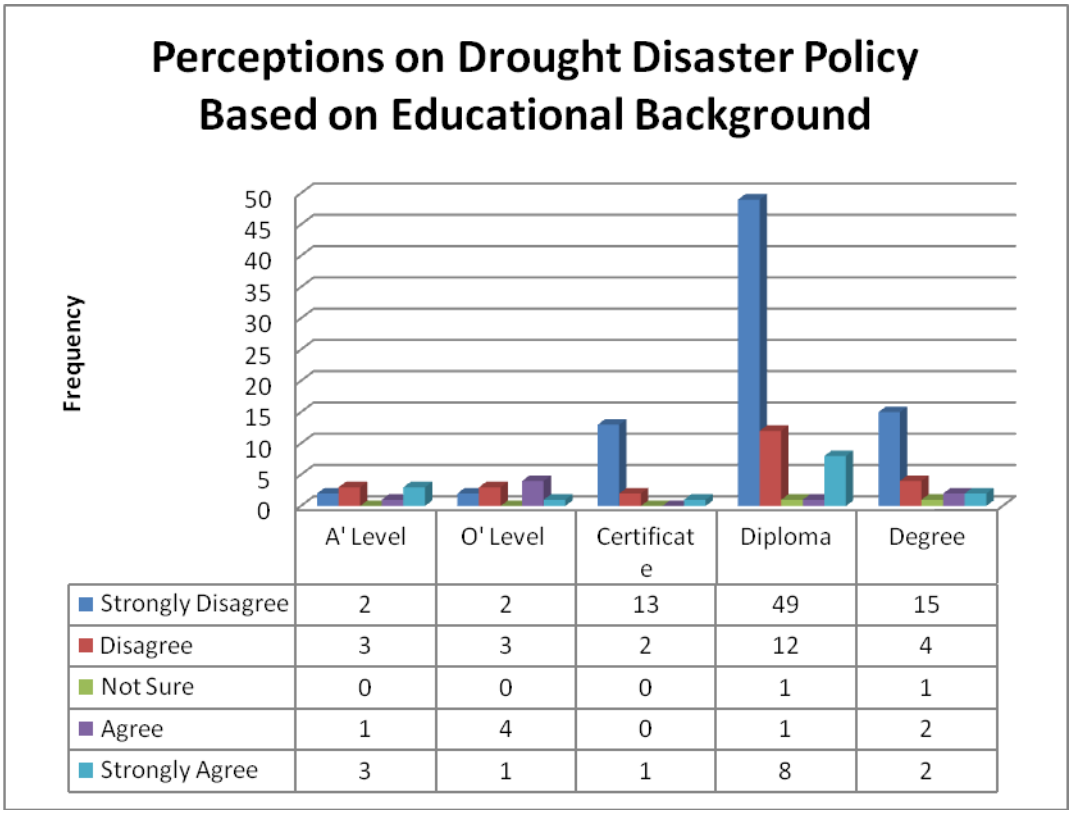


	A' Level	O' Level	Certificate	Diploma	Degree
Strongly Agree	2	5	9	50	17
Agree	7	5	7	20	7
Not Sure	0	0	0	1	0
Disagree	0	0	0	0	0
Strongly Disagree	0	0	0	0	0

Figure 5.11 illustrates that 129 respondents agree with the view that the legal framework is an enabler in drought relief response. The implication of this finding is that the legal framework had an influence on drought relief supply chains in Zimbabwe. The legal framework is a critical mitigating measure which deals with the physical vulnerabilities of communities (McEntire, 2001:191). This finding confirms the findings of Henstra and McBean, (2005) which state that the Australian government managed to avert risk through laws that regulated the construction of building near dams and also the mandatory purchases of buildings constructed along flood disaster prone areas. Laws that regulate the practice of drought relief response promote the importation and transportation of drought relief supplies in Zimbabwe. Of all the enablers, this one is more predictable than others hence it was not seen to scupper drought relief operations.

5.6.6 Drought Disaster Policy

Figure 5.12 Perceptions on drought disaster policy



	A' Level	O' Level	Certificate	Diploma	Degree
Strongly Disagree	2	2	13	49	15
Disagree	3	3	2	12	4
Not Sure	0	0	0	1	1
Agree	1	4	0	1	2
Strongly Agree	3	1	1	8	2

Figure 5.12 illustrates that 106 respondents strongly disagree with the claim that the drought disaster policy is an enabler of drought relief response. This finding suggests that the disaster policy does not influence the effectiveness of drought relief effectiveness. This finding confirms the concerns raised by Von Meding (2012:920) in the aftermath of the New Orleans and hurricane Katrina flood disasters. Disaster policies are blue prints for disaster management, however, implementing these policies has its own challenges. This situation can be explained by the fact that the current drought management strategies are aimed at increasing agricultural output rather than strategies to responding to the needs of people already in need of food aid (Tadesse, 2016:19). Current drought management strategies include water harnessing, irrigation infrastructure rehabilitation and provision of farming inputs.

5.7 Impediments to effective drought relief response

Figure 5.13 Impediments to effective drought relief response

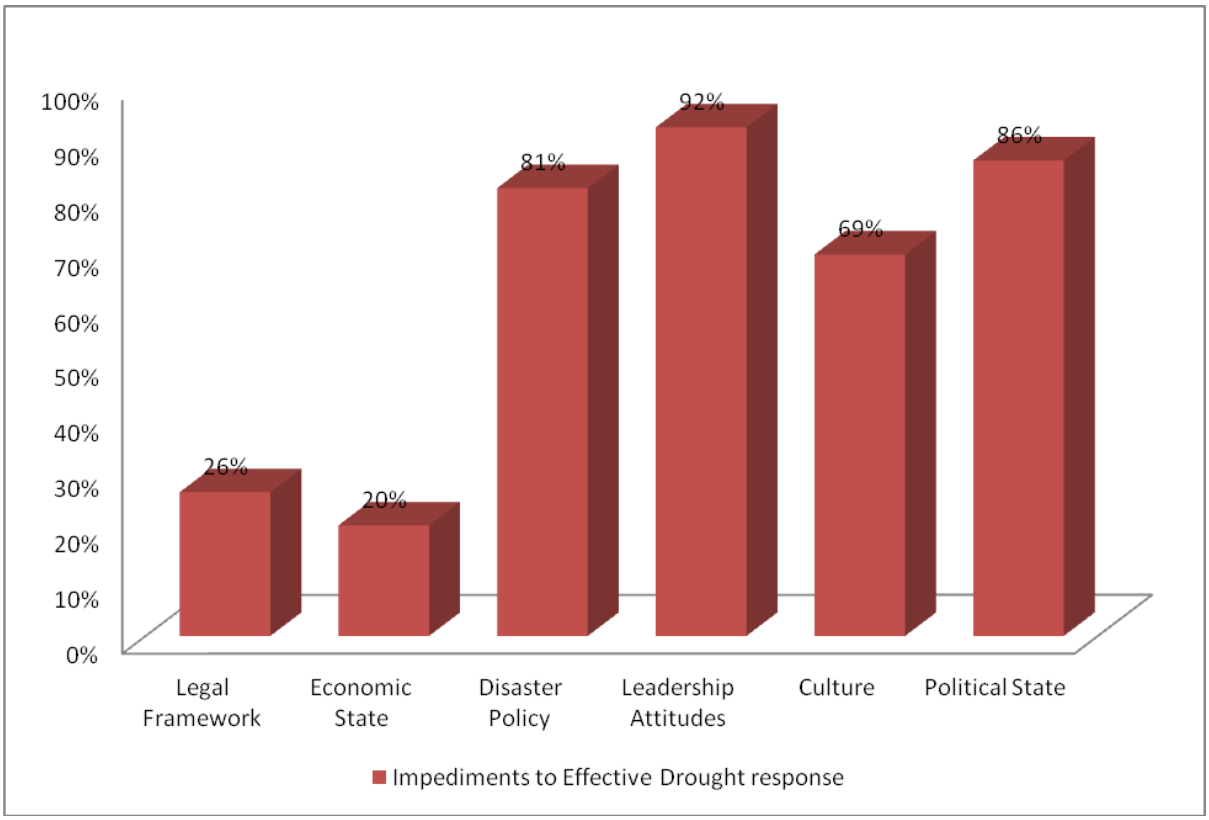


Figure 5.13 shows perceptions of interviewed respondents as follows; 81% view the disaster policy as an impediment. There was a total of 92% who viewed leadership attitudes as an impediment, 69% viewed culture and 86% political state as impediment. However, only 26% viewed the legal framework and 20% viewed economic state as an impediment. The findings in Figure 5.13 imply that disaster policy, leadership attitudes, culture and political state impedes the effectiveness of drought relief supply chains in Zimbabwe. This finding is consistent with findings presented in Table 5.4 that revealed that economic state and the legal framework were viewed as enablers of an effective drought relief supply chain. This is very important because it also proves the internal consistence of the instruments used.

Politicians and community leaders were accused of grandstanding hence delaying food distributions to needy people. The findings in Figure 5.13 are consistent with the work of McEntire (2001:191) on disaster vulnerability. McEntire (2001:191) identified social, physical, cultural, political, economic and technological factors as major factors that increase the vulnerability of communities. What is very clear is that, if the state of factors identified by

McEntire is not improved, they will increase vulnerability of communities. However, the underlying assumption of McEntire's work is that resilience to effects of disaster can be achieved by addressing weaknesses in social, physical, cultural, political, economic and technological factors.

The International Federation of the Red Cross (2003), as cited by Tomasini and Van Wassenhove (2009:35) reported that human suffering around the world was largely ignored as political considerations prevail over humanitarian ones. Tomasini and Van Wassenhove (2009) concede that it is almost impossible to isolate humanitarian relief operations from politics. The ideal situation in humanitarian supply chain management is for humanitarian mission objectives to take precedence over political considerations.

The foregoing discussions focused on the relationships between enablers and education backgrounds. The following section analyses the influence of the type of organisation the respondents belong to on the enablers. Table 5.5 infers the influence of the organisational background characteristics on the findings. This is important given that NGOs are different from government; hence, the analysis was done to provide further insights on the dynamics provided by the nature of the organisation.

Table 5.5 Enablers for effective drought relief response by Government Departments and NGOs

Variable	**Govt** [G]	**NGO** [N]	**Difference** [G-N]	**Mean**
Culture	4.55	1.11	3.44***	1.69
Leadership Attitudes	4.45	1.17	3.28***	1.72
Political State	4.50	1.17	3.33***	1.73
Economic State of the Country	4.64	4.61	0.03	4.62
Legal Framework	4.64	4.63	0.01	4.63
The Country's disaster Policy	4.68	1.29	3.39***	1.86

Notes: Sample size is 130. The third column shows results of the two-tailed *t*-test for the difference in the means. ***, **, and * indicate the 1, 5, and 10 % levels of significance.

Table 5.5 illustrates the perceptions of respondents on culture, leadership attitudes, political state; economic state of the country, legal framework and the disaster policy of the country as enablers of drought relief supply chains based on the type of organisation the respondents

belonged to. The findings revealed that government officials consider culture, leadership attitudes, political state, legal framework and disaster policy as enablers of drought relief response. Table 5.5 also shows that officials from NGOs consider Economic state and Legal Framework as enablers but disagree with culture, leadership attitudes, political state and disaster policy. Table 5.5 also shows the differences in the perceptions of respondents from government and from NGOs. A two-tailed *t*-test for the differences was carried out and was found to be statistically significant at 1% level of significance.

