AN ASSESSMENT OF THE IMPACT OF SUPPLY CHAIN RISK MANAGEMENT IN FOOD-AID DISTRIBUTION IN ZIMBABWE.

Submitted by:

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Declaration

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Dedication

I dedicate this thesis to the victims and survivors of disasters in Sub-Saharan Africa, especially the unprecedented Cyclone Idai.

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Abstract

The present study sought to investigate and interrogate supply chain risks prevalent in the humanitarian sector with reference to food-aid distribution and to also assess the impact of supply chain risk management as a strategy for cost- effective food-aid distribution operations in Zimbabwe. The global increase of disasters and their devastating effects has left communities vulnerable and in need of help from Donors, humanitarian agencies and the host governments. The damage by disasters notably droughts, floods and cyclones have caused various forms of vulnerability on populations living in disaster struck countries, including Zimbabwe. The natural disasters and catastrophes have inadvertently solicited for committed investment by both local and international governments to assist those unfortunate to have been struck by disasters and their impacts. Information on disaster impacts specifically related to food-aid distribution is gathered through an analysis of risks prevalent along the food and humanitarian aid supply chain network. This information will be used by government and various humanitarian stakeholders in the formulation of strategies to mitigate disaster and supply chain risks in humanitarian aid distribution.

A mixed-method approach was employed to assess the impact of supply chain risk management in food-aid distribution in Zimbabwe. A sample size of 80 Humanitarian Aid stakeholders from the District Drought Relief Committee completed structured questionnaires. The Cronbach Alpha Test showed high reliability for the scales used in the study. Furthermore, the study used information from key informants, at least fifteen (15) members from the secretariat, namely, the District Administrators, the Social Welfare officers, as well as the Zimbabwe Republic Police (ZRP) personnel who were readily available at their stations for one-on-one interviews.

Five strategies, that include flexibility, collaborative, prepositioning, hedging, and governance were explored and their impact on distribution of food-aid analysed. Quantitative data was analysed using STATA (version 16). Ordinary Least Squares (OLS) regression was used to investigate the nature and magnitude of the relationship between food-aid distribution efficiency and supply chain risk factors, while also controlling for the effect of demographic variables and results were compared with those of the Tobit models as a test for robustness of the results. Qualitative data was analysed using thematic analysis derived from observations and interviews and descriptive statistics presented in tables. This study tested the robustness of the five strategies used in food-aid distribution and noted that the most commonly used strategy

is insurance, followed by governance, then collaboration, flexibility, prepositioning, and financing.

SIGNIFICANCE OF THE STUDY

It is expected that the study will assist the Government of Zimbabwe, other governments in Southern Africa, and humanitarian aid stakeholders in the formulation of policies for the humanitarian food and non-food-aid distribution. This will lead to improved efficiency in food-aid distribution. Policy recommendations highlight the need for synergistic relationships between WFP, the Meteorological Department, Department of Social Welfare, and the Civil Protection Department. The Government of Zimbabwe should therefore create an enabling environment for stakeholder partnerships in the Humanitarian Food -Aid supply chain that should cascade to the village and community levels. Disaster interventions should not only come from National Central Government but, where necessary and feasible, should be from local community to National, building a bottom up approach in disaster mitigation strategies.

Key words: ***Disaster, Food-Aid, Humanitarian Stakeholders, Supply Chain Management, supply chain risks, vulnerability.***

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List of Acronyms

CMED: Central Mechanical and Engineering Department
CPU: Civil Protection Unit
DA: District Administrator
DCP: Department of Civil Protection
DDF: District Development Fund
DRM: Disaster Risk Management
DRR: Disaster Risk Reduction
DSW: Department of Social Welfare
FAO: Food and Agricultural Organisation
FFW: Free Food for Work
FEMA: Federal Management Agency
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
MRCS: Malawi Red Cross Society
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
RTA: Road Traffic Accidents
SADC: Southern African Development Community
SC: Supply Chain
SCM: Supply Chain Management
SCRM: Supply Chain Risk Management
SCOR: Supply Chain Operations Reference-Model
UNDP: United Nations Development Programme
WFP: World Food Programme
ZIMVAC: Zimbabwe Vulnerability

CHAPTER ONE

Introduction and Background

1.1 Introduction

The world has increasingly witnessed the occurrence of different types of natural disasters, whose occurrence has either killed and displaced people, destroyed their livelihoods and capabilities. This has resulted in some of the disaster affected people dead, and survivors left in need of humanitarian aid in the form of shelter, medicines, water, and food-aid, among other critical pressing needs. The process of reaching food-aid to the beneficiaries goes through the already damaged supply chain networks and is usually affected by disaster induced supply chain risks (Chopra and Sodhi, 2004:56).According to Chopra and Sodhi (2004:56) disaster induced supply chain risks, include damaged physical infrastructure, poor coordination, shortage of supplies, supply and demand mismatch, delays in supplies movement and theft. Norman and Lindroth (2001), Kovács and Tatham (2009), concur with above assertions and highlight the importance of risk management strategies to manage operational risks in food - aid distribution, aspects will be discussed in the following chapters.

1.2. Background to the study

The occurrence of natural disasters around the world have displaced people and destroyed their livelihoods making them vulnerable to poverty and starvation, resulting in most of them requiring food-aid, (Ndiweni and Musarurwa, 2012: 17). The Gujarat earthquake (2001), Bihar floods (2008), Superstorm Sandy in 2012, the Haiti earthquake in 2010, the 2011 Fukushima disaster in Japan , the 2015 Nepal earthquake, and the Asian Tsunami of 2004 (Mahapatra *et al.*, 2015: 14-20) are a few examples of disasters that have killed and displaced people, and disrupted the food supply chains and also making disaster survivors vulnerable. Chari and Ngcamu (2017:3), Mavhura (2016:609), concur with the above, posting that droughts, that Zimbabwe experienced from 1991, 1992 to 2016 and floods from 1991 to 2011 have subjected some parts of the Zimbabwean population to vulnerability. This spelled massive displacement, poor living conditions, starvation, malnutrition, illnesses, and, forced some of the people to essentially require food-aid.

Based on the above challenges, national governments as mandated by their constitutions assist disaster victims with food-aid in order to save lives, (Lee, 2009: 2797). The system of

delivering food-aid used by the governments and humanitarian organisations is full of supply chain risks that impede cost-effective distribution of food-aid to beneficiaries (Sodhi and Tang, 2012: 5).

It is against this background that this research seeks to investigate supply chain risks associated with food-aid distribution in Zimbabwe, so as to improve on future operations. Furthermore, the research also seeks to assess the impact of supply chain risk management strategies on food-aid distribution in Zimbabwe. The above rationale of this study is theoretically informed by the Supply Chain Theory, Supply Chain Risk Management Theory, Social Network and the "Collaborative Framework Theories" as suggested by Shepard (2012: 8).

1.3 Statement of the problem

Natural disasters such as cyclones, droughts and floods have affected the food supply chain in some parts of Zimbabwe, subjecting communities to deaths, vulnerabilities, and starvation. Madamombe, (2009), Lunga and Musarurwa (2015), Chitongo (2013), Bola *et al*. (2014), Ndiweni and Musarurwa, (2014) and Mushore *et al.* (2013) have all written about natural disasters in Zimbabwe, citing cases of floods and drought mitigation in Zimbabwe. They all concur that disasters create compounded negative impact on the environment and society at large, which in turn force governments and Non-Governmental Organisations (NGOs) in the country to provide humanitarian relief to disaster-impacted communities. The relief aid sourced for disaster victims is delivered to beneficiaries through malfunctional supply chain networks, that have been ravaged by disaster impacts, resulting in it failing to adequately meet beneficiary demands. The risks embedded in supply chains have triggered this study to further interrogate the malfunctionality of supply chain systems along food-aid supply chains, an area this study wants to unpack so that suitable interventions can be put in place to improve on efficacy in the distribution of food -aid in Zimbabwe.