Follow up interviews helped to explain the discrepancy between the perceptions of government respondents and NGO respondents. From government perceptions, culture and leadership, attitudes revolved around the role of traditional leaders in the distribution of food to communities. Government respondents perceived that traditional leaders were responsible for identifying the families in need of food relief aid. As aptly put by one government respondent, *"...as government we don't have the capacity to identify all the families who require food...we get that information from community leaders...they are the ones who know what is on the ground..."*. While on the political state of the country, respondents revealed that sitting members of parliament work very closely with traditional leaders in ensuring that communities get food on time. As stated by one respondent, *"..it is the duty of the Member of parliament to ensure facilitation of sourcing and distribution of food relief for their constituency...they should be aware of the food situation in their areas.."*. Respondents also revealed that food aid was distributed to all members of the community regardless of their political affiliation or ethnic origins. This is in line with the virtues of humanitarianism. Tomasini and Van Wassenhove (2009:20) stressed that humanitarian actions should encapsulate three important principles namely; humanity, neutrality and impartiality. Priorities for food relief distribution must not be based on political affiliation but rather be on merit.

Findings obtained from respondents from the NGO community were different from those from government respondents on the culture, leadership attitudes and political state. The results show that culture, leadership attitudes, political state and the country's disaster policy do not play an important role in drought relief response. This was attributed to the fact that NGOs carry out their own vulnerability assessments through their field officers in order to identify individuals requiring food aid. As revealed by one respondent, "… *we can't rely on*

information from traditional leaders because they are biased....we have our own field officers who carry out needs assessments....we analyse information we get from our field officer to plan for food deliveries..". This arrangement limited the influence of traditional leaders in relief operations.

It was also revealed that politicians were more interested in enhancing their political aspirations ahead of alleviating the suffering of the communities which is behaviour consistent with Tomasini and Van Wassenhove (2009:10) who postulate that humanitarian action cannot be isolated from politics. Another NGO respondent had this to say, "*.... sometimes we are forced to wait for political leaders to officiate at food distribution events which sometimes delays distribution by some days ...".* This claim is also supported by the Zimbabwe Human Rights Commission in its 2016 report which castigated politicians for furthering their political standing at the expense of suffering communities. The following section presents findings for current drought supply chain strategies.

5.8 The Current Supply Chain Strategies

Figure 5.14 Current supply chain strategies by Government departments and NGOs

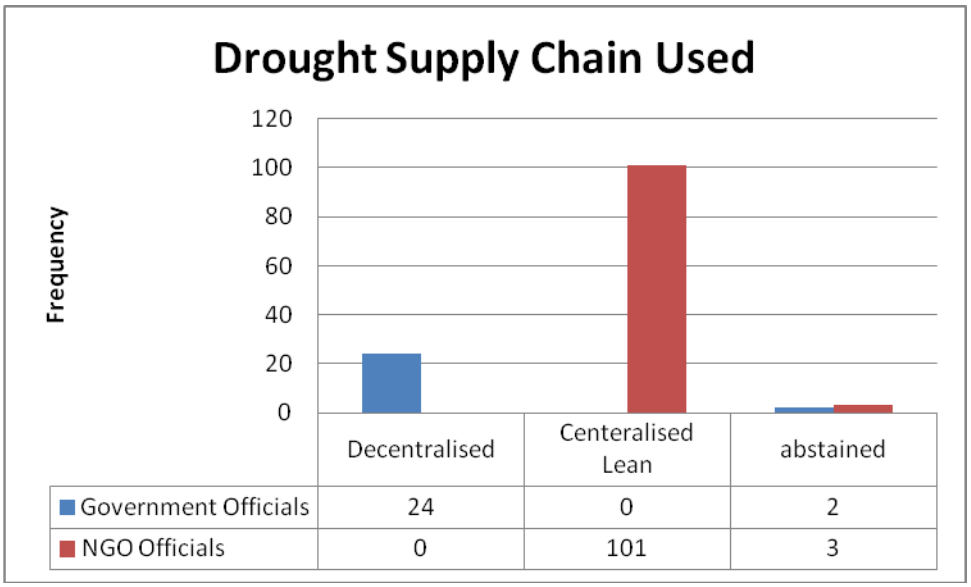


Figure 5.15 Interview Results on SCM strategies

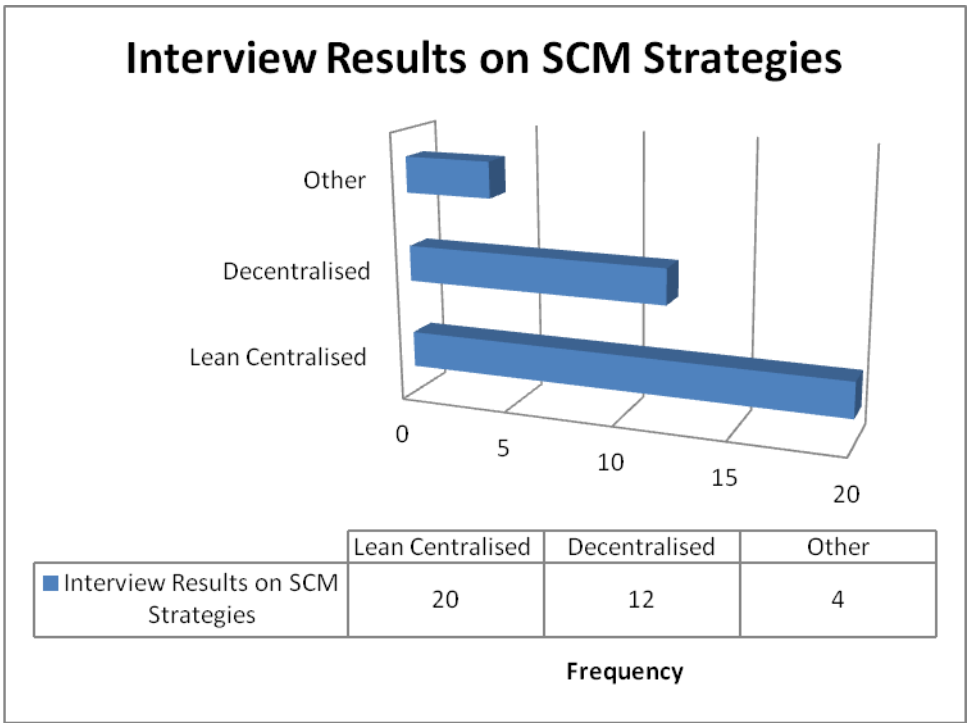


Figure 5.14 and 5.15 are a mirror image of questionnaire responses and interview response. Figure 5.14 shows that 24 out of 26 government respondents representing 92.3% identified that the government's drought relief supply chain was decentralised. Figure 5.14 also shows that 101 NGO respondents representing 97% of NGO respondents identified that drought supply chains of NGOs are centralised. Figure 5.15 shows that 20 interview respondents identified the supply chain management strategy was a lean centralised structure while 12 identified a centralised structure. However 4 respondents did not identify either of the two SCM strategies.

The government drought relief supply is decentralised because its actions through the Department of Civil Protection and The Department of Social Services extend from provinces to districts. This finding is consistent with supply chain design for operations covering wide geographical spread (Gatignon et al, 2010:103). A decentralised supply chain strategy, therefore, is best suited to enhancing supply chain effectiveness as relief supplies decision making can be done at different levels. The decentralised drought supply chain design is in line with the findings of Gatignon *et al.* (2010: 103) on the effectiveness of drought relief response for the International Federation of the Red Cross (IFRC). In the foregoing chapters, drought disasters were classified as slow on-set, hence, they do not pose immediate danger to communities (Cozzolino *et al*., 2010:7). A decentralised humanitarian supply chain strategy

enables response planning to be carried out at the lowest level of the drought relief supply chain enhancing speedy response. Lysons and Farrington (2006) also seem to be in support of a decentralised supply chain structure. Because of wide geographical spread of the country it is impossible to centrally manage disaster risk. A decentralised supply chain provides some autonomy to provinces and districts to kick start relief response. It empowers relief actors on the ground to make important decisions that enable relief aid to reach needy communities on time.

Figure 5.14 illustrates that the NGOs prefer a centralised lean supply chain for their operations, a finding which is not consistent with the findings of Gatignon *et al.* (2010: 103). The discrepancy can, however, be explained by the fact that the NGOs in Zimbabwe have regional mandates, a characteristic which differs from the study of Gatignon et al. (2010:103) in their study of the IFRC. The IFRC covered a wide geographical spread while the Zimbabwean NGOs focused on specific mandate areas. Beamon *et al.* (2008:8) explains that different types of organisations require different supply chain designs and strategies. They state that a lean supply chain is best suited for a sector with a small variety of products, long product cycles, and predictable and stable demand. Beamon *et al.* (2008) assertion stands to be true with regards to NGOs. Data from questionnaire and interviews revealed that the variety of food supplies is very small as it mostly involves maize, beans, cooking oil and sorghum. The product life cycles of these food supplies are long and the major source being World Food Program (WFP). The demand for these foods is predictable and demand forecasts are done through vulnerability assessments. Demand forecasts for food relief can also be deducted from weather forecasts that can determine agricultural output in advance. Table 5.6 examines the role of supply chain management in drought relief response.

5.9 The Role of Supply Chain Management (SCM) in Drought relief response

Table 5.6 The role of SCM in drought relief response

Variable	Mean	Min	Max	Sd
SCM enables speed response	4.79	4	5	0.407
SCM help save cost	4.89	4	5	0.311
SCM plays a critical role in saving lives	4.93	4	5	0.255
SCM ensures resources reach victims	4.94	4	5	0.241
SCM minimize damage	4.87	2	5	0.401

Table 5.6 depicts the mean of perceptions of respondents on the importance of supply chain management (SCM) on drought relief response. The perceptions were measured on a likert scale of 1 to 5 where 1 was the least score and 5 being the highest score. The respondents overwhelmingly agreed that SCM plays a critical role in enabling speed response, saving cost, saving lives, ensuring the necessary resources to reach the victims and also help minimize damage. All the stated supply roles obtained a mean of at least 4.7.

However, on whether SCM helped minimize damage, some respondents scored a minimum of 2 which warranted an interview follow up. On follow up interviews, it was revealed that minimization of damage was intense at the mitigation stage of disaster management. Notwithstanding this, there was overwhelming evidence that SCM helped reduce damage at the response stage as it allowed for speedy movement of necessary resources to affected areas. Also, there is a view that SCM is not as important in minimizing damage especially that which has to do with loss of livestock. Drought also affects livestock especially cattle, which represents the source of draught power for many communities in Zimbabwe. Beamon and Balcik (2008) also propose that relief supply chain can be measured on cost, response time, resource utilisation, output and flexibility.

The findings on the role of supply chain management on drought relief are consistent with many researches (da Costa *et al*, 2012; Tomasini and Van Wassenhove, 2009; Oloruntoba and Gray 2006). The researches carried out on humanitarian supply chains to date mainly centred on saving lives, speed, costs and damage minimisation. Supply chain management plays an important role in drought disaster management in the same manner as in commercial

businesses (Van Wassenhove 2006). Beamon and Balcik (2008) identified performance metrics for a supply chain in terms of speed, cost, quality, resources and agility in the business world. In humanitarian terms it was also fundamental to identify metrics that define an effective humanitarian supply chain. The performance metrics were identified as response speed, cost saving, life saving, resources movement and damage minimisation for drought relief supply chains (Van Wassenhove, 2006; Cozzolino *et al*., (2012); Oloruntoba and Gray, 2006).

5.10 The Modes of Transport used for Drought Relief Response

Perceptions of respondents on the use of the modes of transport are presented in Table 5.6. The 36 interview respondents also revealed that most transport services to move drought relief supplies were outsourced.

Table 5.7 Modes of transportation for drought relief aid

Mode of Transport	Mean	Min	Max	Sd
Road transport	4.631	4	5	0.484
Railway transport	4.423	4	5	0.496
Sea transport	4.592	4	5	0.493
Air transport	1.146	1	3	0.376
Intermodal	4.454	4	5	0.422

Table 5.7 illustrates the modes of transport preferred for moving relief supplies from source to the beneficiaries. The major transport modes used in drought relief operations as can be seen in table 5.7 are road, railway and sea transport with a mean of at least 4.4. Air transport with a mean of 1.146 is the least used. Intermodal transport is also very popular with a mean of 4.454. Road, rail and sea are used because of food supplies are transported in bulk. The bulk of food supplies transported comprise of maize, wheat, sorghum and beans. The transportation of food supplies may require more than one form of transport mode. The use of more than one transport mode is called intermodal transport. For example, the WFP use sea transport to move food supplies from international sources. The supplies will be transported at sea ports by railway then by road for last mile delivery. Further enquiry through interviews revealed that air transport was rarely used as this transport mode did not suit drought relief response which is heavily dependent on moving bulky food stuffs. One respondent recons

that, "*... air transport is very expensive for the quantities we try to move...it is the fastest but it is just unaffordable..so instead we use sea and rail which are a lot cheap..*"

Further analysis was necessary in order to determine the factors that are considered when selecting the most appropriate mode of transport to move food supplies to affected communities. The major food supplies transported by both the government and NGOs were maize, sorghum, beans and cooking oil.

According to da Costa *et al.* (2012), it is important to evaluate how best the modes of transport can be utilised in order to efficiently support distribution activities in both the strategy of shipment and logistical support to the relief operation. Transportation is the core of relief logistics. In Zimbabwe food supplies such as maize, sorghum, cooking oil and beans are transported using mostly road transport. Table 5.8 examines the factors that are considered in selecting mode of transport for shipping drought relief supplies.

Table 5.8 Transport modes and influencing factors

Variable	Mean	Min	Max	Sd
Modes of transport used				
Road	4.63	4	5	0.484
Railway	4.42	4	5	0.496
Sea	4.59	4	5	0.493
Air	1.15	1	3	0.376
Intermodal	4.454	4	5	0.422
Factors affecting choice of mode				
Cost	4.52	4	5	0.501
Distance from supplier	4.66	4	5	0.475
Load size	4.56	4	5	0.498
3rd party logistics	4.65	4	5	0.480

Table 5.8 brings into perspective the factors that determine the choice of transport. The perceptions of respondents were measured on a scale of 1 to 5. Cost, distance from supplier, load size and 3rd party logistics recorded means of 4.52, 4.66, 4.56 and 4.65 respectively. Cost, distance from supplier, load size and third party logistics were viewed as major considerations for the selection of the most appropriate transport. While air transport can achieve the speed that helps improve the response speed, interviews revealed that, the tradeoffs between cost and quantity were not worthwhile given that drought disasters are

slow-on-set. Krajewski *et al*., (2013) state that cost, distance, load size and 3rd party logistics are some of the important considerations for the selection of a transport mode.

5.11 Warehouse Location in drought relief operations

Tables 5.9 reveal the perceptions of respondents on the factors that influence the choice of a warehouse location.

Table 5.9 Means of factors for warehouse location

Variable	Mean	Min	Max	Sd
Cost	4.48	4	5	0.502
Distance from Supplier	4.68	4	5	0.469
Last Mile delivery	4.40	0	5	0.630
Road network	1.14	1	2	0.347
Quantity and product type	1.21	1	4	0.509

Table 5.9 reveals the mean perceptions of respondents on stated factors for locating a warehouse. The perceptions were measured on a scale of 1 to 5. It was established that cost, distance from supplier and last mile delivery were important considerations averaging 4.48, 4.68 and 4.40 respectively. Road network and quantity, and product type averaged 1.14 and 1.21 respectively. Road network and the type of product being delivered were not taken into consideration because the organisations cannot do anything about them. Some roads were said to be in a very bad state making it very difficult to deliver supplies as close to the beneficiaries as possible. In the Pakistan earth quake in 2005, a ragged road network was identified as one of the major impediments to disaster response (da Costa *et al.,* 2012). Last mile delivery was a very important consideration, the government and NGOs made use of classrooms in schools to ensure supplies get as close to the communities as possible. This helped the communities from incurring further transport costs. The people used ox or donkey drawn scotch carts to transport their ration to their homes.

Warehousing is an important aspect of drought disaster relief operations (da Costa *et al.*, 2012). Food supplies are transported in huge quantities and storage of such is paramount before they are distributed to beneficiaries in an orderly manner. At warehouses, relief supplies are subjected to handling, repackaging screening and discharge of rejected goods (da Costa *et al.,* 2012).

According to Krajewski *et al.,* (2013) there are mathematical models that can be applied to locate a warehouse. The authors suggested two models, the Load-Distance method and the Centre of Gravity method. The load-distance method is a mathematical model that is used to evaluate locations based on proximity factors (Krajewski *et al.,* 2013). The objective of this method is to select a location that reduces loads multiplied by the distance that the load travels. There was no evidence of any mathematical manipulations by the organisations that provided drought relief, however, their considerations for warehouse location satisfied the requirements of the load-distance model.

Another model is the centre of gravity model which identifies the ideal location on a map that ensures the minimum or shortest distance from node to node (Krajewski *et al.,* 2013). In Table 5.9 there was no useful information to support the use of the centre of gravity model. Shortest distance travelled can be calculated where there are route options. In the case of Zimbabwe, the road network is a limiting factor, hence, there is usually no route options to a warehouse location. A regression analysis on warehouse costs will be carried out in Chapter 6.

5.12 Fundamental aspect of Humanitarian Supply Chain Management

In figure 5.12 the most important aspects that make up a drought relief supply chain are presented.

Figure 5.16 Fundamental Aspects of a Drought Relief Supply Chain

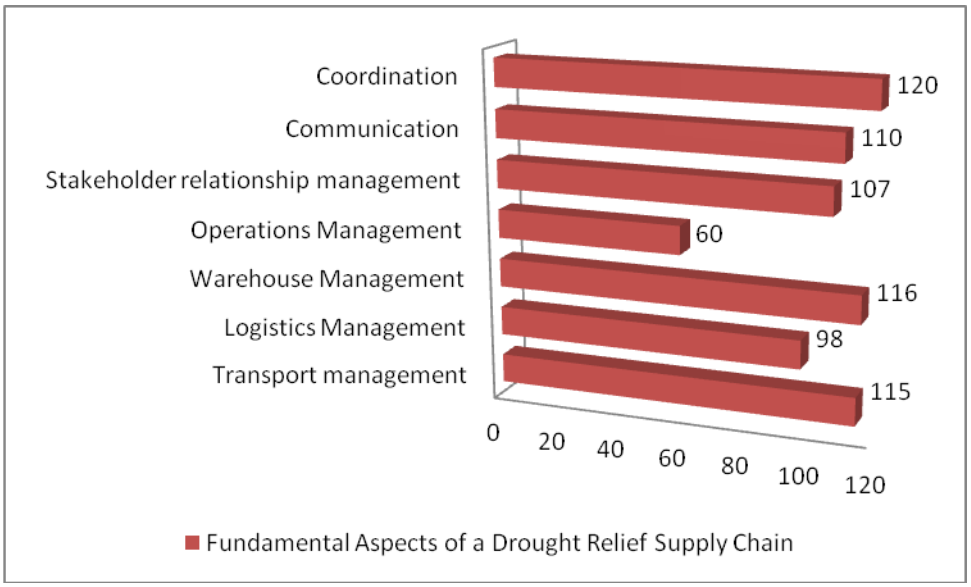


Figure 5.16 shows aspects of the supply chain that were identified by respondents including, logistics management, operations management, warehouse management, stakeholder relationships management, coordination of actors, transportation and communication among others (Tomasini and Van Wassenhove 2009). Interview results are consistent with the findings in figure 5.16. Coordination, communication and information sharing, logistics planning and stakeholder relationship management were identified as critical success factors for a drought relief operation. The fundamental aspects of humanitarian supply chains are consistent with those stated in the publications of Balcik *et al.*, (2010); da Costa., (2012); Tomasini and Van Wassenhove, (2009) and Oloruntoba and Gray, (2006).

Table 5.10 Means of Fundamental Aspects of SCM by Type of Organisation

By type of organization	Mean	Sd	Min	Max
NGO	3.03	0.837	1	5
Government	2.50	0.740	1	4
Difference in means	0.53***			

Notes: Sample size is 130. The third column shows results of the two-tailed *t*-test for the difference in the means. ***, **, and * indicate the 1, 5, and 10 % levels of significance.

Table 5.10 shows that NGO respondents recorded a mean score of 3.03. Government respondents also recorded a mean score of 2.50. There was a mean difference of 0.53. A two-tail t-test was carried at 1, 5 and 10 levels of significance. The difference in means was found

to be statistically significant at 1% level of significance. The respondents were required to list aspects of the supply chain they felt were fundamental in drought relief response. Those who identified one got a score of 1 and those who suggested at least five got a score of 5. Respondents from NGOs were able to identify more aspects than their counterparts in government as evidenced by a mean of 3.03 against 2.50 for government respondents. The respondents were analyzed based on those from the NGO community and those from government.

Table 5.11: Means for Fundamental aspects of drought relief SCM by Educational background

Education	Mean	Sd	Min	Max
Non Tertiary	2.74	0.653	1	4
Tertiary	2.97	0.868	1	5
	-0.24			

The aspects that were identified by respondents have been alluded to in the foregoing paragraph. A respondent was awarded a score of 1 if they identified one aspect and a score of 5 if they identified five aspects or more. Table 5.11 is showing that respondents with a tertiary qualification recorded a mean of 2.97. This means the respondents were able to identify at least three aspects of drought relief supply chain management. Respondents with a non-tertiary qualification recorded a mean of 2.74. This means the respondents were able to identify fewer than three aspects of drought relief supply chain management. The difference in means of -0.24 was, however, found not to be statistically significant at 1, 5 and 10% levels of significant. These findings show that humanitarian supply chain imperatives are not very familiar to many emergency actors.