1.4 Purpose of the study

The purpose of this study is to assess the impact of supply chain risk management as well as strategies of managing risks associated with food-aid distribution in Zimbabwe. The research also seeks to assist humanitarian stakeholders in developing and establishing cost-effective risk reduction strategies, legislation, and policies to assist governments and Non-Governmental

Organisations (NGOs) involved in Humanitarian relief and food-aid distribution in Sub-Saharan Africa, and Zimbabwe in particular.

1.5 Research Problem

Globally, climatic change and variations have had a strong bearing on the emergence of floods and droughts that have caused starvation and hunger and often either killed people or forced most of them, to require food-aid. The Zimbabwe Vulnerability Committee (ZIMVAC 2016) reported that the 2015-16 agricultural season was impacted by drought, resulting in almost four million Zimbabweans requiring food-aid. In the same vein, WFP reported that during the same period, almost 1.5million people (16% of the Zimbabwean population) was affected by drought in 2016 (WFP, 2016a). In 2019, Cyclone Idai devastated some parts of Manicaland, notably Chipinge and Chimanimani districts in Zimbabwe and parts of Mozambique, destroying livelihoods, killing people and making survivors vulnerable to natural conditions thereby requiring aid interventions in the form of shelter, food, clothing and medical supplies in order to mitigate their plight.

In response to disaster and disaster impact, governments, non-governmental organisations, private sector, civil and military organisations, worked together in order to provide urgent relief to the affected victims compensating for emergency losses sustained (Balcik *et al*, 2010; Vanany *et al*. 2009). Patemen, Hughes and Cahoon (2013:81-102), Costa *et al*., (2012: 598-607), Balcik, (2010), Van Wassenhove and Charles, (2010), Olorumba and Gray (2006) have produced research articles streamlining relationships between supply chain management and disaster occurrences. The providers of food-aid navigate food-aid movement to disaster victims through the supply chain or distribution networks that would have already been affected by the disasters and their impact (Jüttner and Maklan, 2011: 249). Thus, the operational efficiency of the organisations was challenged vis-a-viz the need to distribute food-aid as quickly as possible in order to avert further disasters emanating therefrom. According to Dwivedi, Mahmud, Wright, Kizgin and Rana (2018:2), the success of emergency relief distribution fundamentally is contingent on maintaining efficacy of the food-aid supply network. It is against this background that this research seeks to assess the impact of supply chain risk management in food-aid distribution operation in Zimbabwe. The research studies cited above have mainly concentrated on supply chain management responding to sudden onset disasters, but the impact of supply chain risk management in food-aid distribution in Zimbabwe and Southern Africa

has not been explored. Therefore, there seems to be a gap in literature on supply chain risk management application in disaster relief operations in Southern Africa, with Zimbabwe in particular lacking data on supply chain risk management strategies in distributing food-aid in country.

1.6 Research Objectives

The aim of the study, will be met through the following specified objectives:

1. To explore supply chain risks prevalent in humanitarian food-aid supply chain distribution in Zimbabwe.
2. To determine supply chain risk management strategies that have been employed to address supply chain risks.
3. To assess the relationship between supply chain risk and food-aid distribution efficiency in Zimbabwe.
4. To assess the effectiveness of supply chain risk mitigation strategies in achieving efficiency in food-aid distribution.

1.7 Research Questions

1. What are the supply chain risks prevalent in food-aid distribution in Zimbabwe?
2. What mitigation strategies have been put in place to address supply chain risks in food-aid distribution operation?
3. What is the relationship between supply chain risks management and food-aid distribution efficiency?
4. Which supply chain risk management strategies have been used in conducting cost effective and efficient food-aid distribution in Zimbabwe?

1.8 Hypothesis (Null hypothesis)

H_0: There is no relationship between supply chain risk and food-aid distribution efficiency in Zimbabwe.

H_1: There is a direct relationship between supply chain risk and food-aid distribution efficiency in Zimbabwe.

1.9 Significance of the study

This study is of significance as it documents food-aid distribution operations in Zimbabwe. Information gathered will contribute to the body of knowledge in the field of supply chain risk management in food and other forms of humanitarian aid distribution, for use by both local and international actors in humanitarian relief operations. In addition to the above, this study will help in the review and regeneration of policies, rules and regulations governing food distribution in Zimbabwe. Of importance is that the study will also review theories that has been produced if they are workable in the Zimbabwean scenario.

1.10 Theoretical Framework

The overarching theoretical framework underpinning this research is the Disaster Phase Model the Mentzer Model and the SCOR Model. According to Carr (1932:208), The Disaster Phase Model is divided into four phases, namely, mitigation, preparedness, response, and recovery. The Mentzer and SCOR models lay emphasis on the importance of modelling the supply chain to fit in the organisation needs and enabling it to be able to competitively assert itself in the competitive market place (Van Weele, 2006; Lysons and Farrington, 2006). Food and humanitarian aid is contingent on the premise that communities require humanitarian aid because a disaster has occurred. This premise resonates well with the assertions that disasters in their phases lead to vulnerability. Based on Carr's model, this research is going to dwell much on the response and recovery to disaster impacts, where food-aid distribution is situated. Working in tandem with the SCOR Model, to provide efficacy in the food-aid distribution process.

1.10.1 The Disaster Phase Model

The Disaster Phase Model, also called the Disaster Management Cycle, has predominantly four stages, namely: the preparedness, response, recovery, and the mitigation phases. Carr's model suggests that the disaster pattern follows a sequence of events or a predetermined pattern. The disaster phase model informs the governments and communities of the type of response required. The phases look at the progress of disasters. When a disaster event 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 have a sudden onset while others have a slow onset (Tomasini and Van Wassenhove, 2006:45). The thrust of this study is on the impact of supply chain risk management in food-aid distribution to disaster victims. The

response stage of disaster management is characterised by the availability of many actors and a variety of processes or activities that ensures the food and humanitarian aid reaches the intended beneficiaries (Oloruntoba and Gray, 2006:116; Tomasini and Van Wassenhove, 2009:41). The response stage is further complicated by the diversity of stakeholders it attracts (Balcik et al 2010). 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 et al 2010:23).All in all the supply chain risk management system should be informed by the four (4) stages of the disaster phase model for the response to be appropriate and adequate for the needs of the disaster impacted community.

1.10.2 The Crunch, and the Pressure and Release Models

While the Disaster Phase Model presents a disaster management cycle, O'Keefe's Crunch model (Westgate and Wisner, 1976) and Blaikie's Pressure and Release Model (Cannon, Davis, and Wisner, 1994) were developed to help researchers understand the progression of community vulnerability to disasters. The two models present similar scope and they are good instruments for identifying sources of vulnerability and events that trigger disasters.

The models act as barometers to food and humanitarian action to see the determining situations to inform governments and humanitarian actors on the required response mechanisms and timelines.

The models used in this research provide guidelines for implementing disaster mitigation strategies through food-aid distribution and also the procedures spelled out by supply chain models in ascertaining the movement of food-aid distribution from source to final consumption. These models will be presented in significant detail in Chapter Two of this study as a prelude to food-aid distribution. The following section looks at supply chain management model as a conduit on which food-aid is managed despite availability of supply chain risks due to disaster occurrence.