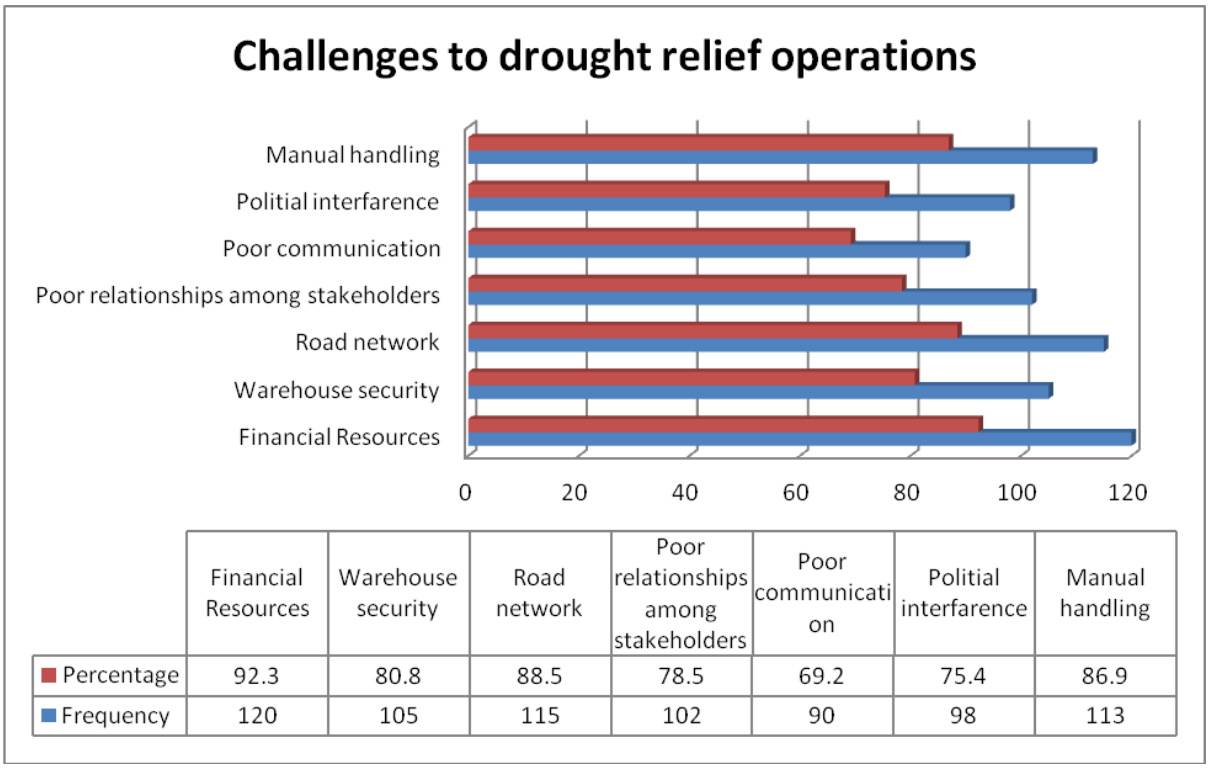
Maon *et al.,* (2009) are concerned with how supply chain imperatives are ignored when planning for disaster response. As aptly put by Maon *et al*, (2009:153), "relief agencies lack a general understanding of what good logistics does and can offer: improved efficiency, contingency plans, accountability and reduced costs" (Rickard 2003:18). Also Oloruntoba and Gray (2006: 116) support these findings when they noted that "there is evidence of a lack of planning in humanitarian supply chains, resulting in inefficiencies, for example overuse of expensive and unsafe air charter, failure to pre-plan stocks, congestion caused by unplanned deliveries, and a lack of inter-organisational collaboration for information systems". The

incorporation of these fundamental supply chain aspects in disaster management planning can yield phenomenal results (Tomasini and Van Wassenhove, 2009).

5.13 Major Challenges in Relief Operations

In keeping with the objectives, the study set out to identify major impediments encountered in drought relief operations in Zimbabwe. Section 5.3 discussed some impediments as a follow up to the question of the impact of culture, leadership attitudes, political state, economic state, legal framework and the disaster policy. It was imperative to solicit for drought relief impediments from the respondents from an operational perspective. Impediments listed by respondents included lack of financial resources, poor warehouse security, poor road network, strained relations with community leadership, lack of communication, lack of storage space and manual handling as depicted in Figure 5.4.

Figure 5.17 Operational Challenges to Drought Relief Supply Chains

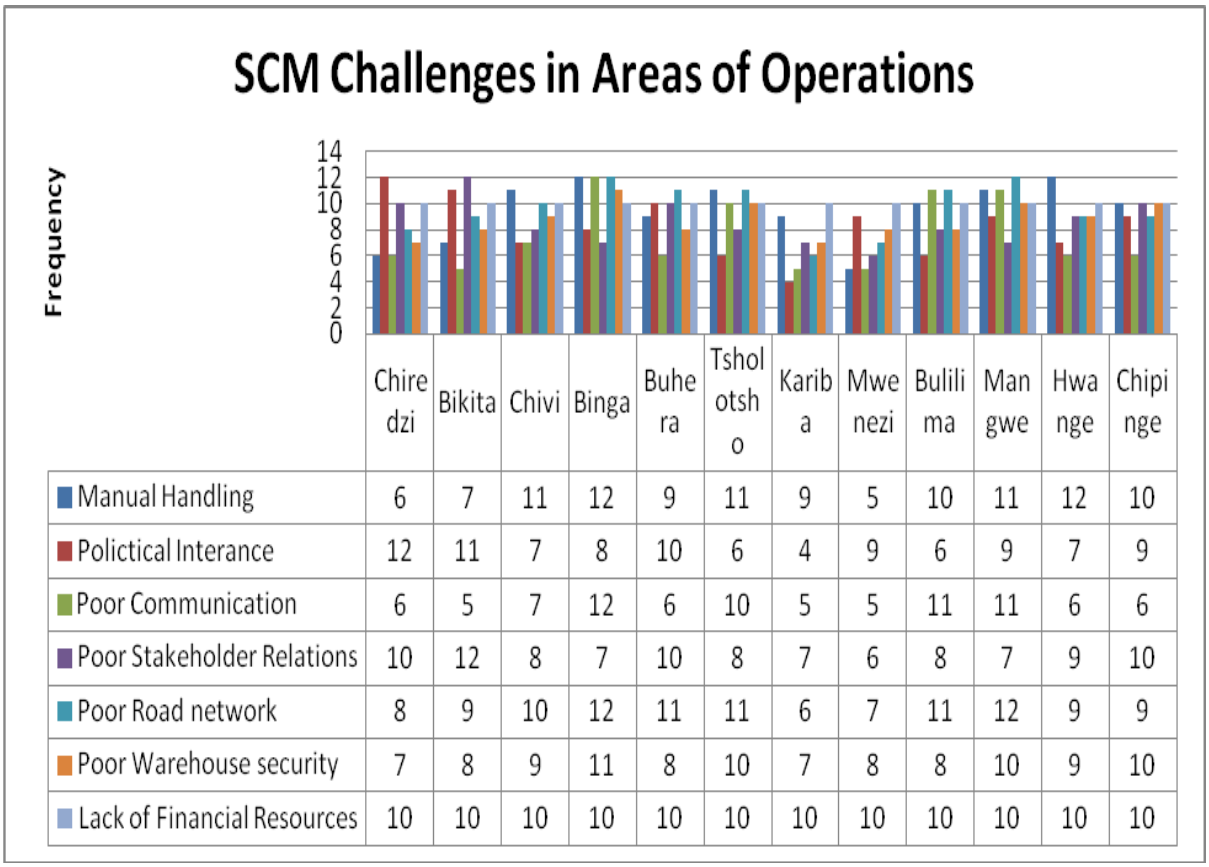


	Financial Resources	Warehouse security	Road network	Poor relationships among stakeholders	Poor communication	Politial interfarence	Manual handling
Percentage	92.3	80.8	88.5	78.5	69.2	75.4	86.9
Frequency	120	105	115	102	90	98	113

Figure 5.17 shows the major challenges encountered during drought relief operations. Figure 5.17 show that lack of financial resources was the major challenge faced in drought relief at 92%. Other challenges identified by respondents were warehouse security at 81%; poor road network at 89%; poor relationships among stakeholders at 79%; poor communication at 69%; political interference at 75% and Manual handling of supplies at 87%. The findings suggest that lack of financial resources; poor warehouse security poor road network, poor stakeholder

relations, poor communication, political interference and manual handling were the major challenges faced in drought relief operations in Zimbabwe. The findings are in line with the finding of Dolan and Krug (2006:59), da Costa et al. (2012:601) and Tomasini and Van Wassenhove (2009:43). The discussions on each challenge to drought relief follow in the sections below. Figure 5.18 below shows SCM challenges in the individual areas of drought relief operations.

Figure 5.18 SCM challenges in Areas of Relief Operations



	Chiredzi	Bikita	Chivi	Binga	Buhera	Tsholotsho	Karibа	Mwenezi	Bulilima	Mangwe	Hwange	Chipinge
Manual Handling	6	7	11	12	9	11	9	5	10	11	12	10
Polictical Interance	12	11	7	8	10	6	4	9	6	9	7	9
Poor Communication	6	5	7	12	6	10	5	5	11	11	6	6
Poor Stakeholder Relations	10	12	8	7	10	8	7	6	8	7	9	10
Poor Road network	8	9	10	12	11	11	6	7	11	12	9	9
Poor Warehouse security	7	8	9	11	8	10	7	8	8	10	9	10
Lack of Financial Resources	10	10	10	10	10	10	10	10	10	10	10	10

Figure 5.18 shows that political interference was common in Chiredzi, Bikita, Buhera and Mwenezi a finding that agrees with the ZHRC (2017) report. Lack of financial resources is also highlight as major challenge in all the 12 areas of drought relief operations. Poor road network is sighted as a major drawback in Binga, Tsholotsho, Mangwe and Bulilima. Table 5.12 presents operational challenges faced during drought relief operations.

Table 5.12 Means of Operational challenges to Drought Relief Supply Chains by Type of Organisation

By type of Organisation	Mean	Sd	Min	Max
NGO	3.58	0.699	2	5
Government	3.64	0.581	3	5
	-0.05			

Table 5.11 depicts impediments to relief operations listed by respondents. Respondents who listed only one challenge to drought relief were awarded a score of 1 and those who listed at least five challenges to drought relief were awarded a score of 5. NGO respondents recorded a mean of 3.58 and government respondents recorded a mean of 3.64. The respondents from both sets of organisations were able to identify at least three impediments that they felt were hindering relief operation activities. The difference in means was also found not to be statistically significant at 1, 5 and 10% levels of significance. Table 5.13 presents findings on drought relief challenges based on the respondent's educational background.

Table 5.13 Means of Operational Challenges to Drought Relief Supply Chains

By respondent's education	Mean	Sd	Min	max
Non Tertiary	3.42	0.607	2	4
Tertiary	3.62	0.688	3	5
	-0.20			

Table 5.12 revealed that non tertiary respondents recorded a mean of 3.42 and those with a tertiary qualification recorded a mean of 3.68. Regardless of their educational backgrounds, respondents were able to identify at least three impediments to relief operations. The results, however, showed bias towards respondents with a tertiary qualification. The difference in means at -020 was also found not to be statistically significant at 1, 5 and 10% levels of significance.

The findings in Figure 5.13 are consistent with supply chain challenges identified by researchers such as Balcik et al, (2010:20-34), Oloruntoba and Gray, (2006:115), da Coster et al, 2012:598-607) McEntire (2001:189-196), Van Wassenhove (2006:475-489) and Tomasini and Van Wassenhove, (2009:10). The following sections explain each challenge to drought relief response.

5.13.1 Lack of Financial Resources

Lack of financial resources was highlighted as a serious challenge in drought relief response. The magnitude of the drought for 2016 agricultural season was so severe that it was declared a national disaster. The implication of the declaration was that the government's resources could not cope with the demand for food assistance. According to the Government of Zimbabwe (2017), in 2016 alone the government spent $200 million (United States Dollars) on maize imports from Zambia, Tanzania and Brazil. The lack of financial resources meant that food supplies were not consistent. According to Oloruntoba and Gray (2006:116), charities and governments find it difficult to raise funds for emergency assistance.

5.13.2 Warehouse Security

Warehouse security issues were raised especially for last mile delivery. It was found that food supplies are dispatched from distribution points to various places. On arrival at places for distribution the food is offloaded sometimes in open places without proper security and also to avoid payment of demurrage to the transporter. This is a supply chain risk which may result in some food supplies being stolen as the case in the Japan earthquake in 2011. The off-loading of food supplies in the open was also seen to expose the food to bad weather and unhygienic conditions which could potentially create health problems for the communities (da Coster et al, (2012:603).