1.10.3 The Supply Chain Management

This research is aimed at exploring the role supply chain management plays in the wake of disaster and creating of disaster impacts. Van Weele (2006:475) defines supply chain management as "the management of all activities, information and financial resources associated with the flow and conversion of goods, up from raw materials, and services, such as transport, in such a way that the expectations of the end users are met or surpassed". The above activities happen in the realm of food -aid distribution activities.

1.10.4 Humanitarian Supply chain

In disaster management supply chain plays an instrumental role in ensuring that beneficiaries receive the required humanitarian aid. Patemen, Hughes and Cahoon (2013:83) posit that an invention called humanitarian supply chain has been created to provide the response to humanitarian needs in disasters. They define Humanitarian supply chain "as the process of planning, implementing, and controlling the efficient, cost-effective flow and storage of goods, notably food-aid and related information from point of origin to the point of consumption for the purpose of alleviating the suffering of vulnerable people.

Food-aid distribution activities consist of a range of activities that include production, sourcing, distribution, and consumption by the final beneficiary (Reddy et al., 2016). Despite the existence of a plethora of risks encountered in the process of food-aid distribution, the process has many players involved in managing a network of activities that include the sourcing, distribution, and consumption of the food-aid. Existing literature has underscored supply chain risks such as disruptions and coordination difficulties. Balcik, Beamon, Krejci, Muramatsu and Ramirez (2010: 22) posit that the post disaster relief environment is usually chaotic, because of the large numbers of players involved in humanitarian relief, drastic shortage of resources, delays in the movement of food-aid, and malpractices practised by humanitarian aid workers involved in food-aid distribution. Overall, this has often created a gap that has not been explored in the distribution of food-aid in Zimbabwe. Colicchia and Strozzi (2012) posit that distribution of food-aid is associated with operational risks along the food-aid supply chain. They further contend that since disasters create uncertainty in the business environment, they also create complex supply chains which stakeholders must manage in order to minimize problems of interruptions towards reduction of negative performance on food-aid delivery.

1.10.5 Supply chain Risk Management

Authors including Tang (2006), Zsidisin (2003b), Rho *et al.* (2008), Ouabouch *et al.* (2014), Singhal (2010), have conducted research studies drawing interesting insight in supply chain risks and their relationships with disaster occurrences. Disasters risks and their impacts are also analyzed, as well as the impact of chain risks management strategies on the performance of food-aid distribution. Occurrence of disasters cause a series of risks in the supply chain, which should be managed because if left unabated, serious challenges befall the community, leading to social, environmental, and economic losses (Chakravarty 2014:1, Chopra and Sodhi 2004:54, Tummala and Schoenherr 2011:475). In addition, risks in the supply chain cause significant physical damage to infrastructure, resulting in drastic changes to the economic, and social environment of communities, (Fritz Institute 2012:8). Damage to infrastructure causes delays in food-aid distribution, and as such, an efficient food-aid distribution is contingent on the organisation's ability to manage supply chains in the face of disaster impacts (Faizal and Palaniappan 2014:19).

1.10.6 The SCOR Model

The Supply Chain Council developed and endorsed the "Supply Chain Operations Reference-Model (SCOR)" as a standard supply chain management model in 1996 (Zhou *et al.*, 2011:332). Since its inception the SCOR Model has been used across-industries and found instrumental in enhancing efficacy in business operations. Zhou *et al.* (2011:332) concurs with Irfan *et al.* (2008:288), that the SCOR Model has been adopted and used by a variety of business enterprises in both private and public enterprises since its inception.

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.

1.11 Conceptual framework

This study explored three disaster management models and two supply chain management concepts used in both commercial and humanitarian supply chain. The Mentzer and the SCOR

Models have been adopted for analysis in this study. 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

A disaster is a "serious disruption of the functioning of society, caused by natural, and man-made catastrophes, that causes widespread human, material or environmental losses, affecting the people's ability to cope with the situation using only their own resources, (United Nations, 1992:21). According to Yu *et al.* (2015:1), about 1.2 million people were killed by disasters, while 9.2 billion people were affected by different kinds of disasters, with drought, earth quakes and floods being the most pronounced, with the world struggling to provide relief aid to disaster struck countries. Disasters create emergencies that make economies, communities, and people vulnerable, (Bayode *et al.*, 2014:1). Chang *et al*., (2007) argue that when people become vulnerable, they need some form of assistance in the form of food-aid, in order to save lives.

1.13 Research Gap

As has been alluded to earlier in this chapter, research on supply chain management in disaster management has been carried out to a greater extent. However, this study sought to examine the impact of supply chains risk management in food-aid distribution, an event that normally occur after cyclones, droughts and floods occur in Zimbabwe. There is a literature gap on the management of food-aid distribution in disaster situations in Zimbabwe as well as need to carry out further studies in disaster Supply Chains ideal for specific disasters such as cyclones, drought, and floods in Southern Africa and in Zimbabwe in particular.

1.14 Scope of the study

The study focused mainly in determining risks associated with food-aid supply chains in Zimbabwe, and how they can be effectively managed, especially given the ever increasing onslaught occurrences of cyclones, floods and droughts in Zimbabwe and Southern Africa at large. The study is also delimited to stakeholders involved in food-aid distribution, especially the members of the District Drought Relief Committees who form the crucial team of managing disaster risk events and mitigation strategies in the selected areas of study.

1.15 Communities and Geographical Area for the Study

This study is located in the discipline of Public Management with particular reference to Disaster Risk Management and Supply Chain Management. In this study, the targeted respondents are office bearers from national government, Local Government (District Councils) Non-Governmental Organisations, and United Nations Agencies who constitute the District Drought Relief Committees (DDRC) governs and implements the food and humanitarian aid distribution in the seven districts under study. Thus, the officials were selected based on the role they play as enshrined by the Drought Mitigation Strategy document on issues to do with drought relief and food-aid distribution. The geographical districts covered by this study were as follows; Chiredzi, Chivi, Masvingo, Mbire, Muzarabani, Mwenezi and Zaka districts. These districts are found in ecological regions IV and which receive the least rainfall in Zimbabwe and the district are food insecure (ZimVAC 2015:50)**.**

1.16 Limitations of the study

The study did not cover the whole of Zimbabwe due to financial and time constraints despite the fact that a comprehensive coverage of the whole country, would provide an accurate account of the impact of supply chain risk management in food-aid distribution in Zimbabwe. The study is delimited to, Chiredzi, Chivi, Masvingo, Mbire, Mwenezi, Muzarabani and Zaka Districts which serve as constant recipients of perennial food-aid distribution operations since 2002(ZIMVAC,2016:154).

In addition to the above, the research questions and interviews will be directed to stakeholders employed in local and national government as well as humanitarian agencies, as the direct people involved in food-aid distribution operations in Zimbabwe. Further to the above, not all food-aid supply chain management risks may have been identified. The methodology used to

acquire data is a limitation because the researcher sampled a portion of the country, namely Masvingo province using purposive sampling. The study focused on food-aid component of the humanitarian relief only.

1.17. Key Definitions in the Study

- 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 emanating from of any disaster occurrence, with the provision of prompt response to disaster impacts" (Yazdanipour and Yazdanipour, 2012:231).
- Supply chain - "a group of self-governing 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- is "an integrated system in which various organisations, work together to address issues related to material and information flows, (Subbaiah, Rao, and Babu, 2009:1).

1.18. Structure of the Thesis

This study has seven main chapters organised as follows:

Chapter 1: Introduction:

This chapter introduces the study and guides this researcher through to the next chapters. The chapter provides background information, research questions, objectives of the study, as well as the justification of the study. It also gives the assumptions, limitations, and delimitations of the study.

Chapter 2: Literature Review: An International Perspective.

Chapter Two reviews the related literature found in the field of supply chain risk management by examining the studies concerning risks that are prevalent in food-aid distribution operations and looks at current strategies being used to mitigate supply chain risks and strategies used to improve the performance of the food-aid distribution operational framework. This analysis is

meant to review and assess gaps from previous researches on supply chain management in disaster risk relief operations and collaboration used in implementing disaster relief operations, thus giving direction to this research.

Chapter 3: Literature Review: The Zimbabwean Perspective.

The focus of this chapter is to provide an overview of supply chain risks that affects the holistic implementation of food-aid relief operations in Zimbabwe. It also looks at mitigation strategies put in place by the government and stakeholders in the humanitarian supply chain sector. The Zimbabwe Disaster Relief framework, the Humanitarian Agenda and the Civil Protection Unit policies and legal framework protecting human life from disasters.

Chapter 4: Research Methodology:

The purpose of this chapter is to discuss the research methodology employed in this study to gather data pertaining to this study. The chapter covers aspects that include research design, sampling procedures, research instruments, data analysis and presentation procedures.

Chapter 5: Data presentation, analysis, and discussion.

Data presentation and analysis and discussion of the research findings: The Chapter will present data in the form of tables and graphs for information gathered through questionnaires. Quantitative data gathered will be discussed in pictorial graphs and qualitative data from observations and interviews will be reported in vignettes (narrative) episode.

Chapter 6: Conclusion and recommendation.

This chapter is the concluding chapter that gives the summary of all activities done from chapters one to six, showing findings, conclusions, and recommendations by the researcher. Thus, conclusions will be based on the critical analysis of the research findings. The chapter also looks at the areas for further research.

1.19 Conclusion

Chapter one gave an overview of the research background, its significance, and the problems to be studied. The chapter sets the objectives of the study in respect of the impact of supply chain risk management strategies in food-aid distribution in Zimbabwe. The next chapter will review the literature on the current study.

CHAPTER TWO

Supply chain Risk Management in Food-aid Distribution: A Global Scenario.

2.1. Introduction

Chapter Two reviews the available and related literature on disaster occurrences, supply chain management and supply chain risk management. It considers the theoretical foundation of food-aid distribution, vulnerability, and risk management strategies. Prevalent risks related to food supply chains are examined and food-aid distribution operations are further reviewed. Approaches that have been used to mitigate vulnerabilities and risks in food-aid distribution operations are analysed and reviewed. In addition to the above, the chapter discusses the theoretical framework of supply chain risk management, in conjunction with common disaster framework models, the social network and the contingency theory of best fit in relation to disaster occurrences and the related movement of food-aid from source to final consumption. The impact of risk management strategies on food-aid is also investigated and analysed in order to review and assess gaps from earlier researches on management of supply chains in disaster relief operations.

2.2 The Disaster Management Framework

The overarching theoretical framework underpinning this research is the Disaster Management Framework. Carr (1932:208) formulates this framework and refers to it as the "Disaster Phase Model". The model is divided into four phases, namely: mitigation, preparedness, response, and recovery. Based on Carr's model, this research focuses on the response and recovery to disaster impacts and the phases where strategies to manage humanitarian supply risks are also discussed.

It is on that basis that the need to seek for food and humanitarian aid is contingent on the premise that communities have been subjected to vulnerability due to disaster occurrence. The disaster occurrence has often led to the need for disaster relief or humanitarian aid because the emergence of some misfortune often deprives a community of its livelihood and other means of sustaining life (Whybark, 2007:228). Beamon and Balcik (2008:10) and Thomas and Kopczak (2005:2) concur that the strategic objective of humanitarian supply chain management is to reduce the impact of disaster effects, prevent loss of life, alleviate human suffering, and

lessen the loss of human life on the suffering and vulnerable communities, given their financial constraints, social and economic vulnerability.

2.2.1 The Disaster Phase Model

The Disaster Phase Model, also called the Disaster Management Cycle, has predominantly four stages, namely: the preparedness, response, recovery, and the mitigation phases. Carr's model suggests that the disaster pattern follows a sequence of events or a predetermined pattern. A synopsis of the Disaster Phase Model shows us where the relief element is roped in to assist the vulnerable beneficiaries. With reference to Carr's model, this research dwells much on the response and recovery stage of disaster management where food-aid distribution is situated. The response stage of disaster management is characterised by the availability of many actors, and a variety of processes or activities whose implementation is there ensures that the food and humanitarian aid reaches the intended beneficiaries (Balcik et al, 2010:22; Oloruntoba and Gray, 2006:116; Tomasini and Van Wassenhove, 2009:41). When a disastrous event occurs, response and reconstruction are triggered into action. The nature of response is determined by the nature of a disastrous event and the magnitude of its effect (Tomasini and Van Wassenhove, 2006:45). 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, et al. 2010:23).

In the Disaster Phase Model, we were enlightened about the phases of the disaster, which normally force communities into vulnerability. An analysis of the Disaster Management Model buttresses the much laid emphasis on the post disaster activities that include provision of relief and hence ignores the causes of the disastrous events and their impact as a precursor to societal vulnerability (Vermaak and Van Niekerk2004: 557). This model is further qualified by the Crunch Model followed by the Pressure Release Models.

2.2.2 The Crunch, and the Pressure and Release Models

While the Disaster Phase Model presents a disaster management cycle, O'Keefe's Crunch Model (Westgate and Wisner 1976) and Blaikie's Pressure and Release Model (Cannon, Davis, and Wisner 1994) were developed to help researchers understand the progression of

community vulnerability to disasters. The detail contributed on this part of the chapter is a prelude to the supply chain management processes found within the disaster environment and food-aid distribution processes. As vulnerability is found in the supply chain environment, the supply chain management conceptual framework is here under analysed. As stated in chapter One, the Crunch and the Pressure and Release Models act as barometers to government and humanitarian actors to see and determine the disaster situations and to inform their response mechanisms and time frames.

The Crunch and the Pressure and Release models have been used to test organisational (governments and humanitarian actors) capability Interms of their sufficiency and adequacy in dealing with vulnerabilities in their bid to assist communities struck by disasters as well as establishing the resilience of communities they are serving. The Crunch Model has three fundamental ingredients in understanding disaster occurrences, namely underlying causes, unsafe conditions and trigger events, that lead to community or societal vulnerability .Thus as noted above ,that disasters create a form of vulnerability amongst the affected people McEntire (2001:191) also acknowledged 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. With regards to the above, Coppola (2012:87) concurs with McEntire (2001:191) on the above issues they all agree cause communities to be vulnerable. Within the Crunch model, various forms of vulnerability are spelled out, namely, physical, cultural, economic, social, political, technological vulnerability.

Physical vulnerability is brought about by occurrence of disasters ,such as drought, floods, cyclones, etc 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”.

Within the Crunch Model there are also issues of Social vulnerability. According to McEntire, (2001:191),Social vulnerability is a product of a community having limited education including inadequate knowledge about disasters, scarce routine and emergency health care, etc such that when disasters occur in these communities the communities are ill prepared to fight them, as in the case of droughts, cyclones ,such that vulnerability is not controlled which in turn forces governments to offer relief in for of food aid distribution.

Third comes the aspect of Cultural vulnerability, which 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. An example being that people in Muzarabani and Mbire are perennially affected by flood disaster whenever more than normal rainfall is received in the area. According to Schwartz (1992), reluctance to embrace disaster awareness by rural communities is further aggravated by religious beliefs which force followers to behave in certain specified religious ways at the expense of their own safety. This was also evidenced in Indonesia during the 2006,Merapi volcano eruption when the Javanese community refused to heed government warning about the impending volcanic eruption ,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).