5.13.3 Poor roads and road network

The state of roads in the country is very bad, making it very difficult to access from drought stricken areas. According to one respondent, *"... the roads are very bad that sometimes it is impossible to access certain areas ... the beneficiaries will have to travel longer distances to collect food rations at nearest dropping points.."* another respondent also stated that, "*...because of the poor state of roads, transporters are reluctant to transport food supplies to certain areas...those who agree charge very high transportation charges.."* The effects of bad roads were witnessed in the aftermath of the 2005 earth quake in Pakistan. According to da Coster et al, (2012:603) supply chain performance was hampered by extremely rugged topography with some areas completely inaccessible by road.

5.13.4 Poor relationships with stakeholders

The multiplicity of drought relief response stakeholders comes with a lot of discord (Balcik et al, 2010:22; Oloruntoba and Gray, 2006:116). The identified stakeholders in Zimbabwe included the beneficiaries, Chiefs, Kraal heads, counsellors, Members of Parliament, District administration officers, civil society and political parties to mention a few. The diversity also brings with it conflict of interest among the stakeholders which sometimes affects the efficiency of a drought supply chain. Management of relations with stakeholders is a critical success factor for drought relief supply chains.

5.13.5 Poor communication

Poor communication exacerbated the problem of managing relations with stakeholders. It was established that there was no free information sharing and communication amongst the actors in drought relief operations. According to one respondent, "*...some times when we request the numbers of affected people we are given inaccurate figures ... this has resulted in us sending insufficient food supplies...exact numbers are sometimes very difficult to get...*". Poor communication and lack of information sharing amongst drought relief actors affects the efficiency of the supply chain (Oloruntoba and Gray, 2006:116; da Coster et al, 2012:603).

5.13.6 Political interference

Political shenanigans have been discussed in previous sections. However, this finding is also important as it corroborates the internal consistency of the research instrument used. Tomasini and Van Wassenhove (2009:10) also stated that it is impossible to separate politics from humanitarian operations.

5.13.7 Manual handling

Manual handling is a problem observed when off loading food supplies during last mile delivery. In communal areas, mechanical materials handling equipment such as forklifts and conveyor belts are not available hence off loading is done manually. Manual off loading of food delivery trucks takes very long and is also expensive as it is labour intensive.

5.14 Number of People Affected and the Costs Involved

Table 5.14 Number Affected People, Transport Cost, Quantity delivered and Warehouse cost by nature of organization

	NGO	Gov	Diff	Total
Number affected	65065	2000000	1934935***	392515
Transportation cost ($)/km	3	2	1***	3
Quantity delivered (tones)	781	24000	-23219***	4710
Warehouse cost ($)/month	1581	1650	-69	1593

Notes: Sample size is 130. The third column shows results of the two-tailed *t*-test for the difference in the means. ***, **, and * indicate the 1, 5, and 10 % levels of significance.

Table 5.14 statistics by NGOs and government of the numbers affected, cost of transporting relief aid, quantities delivered and cost of warehousing. The average number of affected people by NGO respondents was 65065 per NGO and the average number of affected people by government respondents was 2 million. Average transport costs by NGO respondents' averaged $3/km and for government respondents $2/km. the average quantities moved by was 781 tonnes and 24000 tonnes by the government. Warehouse costs for NGOs averaged $1581 per month and $1650 per month for government. A two-tailed t-test for the difference in the means at 1, 5 and 10 levels of significance was carried out. It was found out that the results were statistically significant except for the cost of warehousing. A two-tailed *t*-test was carried out at 1, 5 and 10 % levels of significance and the findings for the number of people affected, transport costs and quality delivered were found to be statistically significant at 1 % level of significance.

The transport cost discrepancy between the government and NGOs can be explained by the fact that the government has access to transport equipment by departments such as the District Development Fund (DDF), The Central Mechanical and Engineering Department (CMED) and the Ministry of transport to deliver food supplies. In these arrangements the government will be liable to provide fuel. In Table 5.14 it is revealed that the transport incurred by NGOs is high at $3 per kilometre. As already been explained in the previous section, transporters charge exorbitant prices as a result of some roads being in a very bad state.

5.15 Conclusion

This chapter looked at the descriptive analysis of the findings. In this chapter research questions 1, 2, 3 and 4 were answered descriptively. Empirical evidence and relevant theories were identified and used to explain the findings. The major highlights of the chapter were that culture, political state, leadership attitudes and the disaster policy were not enablers of drought relief supply chains while economic state and the legal framework were considered to be enablers of drought relief response; challenges to drought relief in Zimbabwe were identified; current drought relief supply chain strategies were identified and the fundamental aspects of a drought relief supply chain in Zimbabwe were identified. The following chapter presents inferences into relationships between enablers and some identified supply chain performance measurement metrics.

Chapter 6

Quantitative Data Analysis

6.1 Introduction

The chapter reveals the impact of culture, leadership attitudes, political state, economic state and legal framework on each supply chain performance measurement parameter. The OLS estimation of the relationship between the enablers of drought relief supply chain effectiveness which are specified in equation (1) of this study are presented. As equation (1) specifies, enablers are measured using culture, leadership attitudes, political state, and economic state and supply chain efficiency is proxied by Transport costs, warehouse costs, quantities delivered and also the number of people affected. Equation (1) also includes a vector of the background characteristics of the respondent as well as those of his or her organization. These background characteristics are included so that the impact of enablers is identified.

6.2 The Impact of Drought Relief Enablers on Transport costs

Table 6.1 Impact of enablers on transport cost

	Transport Cost (I)	Transport Cost (II)	Transport Cost (III)	Transport Cost (IV)	Transport Cost (V)
Education	-0.0371	-0.0414	-0.0490	-0.0324	0.00415
	(0.126)	(0.122)	(0.128)	(0.131)	(0.111)
Work experience	0.0306	0.0302	0.0298	0.0294	0.0250
	(0.0331)	(0.0315)	(0.0321)	(0.0307)	(0.0285)
Government	-0.996***	-1.101***	-1.196***	-1.116***	-1.102***
	(0.101)	(0.136)	(0.134)	(0.100)	(0.100)
Culture	-0.0353				
	(0.0335)				
Leadership attitudes		-0.00554			
		(0.0312)			
Political state of the country			0.0221		
			(0.0445)		
Economic state of the country				-0.0399	
				(0.0693)	
Legal framework					-0.147**
					(0.0608)
Constant	3.503***	3.476***	3.437***	3.636***	4.039***
	(0.374)	(0.326)	(0.351)	(0.570)	(0.448)
Observations	130	130	130	130	130
R-squared	0.657	0.657	0.657	0.658	0.676

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6.1 shows the OLS estimation of the impact of enablers on transport costs. According to Table 5.14 in Chapter 5 the average transport cost per kilometre is $3 and $2 for NGOs

and Government respectively. The finding reveals that save for the legal framework; all enablers do not have statistically significant impact on transport costs. The finding implies that legal framework influenced transport cost that relates to drought relief supplies. Specifically, Column (V) of the table shows that an increase in the perception of the importance of legal framework on the part of the respondent decreases transport costs per kilometre by $0.147. This finding is statistically valid at the 5% level of significance and is in line with previous studies such as da Coster et al (2012:605) in the study entitled Supply chains in humanitarian operations: Cases and Analysis and Balcik et al. (2009:29) in a study on coordination in humanitarian relief chains: Practices, Challenges and Opportunities. The authors recognise that legal framework plays an important role in influencing transport costs which account for a significant %age of the disaster supply chain.

The reduction of transport costs can be attributed to government interventions through relevant statutory instruments that promote easy movement of relief supplies to affected communities. Goods brought into the country by registered charity organisations are exempted from paying duty and value added tax in terms of the Customs and excise regulations Section 124 and Statutory Instrument 154 of 2001. Transport costs form a major part of drought relief expenditure hence exemption from paying duty, value added tax, toll fees and other regulatory fees results in phenomenal cost reduction. However, for an organisation or individuals to enjoy these tax benefits, they must be registered in terms of the Private Voluntary Organisations Act [Chapter 17:05].

When one considers the background characteristics of the respondent or their organization, one can see from Columns (I) to (V) of Table 6.1 that the significant factor reducing transport costs is when the respondent is from the government. Therefore, reduction in transport cost can be attributable to the fact that once the President has made a declaration, this empowers the Department of civil protection (DCP) to access transport resources from sister departments such as the Central Mechanical Equipment Department (CMED) and the District Development Fund (DDF) who boast of large fleets of vehicles that can be used to transport food supplies. In this regard the DCP will only be liable to source for fuel resulting in substantial reductions in costs.

6.2 The impact of Drought Relief Enablers on Warehouse Costs

Table 6.2 Impact of enablers on warehouse costs

VARIABLES	Warehouse costs (I)	Warehouse costs (II)	Warehouse costs (III)	Warehouse costs (IV)	Warehouse costs (V)
Education	-224.6	-244.8	-286.2*	-222.2	-183.1
	(137.6)	(139.8)	(137.2)	(131.3)	(118.8)
Work experience	-35.82*	-39.61**	-38.17*	-36.15*	-40.53**
	(16.22)	(16.22)	(18.06)	(16.80)	(16.02)
Government	43.85	-256.2	-720.9*	17.95	32.30
	(375.3)	(418.8)	(354.5)	(313.2)	(314.6)
Culture	-7.742				
	(57.29)				
Leadership attitudes		81.33			
		(81.26)			
Political state of the country			213.6**		
			(77.39)		
Economic state of the country				-14.41	
				(116.0)	
Legal framework					-133.9
					(89.79)
Constant	1,406***	1,280***	1,106***	1,459***	1,920***
	(216.9)	(263.6)	(241.7)	(448.7)	(466.4)
Observations	130	130	130	130	130
R-squared	0.048	0.055	0.087	0.049	0.073

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6.1 shows the OLS estimation of the impact of enablers on warehouse costs. Table 6.2 shows, in column (III), that the perception on political state resulted in an increase of warehouse costs by $213.6. This finding is statistically valid at the 5% level of significance and is in line with previous studies such as Tomasini and Van Wassenhove (2009:10) and Balcik et al. (2009:29). The finding suggests that political state resulted in warehousing costs increasing by $213. This finding is also consistent with findings in sections 5.3.3 and 5.9.6 in chapter 5 that revealed that politicians were accused of interfering with food aid distribution. Political shenanigans resulted in delays in food aid distribution which consequently raised storage costs. The longer the food supplies remain in the warehouse, the more costly the storage. The longer the food aid supplies stay in the warehouse the more it accrues costs. The costs included rentals, security and also theft.

Table 6.2 also that culture, leadership attitudes, economic state and legal framework have no significant impact on warehouse cost. The vector for background characteristics of the respondents was revealed to have some impact on warehouse costs as can be seen in column

(III) of Table 6.2. Table 6.2 shows that work experience reduced warehouse costs by between $35.82 and $40.53 per month depending on the years of experience of the respondent. The more the respondent's experience the more they are able to make savings on warehouse cost. This result was statistically significant at 10% levels of significance. Table 6.2 also reveals that the level of education resulted in the reduction of warehouse costs by $286.2 per month. This finding is valid at 10% level of significance.

The finding on the relationship between work experience and warehouse costs can be explained by the learning curve theory. The learning curve theory was popularised by Wright (1936:122) and it is also known as the experience curve. The major assumption of the learning curve is that proficiency increases with experience. This finding confirms that work experience and level of education helped the respondents to reduce warehousing costs through, accurate forecasting of demand, reduction in damages and waste, good relationship management with the land lord which can result in no additional charges for storage beyond agreed tenure periods and also appreciation of cheaper security options.