The cultural vulnerability is followed by political vulnerability. According to McEntire(2001:191),political vulnerability emerges as a result in availability of support or availability 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 humanitarian food- aid as a bait to further their political careers at the expense of the disaster victims. From political vulnerability follows economic viability.

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.

Lastly as seen the world over, communities are not technologically gifted thereby creating 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.

Thus, systems in response to disaster impact should be informed by the progression of the disasters as indicated in the two models above. As stated above, the said two models are very similar in their scope and are good instruments for identifying sources of vulnerability and events that trigger disasters. In addition to the above, the two models provide a solid base of the theoretical frameworks which underpin the study.

2.3 The Concept of Supply Chain

The supply chain concept informs business and industry on processes taken by the movement of goods and services to satisfy man's needs and wants in commercial or in humanitarian settings.

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 customer 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.

Samaranayake (2005), Udbye (2014) and Lambert *et al*., (1998) concur that the supply chain concept describes the network that links organisational supply chain processes for goods and or services towards customer satisfaction. The network is made up of an assortment of activities that include, production, sourcing of goods and services, materials provisions, transportation, warehousing, storage, and distribution of goods from facilities to various customers. According to Chopra and Meindl (2004: 12), supply chain's main role is to fulfil the customer demand by directly or indirectly, involving a number of different actors listed above.

In recent years, 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 Supply chain concept has attracted a lot of research interest humanitarian operations ,and has been coined with another name, being popularly known 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 a critical role in assembling resources and distributing them to the needy in a timeous manner. Various supply chain management concepts have been tabled and discussed in literature that include supply chain, supply chain management, supply chain risks and supply chain risk management and their relationship to food-aid distribution. The study explores and discusses the food-aid supply chain concept in relation to disaster disruption and disaster risks. The discussion is centred mainly on humanitarian supply chain, notably food-aid, distributed along commercial supply chains, because of its versatility and adaptability in the swift movement of goods and services (Whybark 2007:228).

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".

2.3.1 Supply chain Management

The definitions of supply chain management vary from area to area, but for the purpose of this research, the Council of supply Chain Management Professionals (CSCMP)'s definition has

been adopted. CSCMP defines Supply chain management as "the planning and management of all activities involved in sourcing and procurement, conversion of materials to finished products, and all logistics management activities, that move and house products from the source till the final customer receives the goods and or services" (Naslund and Williamson 2010:11).

According to Agarwal and Shankar (2005), holistic supply chain management creates economies of scale to both organisations and beneficiaries through collaborative investments with other stakeholders. The creation of collaborative investments allows organisations to incur minimal operational costs whilst providing quality goods and services to stakeholders along the food-aid distribution network, (Habib 2011:5).

Supply chain in general presents itself in two main forms, namely commercial and humanitarian supply chain, (Kovács and Spens 2007:108). This study explores the Humanitarian supply chain concept. Beamon and Balcik (2008:10), Thomas and Kopczak (2005:2) concur that the strategic objective of humanitarian supply chain management is to reduce the impact of disaster effects, prevent loss of life, alleviate human suffering and lessen the loss of human life on the suffering and vulnerable communities, given their financial constraints and vulnerability. It is in this same vein that this research assesses the impact of risk management strategies in situations of disaster and relief towards the fulfilment of the humanitarian agenda of saving lives and improving livelihoods, through the distribution of food-aid.

2.3.2 Humanitarian Supply chain

Van Wassenhove (2006) defines humanitarian supply chain or logistics as "the process and systems involved in mobilising people, resources, skills and knowledge to help people affected by disasters." According to Bhattacharya, Mukhopadhyay and Giri (2014), humanitarian supply chain arose from the need to deal with complexities in managing supply chains in relief settings. Gil (2006), concurs with the above and also argues that humanitarian supply chain is structured in such a way that it follows systematic linkages and this needs to be managed holistically as it operates in a difficult environment."

Following events during and after disaster occurrence, there is normally a call for humanitarian relief to assist those in need of assistance. This resonates well with the assertion by Whybark (2007:228) that the need for humanitarian food-aid arises from the emergence of some

misfortune which deprives a community of its livelihood and other means of sustaining life. The humanitarian food-aid is then provided for by the humanitarian supply chain. Chakravarty (2014) concurs with the above that humanitarian supply chain network operates under extremely difficult situations that need to be managed.

An understanding of humanitarian supply chain operations from exacting literature by Whybark (2007), Beamon and Balcik (2008), Thomas and Kopczak (2005), Gil (2016) and Patemen, Hughes and Cahoon (2013) enable us to evaluate if the current food-aid distribution in Zimbabwe is effective or not and, if not, devise ways of improving the service.

2.3.3 Supply chain Risk Management

Authors including Tang (2006), Zsidisin (2003b), Rho *et al.,* (2008), Ouabouch *et al.* (2014), Singhal (2010) have conducted research studies drawing interesting insight in supply chain risks and their relationships with disaster occurrences. Occurrence of disasters cause a series of risks in the supply chain, which should be managed, because if left unabated, serious challenges befalls a community, leading to social, environmental and economic losses, (Chakravarty 2014:1), (Chopra and Sodhi 2004:54; Tummala and Schoenherr 2011:475). Resultant disaster risks affect supply chain networks causing significant physical damage to build and environmental infrastructure, causing drastic changes to the economic, and social environment of communities, (Fritz Institute 2012:8). Risk has a strong relationship with disruption, vulnerability, uncertainty, disaster, peril and hazard;+ (Faizal and Palaniappan 2014:19) such that the provision of humanitarian aid is contingent on the basis of a thriving supply chain network operating in disaster affected area, an area which this research focuses on, that is, the relationship between supply chain risk management and food-aid distribution.

Disaster that disrupt supply chain networks often leads to emergence of supply chain risks on organisational processes (Blome and Schleper 2017:1). In order to manage these supply chain risks, Kleindorfer *et al.* (2003), as cited by Blome and Schleper (2017:1), argue that risk, organisations employ risk management strategies to reduce disaster impacts. Over the years, Blome and Schleper (2017:1) argue that the supply chain strategies used in managing disaster impacts tend to be reactive and proactive. A proactive supply chain risk management strategy entails undertaking a plan ahead of disaster occurrence to mitigate risks before they occur. Reactive supply chain risk management entails invoking action or reacting to a risk after it has happened. Prior preparations of disaster event mitigation often facilitate efficacy in the

humanitarian response to the disaster events (Knemeyer et al., 2009). History has proven that reactive supply chain risk management strategies are often associated with redundancies and safety stock. These, according to Sheffi and Rice, (2005) minimise damage in most disaster situations, and are often used as a tool to manage disaster impacted communities.

2.3.4 Social Network Theory

When disasters impact on a community, the community invokes the Social Network Theory to assist one another in fighting disaster impacts. Social network theory is based on the existence of structural relationships and communication networks linking organisations and humans in particular environmental surroundings. This research study investigates the use of Social Network Theory in the distribution of humanitarian aid in Colombia. According to Humberto and Marco (2013:1), the social network theory was instrumental to

the identification of new routes to deliver food-aid. In Pakistan, the Social Network theory proved important in the sharing of information, (Kaplan and Haenlein 2010). Toor and Hasnain (2017:173) argue that the social network theory is instrumental in providing an enabling environment for communities to interact, communicate and share valuable information, making it easier for the communities to work together in times of disaster occurrence.

The theory is important to this research as it outlines how people and organisations network when exposed to disaster situations. It also helps readership and the community to be able to appreciate the way people and organisations communicate given the existence of various network topologies. Social network topologies can also be used to analyse the transportation, communication models and network topologies used in food-aid distribution, that may also have been affected by disaster occurrences (Alvarez and Serrato 2013:3). It is in this area that the importance of human relationships is seen to be effective in coordinating functions in humanitarian aid. In a disaster context, the availability of network structures enable organisations to respond to disaster events by providing resource delivery. According to Hoppe and Reinelt (2010:601), social network analysis helps communities to close the gaps or cracks that normally develop when some organisations that abundantly possess critical or major resources do not have adequate links to other stakeholders working and providing support in the same disaster affected community.

Thus, relationships between the communities translates to community responsiveness in addressing events affecting one person becoming a whole community's problem (Hoppe and

Reinelt 2010:601) through provision of resource that improve communication amongst stakeholders in disaster relief. Thus, having an understanding of how networks in humanitarian aid distribution enhances the coordination capabilities encourage all stakeholders to network and collaborate towards a common cause (Hoppe and Reinelt 2010:601).

2.3.5. Contingency Theory

Stading and Kauffman (2007:1) define the Contingency Theory of Fit as a laid- down foundation on which organisations can plan and prepare for disaster mitigation on disaster risk affecting supply chains. The theory builds up on the premise that organisations and communities need to plan for unforeseen and unknown future eventualities to enable them to respond to disaster risk when they occur. It is on the basis of this theory that organisations pre-plan food-aid distributions for disaster victims, (Yuen and Thai 2017:7). The contingency theory provides a basis for organisational preparedness should a mishap occur. In concurrence with the above, Gabler *et al.* (2017:130) posit that organisations used contingency theories to prepare themselves for future disaster events and their impacts. These approaches enable humanitarian stakeholders to anticipate critical incidents and motivate supply chain stakeholders to develop competencies that can be used in addressing the impact of disaster disruptions (Gabler *et al.*, 2017: 130). Yuen and Thai (2017:6) establish that with contingency theory, the importance of supply chain integration and communication is highlighted through holistic performance of food distribution processes. This can also be applied to the current study as a basis of understanding the importance of the supply chain integration and contingency theoretical frameworks in food-aid distribution.

2.3.4. Impacts of disasters on the supply chain

When disasters occur, major disruptions follow (Tang 2006). Disasters such as cyclones, Tsunamis and earthquakes are prominent in the destruction of built infrastructure and disruption of supply chain networks, causing direct and indirect losses or risks in related industries and communities (UNISDR 2013: 30). The increased frequency of occurrence of both natural and man-made disasters have impacted on the physical environment, social and economic environments and on people making them vulnerable (Kapucu, 2011:9). Such disasters impacts make millions of people vulnerable and ultimately force them to depend on humanitarian aid (Yadav and Bev 2016:321). Yu *et al.* (2015) argue that at a global level, between the years 2000 and 2012, almost 1.2 million people were killed by disasters while 9.2 billion people were affected by different kinds of disasters, with drought, earth quakes and

floods being the most pronounced, leaving the world struggling to annually provide relief aid to these communities.

Disasters cripple business operations and make supply chains dysfunctional (Gill 2012:7). Damages on the road network makes disaster affected areas inaccessible and further affects communication networks, (Balcik *et al.*, 2010:24). The destruction of economic, social and transport infrastructure, often cut-off the disaster affected regions from the commodity supply sources, especially food-aid sources, making communities vulnerable to hunger, starvation, and medical supply shortages. When communities are made vulnerable and desperately need food-aid, demand for food-aid rises as commodity supply lines shrink and hence fail to operate in the normal way. These impacts cause variability in the way they manifest on the normal supply chain, causing ripple effects such as delays in the commodity distribution and information communication processes.

Ngcamu (2011:14), Chopra and Sodhi (2014), Simchi-Levi et al., (2014), Kovacs and Spens (2009:509) all concur that the disruptive nature of disasters cause delays in the movement of goods and services along the supply chain network. Disaster occurrences cause changes on the economic, social, cultural, and built infrastructure leading to widespread human, material, or environmental losses, creating emergent vulnerable societies (Faizal and Palaniappan 2014). UNISDR (2004) concurs with Kovacs and Spens (2007) that such disruptions affect the social, economic and environmental systems, forcing the disaster affected communities to require food and other forms of humanitarian aid, as they would no-longer be able to function on their own without assistance from other sources. The disaster impacts create social and economic vulnerabilities at times often leading to human suffering as risks presents itself to communities. The following are some of the supply chain risks that literature has provided.

2.4. Types of Supply chain risks

We have noted above that disasters cause a plethora of risks that impact heavily on the social, economic, and physical environment there by creating what we call supply chain risks. Considering that the current study seeks to establish supply chain risks prevalent in food-aid distribution in Zimbabwe, literature provides exacting risks that have been experienced in the world over. The risks are discussed in the following sections as a bedrock or foundation to the current study.

Risk has subjective meanings which depend on the environment on which they occur. Several definitions have been proposed but for the sake of this research, the United Nations Office for Disaster Reduction definition is applied. Risk in the context of supply chain operations is the disruption of continuity food-aid distribution processes (United Nations 1992:21). Risk is defined as "the probability of occurrence of particular adverse events in a period, whose occurrences result in negative consequences to disaster affected communities .According to Faizal and Palaniappan (2014:19), risks present themselves in five forms, namely environmental risks and operational risks, information and communication, demand and supply and lastly, political and cultural risks.

Risks created by disasters vary largely and generate challenges for the organisations involved in delivering aid on the already crammed supply chain network (Kovacs & Spens, 2009). When such risks occur, they create inherently chaotic post-disaster relief environments, shortage of enough resources and damaged infrastructure making relief operations difficult to implement (Fenton 2003). The circumstances created by the disaster causes risk on the environment and on the supply chain itself.

Jüttner *et al.* (2003), in their study based on an investigation of aa wide range of industries, identified several supply chain risks that generally distress the supply chain network before, during and after disaster occurrence. Balcik and Beamon (2008:102) concur with the above, and add that any organisation, including governments dealing with disasters has at one time or always encountered risks in the process of mitigating disasters during their occurrence or in the aftermath of the disaster occurrences. Kovacs and Spens (2009) have discussed the causes, effects, and scale of risks on the delivery of food-aid in Ghana.

2.4.1 Environmental risks

Disaster impacts on the built environment, disturbs productive operations in factories, destroys commodities under storage such that supply base is affected. In addition to the above, damage to build infrastructure results, fields full of crops are also washed off by the floods, destroying all crops such that nothing could be salvaged. The damaging effects of the disasters on the physical environment affects the performance of supply chain networks causing supply chain gaps, (Spiegler, et al., 2012:6162). Chakravarty (2014:1), Chopra and Sodhi (2004:54) and Tummala and Schoenherr (2011:475) all concur that disaster disruptions have, in the past,

caused extensive damage to transport road and rail networks, built infrastructure and communication systems.

Where the road network has been destroyed, nothing can be transported along the supply chain network. In cases of humanitarian aid, if there is too much rainfall, dirty roads become difficult to navigate hence affecting movement of trucks ferrying humanitarian aid (Chopra and Sodhi (2004:54). Damage to the road network results in the area or further apart areas not being accessible, such that goods and services cannot reach the affected areas. At times helicopters are used but when the weather is stormy, helicopter movements are curtailed as the machines cannot operate in stormy conditions in fear of causing accidents. These challenges cause delays in reaching the disaster victims, inaccessibility into disaster areas, shortage of supplies, and escalation in supply costs and curtails the ability of the government to reach all affected victims.