6.3 Impact of Enablers on Quantity delivered

Table 6.3 Impact of enablers on quantity delivered

	Quantity delivered	Quantity delivered	Quantity delivered	Quantity delivered	Quantity delivered
Education	-81.59	-87.41	-98.65	-79.24	-64.01
	(66.72)	(64.76)	(67.75)	(73.14)	(66.55)
Work experience	-6.817	-7.644	-7.693	-7.502	-9.453
	(14.28)	(13.13)	(13.46)	(13.33)	(11.98)
Government	230,641***	23,154***	230,221***	231,893***	231,952***
	(89.39)	(101.1)	(106.9)	(64.76)	(65.69)
Culture	-21.94				
	(22.93)				
Leadership attitudes		9.947			
		(32.93)			
Political state of the country			47.99		
			(35.92)		
Economic state of the country				-22.62	
				(33.99)	
Legal framework					-66.02
					(42.92)
Constant	794.1***	757.7***	706.5***	867.6***	1,029***
	(176.3)	(173.1)	(170.3)	(231.8)	(275.7)
Observations	130	130	130	130	130
R-squared	1.000	1.000	1.000	1.000	1.000

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6.3 illustrates the OLS estimation of the impact of enablers on quantity delivered. Quantity delivered to drought stricken communities was measured in tonnes per month. Table 6.3 shows that there is no statistical evidence showing any relationship between culture, leadership attitudes, economic state, political state, and legal frame on the quantity delivered at coefficients -21.9, 9.9, -22.6, 48, and -66.02 respectively. This is evidence by the standard errors for each variable which are too large at 22.93 for culture, 32.93 for leadership attitudes, 35.9 for political state, 33.99 for economic state and 42.92 for legal framework. According to Walliman (2011:118), as the sample increases, the standard error will decrease. This means when the sample is increasing the mean of the sample becomes more accurate.

According to Table 6.3 the vector for background characteristics show that the type of the organisation has impact on the quantity delivered for drought relief. According to column (III) of Table 6.3 the government deliver about 230 221 per month. The finding is valid at 1% level of significance. This finding can be explained by the fact that the government moves a lot of food aid across the country. The government is responsible for distributing food aid to all drought prone areas in the country and the NGOs are responsible for specific relief areas as mandated by the WFP hence moving fewer quantities per month. The government is also responsible for the welfare elderly people, orphans and destitute residing in urban areas. The drought relief action of the government that covers wide areas affected by drought is in line with the humanitarian concept. Tomasini and Van Wassenhove (2009:20) defined humanitarian action as observance of humanity, neutrality and impartiality when carrying out humanitarian operations. Neutrality, humanity and impartiality are important humanitarian principles that should form the basis of the country's disaster management policy. The number of increasing quantity deliveries is also consistent with the report by the Zimbabwe Vulnerability Committee (ZIMVAC) that over 2 million people were in need of food aid in 2016.

6.4 The Impact of enablers of the number of people affected

Table 6.4 Impact of enablers on number affected

	Number Affected	Number Affected	Number Affected	Number Affected	Number Affected
Education	-6,799	-7,284	-8,221	-6,603	-5,334
	(5,560)	(5,396)	(5,646)	(6,095)	(5,546)
Work experience	-568.1	-637.0	-641.1	-625.1	-787.7
	(1,190)	(1,094)	(1,122)	(1,110)	(998.7)
Government	1.939e+06***	1.930e+06***	1.918e+06***	1.932e+06***	1.933e+06***
	(7,449)	(8,425)	(8,908)	(5,397)	(5,474)
Culture	-1,828				
	(1,911)				
Leadership attitudes		828.9			
		(2,744)			
Political state of the country			3,999		
			(2,993)		
Economic state of the country				-1,885	
				(2,832)	
Legal framework					-5,501
					(3,577)
Constant	66,172***	63,143***	58,876***	72,304***	85,756***
	(14,695)	(14,422)	(14,190)	(19,316)	(22,977)
Observations	130	130	130	130	130
R-squared	1.000	1.000	1.000	1.000	1.000

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6.4 shows the OLS estimation of the impact of enablers on the number of people affected by drought relief supply chain. Table 6.4 shows that there is no statistical evidence of any relationship between culture, leadership attitudes, political state, economic state and legal framework and number of people affected as evidenced by the regression coefficients -1.8, 828.9, 3.999, -1.885 and -5.5 respectively. The reported standard errors are too wide hence the sample size was not able to accurately reveal any meaningful relationships between the enablers and the number of people affected by drought relief supply chains.

The vector for background characteristics reveals an increasing number of people being affected by government relief supply chain initiatives. This finding is statistically valid at 1% level of significance. This finding is also consistent with the findings made in Section 6.3 of this chapter which revealed that government was accountable for delivering more quantities per month to affected people. The 2015/2016 agricultural season was declared a national disaster. The onset of the El-Nino effect resulted in wide spread reduction of rain fall in most parts of Zimbabwe. This has seen over 2 million people being affected and in dire need of

food assistance (ZIMVAC, 2016). The findings in Table 6.3 and 6.4 show that drought relief supply chains are critical in drought disaster management.

6.5 The impact of the National Disaster Policy on Humanitarian Supply Chain Effectiveness

Tables 6.5 shows the OLS estimation of the relationship between disaster policy and transport costs, warehouse costs, quantity delivered and number of people affected by drought relief supply chain activities as specified in equation (2) of this study. Equation (2) specifies that drought disaster policy efficiency is proxied by transport costs, warehouse costs, quantities delivered and also the number of people affected. Equation (2) also includes a vector of the background characteristics of the respondent as well as those of their organization. These background characteristics are included so that the impact of enablers is identified.

Table 6.5 shows the relationships between drought disaster policy of the country on stated relief drought supply chains performance metrics such as transport costs, warehouse costs, quantity delivered and number of people affected by drought supply chain activities.

Table 6.5 Impact of national disaster policy on humanitarian supply chain effectiveness

VARIABLES	(I) Transport cost/km	(II) Warehouse cost/month	(III) Quantity (tones)/year	(IV) Number affected (2015-16)
Disaster policy	0.0467	81.41	25.97	2,164
	(0.0401)	(65.90)	(23.36)	(1,947)
Education	-0.0393	-219.8	-83.17	-6,931
	(0.125)	(137.9)	(67.10)	(5,592)
Work experience	0.0295	-36.88*	-7.493	-624.4
	(0.0318)	(18.75)	(13.71)	(1,142)
Government	-1.278***	-259.8	231,099***	1.925e+06***
	(0.199)	(387.4)	(105.3)	(8,772)
Constant	3.383***	1,251***	725.0***	60,416***
	(0.297)	(280.1)	(154.2)	(12,850)
Observations	130	130	130	130
R-squared	0.659	0.059	1.000	1.000

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6.5 shows that there is no statistical evidence which links the drought disaster policy with transport costs, warehouse costs, quantity delivered and number of people affected with regression coefficients of 0.05, 81.41, 25.97 and 2.16 respectively. The lack of statistical evidence may be as result of too wide standard errors with 0.04 for transport costs, 65.9 for

warehouse costs, 23.36 for quantity delivered and 1.947 for number of people affected. This finding is very significant as it corroborates the claims by (Tomasini and Van Wassenhove 2009; Maon *et al.*, 2009; da Costa *et al.*, 2012) that logistics is always left out of policy and humanitarian operations planning. Maon et al (2009) asserts that there is general lack of knowledge about what good logistics can offer to disaster operations. Oloruntoba and Gray (2006: 116) noted that "there is evidence of a lack of planning in humanitarian supply chains, resulting in inefficiencies, for example overuse of expensive and unsafe air charter, failure to pre-plan stocks, congestion caused by unplanned deliveries, and a lack of inter-organisational collaboration for information systems".

The vector on background characteristics in Table 6.5 also reveals that there is statistical evidence that the type of organisation the respondent belongs to had impact on the transport costs, quantity delivered and number of people affected. Table 6.5 reveals that government operations reduced transport cost by 1.28, delivered 231 099 tonnes per month and affected more people. These findings were statistically significant at 1% level of significance. This, however, confirms earlier findings in this chapter.

The findings in this section between the drought relief policy and transport cost, warehouse costs, quantity delivered and number of people affected makes it possible to make the following deductions;

- The policy only provides a reactive framework as serious drought response only kicks in when the situation is declared a national disaster.
- The policy does not adequately empower the Department of civil protection to enforce and compel other actors to act in a certain way.
- The drought policy does not provide for a logistical framework since 80 % of drought relief operations are of a logistics nature.
- The DCP is not adequately resourced to cope with increasing disaster incidents in Zimbabwe. This coming at the back drop of the fact that DCP activities cover other disasters such as floods and epidemics.
- The policy does not provide for how the DCP can coordinate the activities of PVO and government departments. This leaves the DCP powerless to coordinate activities of the other disaster actors.

6.6 Conclusion

This chapter analysed drought supply chain management effectiveness using ordinary least squares to find the existence of relationship between culture, leadership attitudes, political state, economic state, the legal framework and the supply chains proxied performance measurement metrics. The OLS procedure was also carried out on drought disaster policy to establish its impact on transport costs, warehouse costs, quantity delivered and people affected by drought relief activities. The major findings were that the legal framework had positive impact on transport costs and that political state resulted in warehouse costs increasing. Educational backgrounds and work experience also had a positive impact on transport costs and warehouse costs. The OLS did not show the existence of any meaningful relationship between culture, leadership attitudes and economic state on the proxied supply chain performance measurement metrics. The disaster policy gaps identified were that the policy primarily focused on long term building of resilience which is noble, however, did not emphasis on current drought disaster response. Furthermore, the policy does not adequately empower the CPU through provision and resource mobilisation to enable the CPU to effectively coordinate and regulate disaster management operations in Zimbabwe. The next chapter presents conclusions of the study, limitations of the study, recommendations for future research and recommendations of the study.

Chapter 7

Conclusions and Recommendations

7.1 Introduction

The research findings have shown that there is evidence that supply chain management is crucial for drought relief response in Zimbabwe. Zimbabwe will always experience recurrent drought disasters due to its exposure to the El-Niño phenomenon. Until such a time when the country has successfully put in place mitigation measures, drought response will remain on the national agenda for a long time. The theory that guided this study was the disaster phase model by Carr (1932:208). The major focus of the study was the response phase and the application of supply chain management interventions in drought relief operations in Zimbabwe. The study did not show any deviation from the principles of the grounding theory on disaster response. This study, therefore, was significant in exploring supply chain management drought disaster management for gaps. Having addressed the objectives of this study in the foregoing chapters, this chapter presents conclusions and recommendations of this study. The limitations of this study and the suggestions for future research will also be explained.

7.2 Conclusions of the study

Culture, leadership attitudes and drought policy are not enablers of drought relief supply chain in Zimbabwe. Culture and leadership attitudes rely heavily on the diminishing role of traditional leaders. This conclusion is in contradiction with the findings of Lavigne et al., 2008 and those of McEntire (2001). The effectiveness of drought supply chains in Zimbabwe was not affected by culture or leadership attitudes. The progression in intensity of drought disasters in Zimbabwe means that effective response cannot be based on traditional community food security measures and the roles of traditional leaders.