2.4.2 Demand and Supply Risks

Soon after disaster occurrence and its impact on the environment and communities, demand for humanitarian supply chains becomes irregular and variable due to uncertainty caused by disaster risks (Kovács and Spens 2007:108). Both communities and organisations are faced with unpredictability of needs in disaster situations as requirements of affected communities cannot be easily ascertained. Disaster occurrences creates uncertainties and unpredictability in demand and supply for commodities (Nagumey, Cruz, Dong, and Zhang 2005). According to Balcik and Beamon (2008:102), the following are common risks that prevalent in a food-aid supply chain in disaster situations volatility of demand of the required food-aid supplies, source location of food-aid and the food-aid destination, the type and size of food-aid required, and the lead times associated with the transportation of food-aid. In addition to the above, Nagurney (2012) posits that the absence of zero-lead time between the disaster and the need for food-aid is a demand and supply chain risk in food-aid distribution.

Based on the common knowledge that disasters differ in magnitude, type and subsequent needs, it is imperative that organisations must adopt a strategy to deal with different types of risks emanating from disaster occurrence, such as the above cited risk (Beamon and Balcik, 2005; Nagurney, 2012).

Supplies following a disaster often come in unsolicited and undesirable forms. Chomolier *et al.* (2003) and Murray (2005), as cited by Kovacs and Spens (2007:104) concur that

humanitarian aid agencies often receive a variety of unsolicited and sometimes even undesirable commodities amongst the donations, a situation that has often created challenges for both recipient and the beneficiaries at large.

The advent of disasters creates demand of humanitarian aid, which at times often outstrips supply, as the supply market becomes overwhelmed in a short space of time (Jüttner, 2005; Kapucu, 2011). In such cases competition for scarce resources becomes rife, as demand becomes unpredictable and irregular in response to the needs of the affected populations causing supply provision that are unmatched to beneficiary demand, leading to supply and demand mismatch (Wagner and Bode, 2008:311).

Food-aid sourcing and supply is often impacted by the unpredictability of humanitarian food-aid demand and the pressure it puts on the authorities, forcing them to disrespect sourcing and procurement regulations, in a bid to quickly satisfy beneficiary needs. This need for urgent solutions to unpredictable demand, often put authorities in difficulties of producing and working with correct figures of supply requirements against variabilities caused by ever changing demand patterns. This is compounded by the prevalence of uncertainties and unpredictability of events that cannot be easily ascertained against misappropriated timing to unfolding events, even though activities may be manned by unprofessional staff.

Management of processes by unprofessional staff causes risks like poor estimation of required resources, and in the absence of the availability of correct estimation platforms, creates shortfalls of requirements, especially of food-aid supplies, (Gill 2012). Demand requirements should not be estimated after an event so as to reduce the lead time between appeal and actual distribution of food-aid. This whole process also requires the availability of experienced professional staff, as lack of professional staff impacts on food-aid (Gill 2012:4). This is contrary to what happens in most disaster events as needs are only ascertained after the occurrence of a disaster and needs assessments carried out. In the process governments and humanitarian agencies implement operational strategies to manage disaster impacts, and as well encounter operational challenges in the process.

2.4.3 Operational Risks

When disasters occurs, organisational operations come to a standstill in the disaster impacted areas. Lin and Zhou (2011) aver that operational risks are those types of risks found within the

organisation, causing discomfort in the way the supply chain network operates. They are also called internal organisational risks, whose actions if not controlled, incapacitate the operations of the organisation. Chopra and Sodhi (2004), as cited by Vanany, Zailani and Pujawan (2009:17) argue that operational supply chain risks present themselves in various forms, namely: delayed movement of goods and services, large forecast errors, system breakdowns, flawed procurement processes, organisational capacity issues, inventory problems, theft, corruption, elongated distribution lead times and poor quality of food-aid commodities.

Depending on the environment, other forms of risks present in food-aid distribution, include: increased food-aid distribution costs, delays in distribution of food commodities, unavailability of funding, theft, poor and damaged information platforms, shortages of skilled human capital, and lack of funding (Lockamy (2014). This means that organisational activities end up not functioning as expected, hence creating operational risks along the supply chain network for a period of time until assistance is provided from somewhere else.

According to Gill, (2012:4) delayed distribution leads to lengthy and unpredictable lead times, poor performance and increased vulnerability of communities who are no longer able to cope with their own resources. Some organisations use outsourcing and sub-contracting to move food-aid. However, at certain instances, having intermediaries in the supply chain may be an advantage while in other instances, turns out to be a supply chain risk and or risk source (Lockamy 2014). Manuj and Mentzer (2008b) assert that, "risk causes loss and problems that threaten livelihoods and humanity" (Monroe 2014:8). Risk also leads to negative consequences on people's livelihoods as its impact on the socio-economic environment affects the way people live (United Nations 1992:21).

Thomas and Kopczak (2005) cite lack of logistics planning for disaster events, availability of damaged food-aid stocks and late deliveries of relief aid as causes of poor humanitarian aid coordination. McCormack *et al.*, (2008:6) add that this also results in the occurrence of adverse shortages in the supply of goods and services, which is a supply chain risk. There is often shortage of trained professional humanitarian staff in disaster relief operations (Kovacs and Spens, 2007). Lack of professionally trained humanitarian aid personnel, shortage of supplies, delays in food-aid distribution, lengthened lead times, spiralled demand inflation are also the other relevant risks along the food-aid supply chain. Oloruntoba (2007:3) posits that disaster

occurrences invite the insurgence of scores of humanitarian agencies to a common ground to assist the disaster impacted communities.

Operations and programme staff are part of food-aid distribution operations. Lack of professional staff often leads to poor implementation of humanitarian relief operations and waste of resources (Kovacs and Spens, 2009). Availability of professional staff to run the food-aid distribution enables the organisation to ascertain requirements as needed by the beneficiaries effectively. Surprisingly, when disasters and emergencies occur, humanitarian agencies compete for the few available human resources. It is difficult to satisfy all humanitarian agencies staff requirement if the agencies are competing for a few available professional human resources.

Coordination is also part of operationalising risk management even though disasters also present a plethora of coordination challenges. Coordination amongst humanitarian organisations is often difficult because of the existence of various stakeholder groups involved in humanitarian aid operations (namely, the military, government, non-governmental organisations), and often inadequate infrastructure (Balcik and Beamon 2008). The presence of a variety of actors involved in disaster relief may contribute to coordination difficulties as it creates confusion on its own unless strictly and strongly coordinated (Yadav and Barve 2016:324).

According to Rucha and Abdullah (2017:257), the chaotic nature of post-disaster relief environment and the lack of enough food-aid resources for distribution the existence of many parties doing the same job results in supply chain risks, emanating from conflicting roles, coordination and friction amongst the parties. Uncoordinated distribution scheduling, higher costs of transportation, and unavailability of suitable trucks, constitute part of operational risks which lead to delayed distributions (Tummala and Schoenherr 2009:475). McLachlin, Larson and Khan (2009) concur with Beamon and Balcik (2008:11) that the prioritization of goals in the humanitarian context is also complicated by the presence and involvement of many stakeholders in food-aid distribution. Poor coordination of humanitarian response is common during disaster occurrences. Literature has revealed the importance of coordination in humanitarian relief but the same has also indicted the problems caused by lack of coordination.