The political state of the country does not support effective drought response in Zimbabwe. Political shenanigans resulted in increased costs of operations in drought response and cause delays to the distribution of food aid to beneficiaries. Worse still, deserving beneficiaries of food aid are being sidelined because of political affiliation. Needs assessments should not be based on political perspective as they are not accurate. Inaccurate needs assessment information negatively affect the effectiveness of drought relief supply chain management.

The drought policy in Zimbabwe does not provide for capacity to respond to current droughts or provide for affective drought supply chain interventions on current drought disasters. The drought policy has the major aim to facilitating sustainable management of natural resources and encouraging: crop production only in those areas that are climatically and topographically suitable for particular crops, proper mechanical and biological precautions versus soil loss, good land use practices through educational awareness campaign, and research into promotion of drought-tolerant food crops. But as always drought disasters occur frequently and the national drought does not have a logistical framework to provide guidance for food distribution in Zimbabwe. The policy should stipulate a framework for sourcing relief supplies, transportation, storage and distributions of food aid to drought disasters victims.

The economic situation in the country is deplorable, however, remittances from a few people employed and those working abroad helps buy time for drought relief to arrive. The ZIMSTAT (2016) reported that over 60% of people in Zimbabwe are in informal employment. The report further stated that the informal sector business is worth over $1.7 billion dollars. The extent and periods of economic difficulty have motivated communities to devise economic copying strategies which have also resulted in communities being able to minimise the impact of drought disasters. The finding on the economic state as being enabler was unique because it departed from other researches that identified economic hardships as a source of community vulnerability.

The legal framework impacts positively on drought relief supply chains in Zimbabwe. The legal framework is related to pieces of legislation that facilitate the movement of drought relief supplies like exemption of duty and taxes on goods imported for humanitarian aid purposes especially the Private voluntary organisation Act and the Civil Protection Act.

There are two drought relief supply chain designs used by drought relief organisations in Zimbabwe. Government relief operations are decentralised. The supply chain is decentralised because of the wide geographical spread of government involvement. NGOs use centralised and lean drought relief supply chain strategy. NGOs use a decentralised lean because they focus on specific areas, few suppliers and also the range of products involved is small. Most of the supplies handled by NGOs is supplied by WFP and comprise of maize, beans, sorghum and cooking oil.

The study also observed that drought relief supply chains play an important role in drought relief response as follows;

- They enable speed response.
- They help save costs if properly managed.
- They save life and ensure the supply of critical life supporting goods and services to drought stricken communities.
- They minimise damage such as children dropping out of school and other knock on effects of a disaster such as disease out breaks.

The modes of transport used to transport drought relief in Zimbabwe include sea, rail and road transport modes. Sea transport is used to transport food supplies from Brazil and the United States of America. Rail transport is used to transport food supplies from the ports of entry. Road transport is normally used for last mile delivery. The modes of transport are selected on the basis of the quantities, cost, type of goods and last mile delivery considerations.

There is evidence that work experience and level of education are crucial in managing aspects of the drought relief supply chain such as warehouse cost and transport cost containment. This shows when certain aspects of the drought relief supply chain are given attention, the results can be phenomenal.

Organisations decide on the location of warehouses based on cost, distance from suppliers, last mile delivery, road network and quantity and type of products to be stored. Warehousing is a critical aspect of drought relief operations; however, government and NGOs faced challenges of warehouse space availability.

Important aspects as well as drought critical success factors of a drought relief supply chain in Zimbabwe comprise of coordination of actors, communication and information sharing, stakeholder relationship management, management of operations, logistics management and warehouse management.

What was also noteworthy in this study were major challenges to drought relief supply chains in Zimbabwe which are as follows:

- Poor road network which raise the cost of transporting food supplies to affected communities.
- Manual handling of food supply at last mile delivery which results in spillages and increased labour costs.

- Political interference which results in delays in the distribution of food aid to needy people at the expense of political overtures.
- Poor communication and information sharing. Drought statistics are kept as a closely guarded secret. There is a common reluctance to share information among the actors.
- Poor relations among key stakeholders to drought relief operations. This exacerbates the coordination conundrum.
- Poor warehouse/storage security at last mile with food supplies sometimes left in the open and exposed to theft and adverse weather conditions which affect the quality of the supplies and,
- Lack of financial resources. This problem makes it difficult for the government to procure sufficient food supplies for all the needy people. Also, lack of funding affects the DCP to effectively execute its mandate.

This study established that the drought relief policy does not provide for drought supply chain management as it is aimed at building resilience among communities rather than respond to current drought disasters. The gaps identified are as follows:

- The policy only provides a reactive framework as serious drought response only kicks in when the situation is declared a national disaster.
- The policy does not adequately empower the Department of civil protection to enforce and compel other actors to act in a certain way. In many cases the DCP's mandate is taken over by the office of the President and Cabinet when there is a state of disaster declaration.
- There is no provision for a drought logistical framework in the policy.
- The DCP is not adequately resourced to cope with increasing disaster incidents in Zimbabwe.

These gaps have a significant bearing on the performance of drought relief supply chains.

7.3 Recommendations for future research

In light of the findings and conclusions hereof, the following recommendations are made;

Due to the frequent occurrence of the El-Niño phenomenon, countries that are situated South of the Sahara will always be exposed to drought disasters. There is need to research on integrated supply chain management interventions in drought disaster management while concentrating on unique characteristics of each country. The expected outcomes of such a research are that it will help to design a harmonised supply chain for drought disaster

management and also that it will foster cooperation among South of the Sahara countries in drought response.

Given the diversity of actors in drought relief response, there is need to research on the relationship dynamics of the actors. Diversity of actors creates discord among the actors and there is need to establish a relationship model that attempts to close the gap between the values, objectives and aspirations of the different actors of a drought relief supply chain.
Drought disasters are identified in the National Contingency plan as a priority area. Since the reform program, the government has invested significant amount of resources in the agricultural sector with the objective of increasing output. In spite of government interventions, there has not been corresponding improvement in agricultural output as evidenced by frequent food shortages in the country. There is need for research to establish the response of agricultural output before and post land redistribution. The research should aim to clarify the link between frequent food shortages in the country and the land redistribution program. This is important because Zimbabwe's neighbouring countries have recorded surplus agricultural output.

7.4 Recommendations of the study

In light of the findings and conclusion hereof, the following recommendations are made;

- Given that lack of financial resources constraints the effectiveness of drought relief response hence it is recommended that the government re-introduce the drought levy as was the case in the 1992 drought disaster. The establishment of a drought fund will go a long way in enabling the nation to respond to drought disasters. The Department of Civil Protection also requires meaningful funding from the ministry of finance. The department needs adequate funding to enable it to effectively carry out its mandate. Financial resources should be availed towards investment in mitigation and early warning systems. The fund should be aimed at creating resilience in communities than mobilising resources to react to disaster effects. This will also enable the department to train and dissemination information to exposed communities.

- Coordination, information sharing and management of relations among stakeholders in drought relief response is very important. This should be the mandate of the DCP however; the DCP lacks capacity and resources to manage the activities of all the

participants in drought relief missions. There is need for a shift in policy towards creating a drought management task force which will ensure that actions of the actors are coordinated and that every participant has access to important information about drought disaster situations in the country. The DCP is overwhelmed as it is tasked with monitoring all kinds of disasters in the country.

- There is need to provide for logistics in the drought disaster management policy. Logistics constitute over 80% of all drought disaster relief operations hence the need to provide for logistics planning form a policy perspective. In the Zimbabwean context, drought disasters are slow on-set in nature. Most importantly, weather forecasts act as an early warning system for impending droughts. Logistics planning for food relief operations can be done well in advance. There is research evidence that testifies that when relief is diligently planned for, the results will be phenomenal.

- Given that 80% of drought relief operations are supply chain management. It is therefore recommended that training in basic supply chain concept to all actors is fundamental. The findings of this research revealed an improvement in some aspects of the drought supply chain as a result of the educational background of the actors. It can be assumed, therefore, that more supply chain management knowledge can enhance the effectiveness of drought supply chains in Zimbabwe.

- There in need to promote infrastructure sharing among the actors. Warehousing and transportation infrastructure is currently in favour of government drought response initiatives than for NGOs. The drought disaster response policy should grant private voluntary organisations access to enjoy duty and taxes leave, transport infrastructure and warehousing benefits in order to optimise overall contributions to this sector.

- The drought disaster policy must be reviewed and refocus its thrust towards making it proactive than reactive. The policy prioritises building resilience among communities which indeed is very noble. However, before resilience is achieved as is the case currently, response to current drought situations remains a critical component of the drought disaster management policy.

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Appendix 1: Survey Questionnaire

Survey Questionnaire

Dear Participant

My name is Bongani Edwin Mushanyuri and I am studying for a Doctor of Technology degree in Public Management with the Durban University of Technology. My research is focused on studying the role of supply chain management in achieving effectiveness drought induced disasters in Zimbabwe. I hereby by invite you to help by completing this questionnaire and help improve the way in which organisations respond to drought disasters in Zimbabwe. Your contributions and those of organisations will be kept under strict confidence. Also the data generated shall not be used for any other purposes other than for this research only. I would like to thank you in advance for affording time to completing this questionnaire. Should you wish to ask for further information or clarification about this research or the researcher, you can contact me on +263 779 717 881 or bmushanyuri2@gmail.com or21451840@dut4life.ac.za

Yours faithfully

B. E. Mushanyuri

A: General Information

A1. Organisation….....

A2. Place where head office is situated ..……

A3. Nature of Business ……

A4. Year organisation formed/incepted…….

B: Profile of participant

B1.

Region……
……

B2.

Gender……
……

B3.

Age……
……..

B4. Number of years as an employee of the organisation…….

B5.

Qualifications……
……

C: Business of the Organisation

C1. Does your organisation participate in drought disaster relief projects……..

C2. How many times have your organisation been involved in relief projects in the last 10 years.....

C3. At what level of disaster management is the organisation involved? Please indicate below

1. Disaster preparedness 2. Mitigation 3. Response and recovery 4 rehabilitation and reconstruction 5. Other……..

C4. Which parts of the country have you carried out relief projects.....

C5. Please rate how strongly you agree or disagree with each of the following statement by ticking in the appropriate box.

1. Strongly disagree
2. Disagree
3. Not sure
4. Agree
5. Strongly agree

Drought disaster management environment in Zimbabwe	Strongly Disagree	Disagree	Not sure	Agree	Strongly agree
The following variable are enablers for effective drought relief response					
C5.1 Culture	1	2	3	4	5
C5.2 Leader ship attitudes	1	2	3	4	5
C5.3 Political state	1	2	3	4	5
C5.4 Economic state in the country	1	2	3	4	5
C5.5 Legal framework	1	2	3	4	5
C5.6 The country's policy on disaster management	1	2	3	4	5

D: Supply Chain Management (SCM)

D1. What is your understanding of supply chain management …….....

……

……

……

……

……

……
……

D2. Please rate how strongly you agree or disagree with each of the following statement by ticking in the appropriate box.

1. Strongly disagree
2. Disagree
3. Not sure
4. Agree
5. Strongly agree

	Supply chain management play an important role in disaster relief projects					
D2.1	SCM enables effective response to disasters	1	2	3	4	5
D2.2	SCM help save cost	1	2	3	4	5
D2.3	SCM plays a critical role in disaster response	1	2	3	4	5
D2.4	SCM ensures resources reach victims on time	1	2	3	4	5
D2.5	SCM help minimise damage and help save lives	1	2	3	4	5

D3. What is the major product(s)/good(s) you deliver for drought relief purposes

.....
.....
.....
.....
.....

D4. Where is the source of the major product(s)/good(s) for relief projects?

.....
.....
.....

D5. Please rate how strongly you agree or disagree with each of the following statement by ticking in the appropriate box.

1. Strongly disagree
2. Disagree
3. Not sure
4. Agree
5. Strongly agree

The organisation use the following transport mode to carry relief supplies from suppliers					
D5.1 Road	1	2	3	4	5
D5.2 Railway	1	2	3	4	5
D5.3 Sea	1	2	3	4	5
D5.4 Air	1	2	3	4	5
D5.5 A combination of the above	1	2	3	4	5
Following are considered in choosing the most suitable transport mode					
D5.1.1 Cost	1	2	3	4	5
D5.1.2 Distance	1	2	3	4	5
D5.1.3 Load size	1	2	3	4	5
D5.1.4 3rd party logistics	1	2	3	4	5

D6. Does your organisation have a warehouse(s)

.....

.....……

……

If yes in D4 above how many warehouses…….....

where are they located?.....

……

……..

D7. Please rate how strongly you agree or disagree with each of the following statement by ticking in the appropriate box.

1. Strongly disagree
2. Disagree
3. Not sure
4. Agree
5. Strongly agree

The following are consideration for warehouse location					
D7.1 Cost	1	2	3	4	5
D7.2 Distance from supplier	1	2	3	4	5
D7.3 Last mile delivery	1	2	3	4	5
D7.4 Road network	1	2	3	4	5
D7.5 Product type and quantity	1	2	3	4	5

D8. What is the lead time for essentials to reach the affected areas?.....

D9. What risks have you encountered in acquiring and distributing essential goods to victims……

……
……
……
……

……
……..

D10. Describe the relationships that your organisation has with the following

1. Suppliers of essential goods

   .....
   .....
   .....
   .....

2. Transport providers

   .....
   .....
   .....
   .....
   .....
   .....

3. Warehouse service providers

   .....
   .....
   .....
   .....
   .....

D11 what is your current supply chain strategy.....

E: Disaster operations

E1. State drought disasters missions your organisation has participated in indicating as follows

No.	Disaster description	Year	Number affected	Transport cost/Km	Qnty	Warehouse costs/Month
1		2015				

E2. How do you evaluated your organisation's participation in the disasters as explained in E1 indicate as follows;

1. Successful 2. Fairly successful 3. Failed

E3. Explain what could have lead to your answer in E2 above…….....

……
……
……
…….....
.....
.....
.....

E4. Do you think SCM is a critical success factor in disaster management? 1. Yes 2. No

E5. Which aspects of the supply chain do you think are fundamental to effective drought relief response

.....
.....
.....
.....
.....

E6. What were the major identifiable impediments to your operations?

.....
.....
.....
.....
.....

E7. What recommendations can you make regards to how SCM can contribute to drought disaster response effectiveness?

……
……
……
……
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Appendix 2: Interview Schedule

Interview Schedule

Date.....

Place of interview.....

Designation of interviewee.....

Number of work year.....

1. Explain the drought situation in Zimbabwe?
2. How do you explain the disaster management environment in Zimbabwe?
3. How have been affected by variables such as culture, attitudes and politics in your drought relief operations?
4. To what extent is the disaster management policy and other relevant legal frameworks helpful in your operations?
5. Do you have specific supply chain management strategies in place to deal with drought relief operations?
6. What triggers a situation to be considered a drought disaster relief operation?
7. Where do you source your relief supplies from?
8. What are your considerations in making a decision on the source of supplies?
9. What challenges do you face when sourcing for relief supplies
10. Do you have an in-house transport system or you outsource transport?
11. What are the benefits of your answer in (10)
12. Are your major considerations for choosing a transport mode?
13. Do you have private houses?
14. Where are they located and what do you consider when deciding on the location of a ware house?
15. What can you identify as critical success factors for a humanitarian supply chain?
16. How do you explain your working relationships with other humanitarian supply chain partners and stake holders?

17. What would you identify as major impediments in drought relief operations in Zimbabwe?
18. What recommendations would you propose to improve the effectiveness of drought relief supply chains in Zimbabwe?

Appendix 3: Clearance to carry out Research

Ministry of Local Government, Public Works and National Housing

Telephone 263 4 707615
Fax 263 4 797706
Ref: ADM/23/8

ZIMBABWE

The Office of The Secretary
P. Bag 7755
Causeway,
HARARE

24 June 2016

Mr Bongani E. Mushanyuri
6045 Newsen Park
Southgate
Harare

MR BONGANI MUSHANYURI: DURBAN UNIVERSITY OF TECHNOLOGY STUDENT: APPROVAL OF AUTHORITY TO UNDERTAKE AN ACADEMIC RESEARCH

The above subject matter refers;

It is my pleasure to advice you that the Head of Ministry in his memorandum dated 08 June 2016 has approved your application to undertake a field research.

Please be advised that the research findings should not be subjected to external consumption and must be solely used for academic purposes only. You are mandated to complete the Official Secrecy Act before commencement of the research project. Moreover, the final copy of the research findings should be submitted to the Office of the Secretary upon completion.

It is our hope that the research findings will help the Ministry in coming up with relevant strategies and actions in the study area undertaken.

[redacted]

FOR: SECRETARY FOR LOCAL GOVERNMENT, PUBLIC WORKS AND NATIONAL HOUSING

Cc: A/ Director-Civil Protection
Coordinator- Faculty of Management Science

Appendix 4: Sworn Secrecy

DECLARATION OF SECRECY

In order that all Public servants understand their responsibilities in respect of official secrecy, the relevant extracts from those Acts which relate to official secrecy are tabled below.

a) Public Service Act - Chapter 271

First Schedule - acts of misconduct.

An officer shall be guilty of misconduct if:-

"11 Except in the discharge of his official duties or with the concent of the appropriate Minister and in accordance with such directions, if any, as the appropriate Minister may from time to time give him -

a) he discloses information acquired in the course of such duties; or

b) he uses for any purpose information gained by or conveyed to him through his employment in the Service, notwithstanding that he does not disclose such information; or

c) he directly or indirectly, whether anonymously or otherwise makes any communication to the public in connection with any matter concerning the Service or any officer or department thereof, which is prejudical to the Service;

Provided that the provisions of the sub-paragraph shall not apply in respect of a communication made with the authority or by an association recognised in terms of Section forty".

b) Official Secrets Act (Chapter 97)

This Act prohibits the wrongful disclosure of any official information and provides inter alia that any person in the employment of the state who -

i) communicates information of a secret or confidential nature to any person other than a person whom he is authorised to communicate it or a person to whom it is in the interests of the state his duty to communicate it;

ii) uses information of a secret or confidential nature in his possession in any other manner prejudical to the safety or interests of the State;

iii) fails to take reasonable care of, or so conducts himself as to endanger the safety of any information of a secret or confidential nature;

iv) retains for any purpose prejudical to the safety or interest of the State any official document which he has no right to retain or which it is contrary to his duty to retain, or fails to comply with any directions lawfully given him with regard to the return or disposal of such document;

v) allows any other person to have possession of any official document issued for his use alone, or communicates any secret official code word or pass word so issued, or, without lawful authority or excuse, has in his possession any official document or secret official code word or pass word issued for the used of some person other than himself, or on obtaining possession of any official documents by finding or otherwise neglets or fails to restore it to the person or authority by whom or for whose use it was issued;

shall be guilty of an offence.

c) Prevention of Corruption Act (Chapter 70)

Section 3 of this Act reads:

a) If any agent corruptly accepts or obtains, or agrees to accept, or attempts to obtain from any person, for himself or for any other person, any gift or consideration as an indocument or reward for doing forebearing to do, or for having done or foreborne to do any act in relation to his principal's affairs or business, or for showing or forebearing to show favour or disfavour to any person in relation to his principal's affairs or business; or

b) any person corruptly gives or agrees to give, or offer any gift or consideration to any agent for himself or for any other person as an inducements or for himself or for any other person as an inducement or reward for doing or forebearing to do, or for having done or foreborne to do any act in relation to his principal's affairs to business; or

c) any person knowingly gives to any agent, or if any agent knowingly uses, with intent to deceive his principal, any receipt, account or other document in respect of which the principal is interested, and which contains any statement which is false or erroneous or defective in any material particular, and which to his knowledge is intended to mislaid his principal; or

d) any agent, by collusive arrangement with the seller of goods or with any person engaging to render certain services, secretly offers any consideration to an agent in regard to the sale of the goods to the employment of his services;

he shall be guilty of corruption .....

I [redacted] ..... acknowledge receipt of a copy of this paper on "Declaration of Secrecy".

..... [redacted] .....
SIGNED

WITNESS . [redacted] .....
064

DATE 24/06/2016

Appendix 5: Letter of Consent

Letter of Consent

Dear Participant:

You are being invited to participate in a research study on the role of Supply Chain Management on the effects of drought induced disasters in Zimbabwe. This research will require about 1-2 hours of your time. During this time, you will be interviewed about your experiences in drought relief operations. The interviews will be conducted wherever you prefer (e.g. in your home or work of employment)

The major objective of this study is to try and improve the effectiveness of humanitarian supply chains in Zimbabwe. The questionnaires and interviews recordings will NOT contain any mention of your name, and any identifying information. The information that you provide will be used only for the purposes of this study. Your participation in this research is completely voluntary. However, you may withdraw from the study at any time for any reason.

The results from this study will be presented in writing in journals and also will be found on the Durban University of Technology. The results may also be presented in person to University. At no time, however, will your name be used or any identifying information revealed. If you wish to receive a copy of the results from this study, you may contact me at the telephone number given below. If you require any information about this study, or would like to speak to me, please call Bongani Edwin Mushanyuri at +263 779 717 881

If you have any other questions regarding your rights as a participant in this research, you may also contact the Projects Coordinator, Durban University of Technology; Faculty of Management Sciences.

I have read (or have been read) the above information regarding this research study on the role of Supply Chain Management on the effects of drought induced disasters.

_____ (Printed Name)
_____ (Signature)
_____ (Date)

Annexure 1: Plagiarism Report

turnitin | ephorus

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DURBAN UNIVERSITY OF TECHNOLOGY

SUPPLY CHAIN MANAGEMENT IN DISASTER RESPONSE: ACHIEVING EFFECTIVENESS IN DROUGHT INDUCED DISASTERS IN ZIMBABWE

SUBMITTED BY:
BONGANI EDWIN MUSHANYURI
STUDENT REGISTRATION: 21451840

A THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENT FOR THE DEGREE OF DOCTOR OF TECHNOLOGY IN PUBLIC MANAGEMENT

DURBAN UNIVERSITY OF TECHNOLOGY
FACULTY OF MANAGEMENT SCIENCES
DEPARTMENT OF PUBLIC MANAGEMENT
SOUTH AFRICA
2017

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Annexure 2 Language Editing Certificate

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CERTIFICATE OF EDITING

This document certifies that the PhD Thesis whose title appears below was edited for proper English language usage, grammar, punctuation, spelling, and overall style by Dr Sindiso Zhou whose academic qualifications appear in the footer of this document. The research content and the author's intentions were not altered during the editing process.

THESIS TITLE:

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AUTHOR: **BONGANI EDWIN MUSHANYURI**

STUDENT REGISTRATION: **21451840**

DATE: **20 APRIL 2017**

EDITOR'S COMMENT

The author was advised to effect suggested corrections with regards to tense use and subject-verb agreement.

[redacted]

Signature

PhD Applied Linguistics (UFH), MA Applied English Linguistics (MSU), BA (Honours) English and Communication (MSU); Dip Ed English (UZ)