2.4.3. Information and Technological risks

Information is instrumental in determining beneficiary needs. This same information is what donors and other humanitarian agencies require for assembling logistical and supply chain information with regards to sourcing of food and humanitarian aid. In the recent encounter with cyclone Idai in Zimbabwe, the country witnessed the disaster destroy and wash away information technology hardware and infrastructure in Chimanimani and Chipinge districts. When such damage occurs, the communities are left with nothing to use in communicating with the outside world. Disasters need to be communicated and the absence of communication causes further risks by creating information gaps. Chopra and Sodhi (2004) concur with the above and also argue that the recent years, have witnessed organisations increasingly becoming technology-dependent and consequently, vulnerable to information technology problems or breakdowns.

Information Technology-related problems have become extremely relevant to supply chain management since many supply chain management functions are built on information processing and sharing. In view of the above, Kapucu (2006:2010) argue that disaster emergencies create a high level of uncertainty on communities and require stakeholders to timeously create and share accurate information. Risks associated with Information provision has often led to the provision of inaccurate reports based on incomplete data which often translates to compromised supply chain visibility in humanitarian aid distribution. Gill (2012) cite lack of the correct information on the ground, damaged transportation and inaccessibility to disaster areas, damaged social and economic infrastructure, as some of the major supply chain risks which lead to unpredictability of demand for relief aid. Unavailability of information on its own creates disaster risks and is also a disaster on its own. Thomas and Kopczak (2005:2) note that availability of accurate information on distances to reach disaster hit areas, and availability of inaccurate beneficiary information form the centrality of disaster relief operations which, if not managed properly, exacerbates the detrimental effects of supply chain risks.

Information management is great in the production of correct beneficiary data. The authenticity of beneficiary data is the pivot on which sourcing for relief aid and donations is hinged. The availability of information platforms have enabled governments and humanitarian organisations to manage unpredictable demand for relief supplies during the first hours and days after a disaster occurrence. During this time, there is a tendency of humanitarian

operations in “pushing supplies” to the disaster location in a first phase, as aid comes from different directions. Tummala and Schoenherr (2009:475) note that poor and distorted information is a supply chain risk source that often creates disaster events in terms of information gaps, relationships, needs, type, and quantity of the required supplies of humanitarian aid. When information is defective, inadequate, or non-existent, it presents itself as an organisational risk that creates communication gaps amongst humanitarian stakeholders. According to Beamon and Balcik (2008:11), it has become a common scenario that information systems and inventory control systems often lag behind developments as relief organisations mostly focus their attention on specific relief efforts, such as fundraising or looking for donations. The breakdown of information infrastructure also creates communication gaps in the flow and movement of both food-aid and non-food items in humanitarian distribution operations (Tummala and Schoenherr 2009:475), leading to demand and supply challenges in the whole process.

2.4.4 Governance, Political and administrative Risks

Administrative guidelines and laws are there to assist governments and humanitarian organisations manage and control implementation of the food-aid distributions holistically. This enables governments to ensure well-coordinated distributions that are not haphazardly conducted, nor create political upheavals amongst the disaster affected communities. According to Wagner and Bode (2008:311), it is a common scenario that the world over, in countries where food-aid has been distributed, governments have introduced legislative and regulatory frameworks to control the movement and distribution of food-aid. At times, the implementation of these political and administrative laws have been seen to cause uncertainty as the regulations and administrative processes have become political impediments leading to delays in food-aid distribution (Wagner and Bode 2008:311).

Some governments have strict laws that govern the importation of food-aid meant for beneficiaries and some governments do not accept genetically modified foods and their derivatives. The regulations might also stringently provide for the need to obtain approvals from the relevant authorities to import certain varieties of food commodities before the food-aid could be delivered. Unfavourable political landscape, as well as the culture and the way of living of the disaster impacted communities might also create distribution risks despite the need for assistance in those affected communities (Monroe et al. 2014:11). In addition to the above, the efforts of the donors, governments and voluntary well-wishers should be protected and

governments should be seen to be putting in place measures which insulate food-aid donations from abuse and misappropriation as a priority in order to create an enabling environment to make sure the food-aid reaches the intended beneficiaries.

At times legislation also creates barriers for swift receipt of foreign donations when they are received for distribution in disaster impacted areas, as customs and immigration departments might take their time to clear donations at points of entry (Kovács and Spens, 2007:516: Holguín-Veras *et al*., 2012:1-12). Food-aid legislative processes and policies have been seen to stringently control movement of food-aid in Zimbabwe. As procedures are followed the distribution process is slowed down by procedural anecdotes. Delays in food-aid distribution have adverse effects on the lives of the already impacted vulnerable society. At times donations often arrive in unmanageable forms, based on the premise that donors or humanitarian organisations have different origins, background and experience in disaster relief operations (Murray 2005).

During the 2007 and 2008 drought, Ghana experienced challenges in coordinating the distribution of food-aid to the drought disaster victims as some of the operating NGOs did not understand their mandates (Kovacs and Spens, 2009). The NGOs tried to fit everywhere in the disaster assistance framework such that their effort gathered no moss. Instead, the organisations spend most of their time fighting for resources meant to feed the same communities. The Ghanaian National Disaster Management Office (NADMO) implemented a number of statutes and faced coordination difficulties in distributing food-aid in Ghana. Other challenges that manifest on the organisations are that some organisations do not really know their mandates and therefore try to do everything and, at the end of the day, do not have an area of speciality. One of the challenges emanated from the fact that some humanitarian organisations did not know their mandate and instead took time to alleviate the plight of the people in disaster affected areas. Businesses are exposed to various supply and demand risks related to the upstream side of their supply chains. Capacity constraints are witnessed in the way supply chain partners perform their role in food-aid distribution against a bedrock of supply chain risks that manifest through food sourcing**.** The above is further explained by the existing supply side risks exist in sourcing, procurement, suppliers, supplier relationships, and supply networks, (Wagner and Bode 2008:310).

2.5. Supply Chain Risk Management

Supply Chain Risk Management has become an integral part of a holistic supply chain management design in responding to disasters (Christopher and Lee 2004:3), which Day *et al.* (2012:21), asserts that the occurrence of disaster affects the operations of a functional society. The main objective of supply chain risk management in disaster events is to ensure that food and humanitarian aid supply networks continue to operate in a predetermined way as planned, so that humanitarian aid reaches disaster victims, (Waters 2007:86). Mohaghar *et al.* (2017:310) posit that Supply Chain Risk Management is a strategy that is influential in the creation of approaches that can be used to identify, assess, analyse, and treat issues of vulnerability caused by risk in supply chains.

Managing risks along the humanitarian supply network requires strategic thinking in order to reduce communities' exposure to disaster impacts and imbalances triggered by disaster occurrence. Liu, Lin, and Hayes (2010), Tummala and Schoenherr (2011) and (Chopra and Sodhi, 2004), all concur that the management of risks prevalent in the supply chain network sets free economies and communities from the harsh impacts of disaster created uncertainties. Hutchins and Gould (2004:75) concur with Ngcamu (2011:17) that the existence of supply chain risk management strategies enable organisations to assemble tools and processes ideal for the emergency relief implementation, so as to respond to uncertainties and disaster impacts.

Supply chain risk management entails the process of systematically identifying, analysing, and dealing with risks that manifests in the supply chain (Waters 2007:76). The implementation of supply chain risk management enables organisations to mitigate risks and future emergencies, caused by disaster occurrences, such as drought, food-aid shortages, theft, and corruption. (Alexander 2016:268). According to Munyuko (2015), organisations normally undertake, the three strategies, namely: avoidance, control, and cooperation to manage risks in the supply chain.

Vanany *et al*. (2009), Li *et al.* (2006) and Tang (2006) have written and suggested frameworks that can be used to manage risks in the food-aid supply chain (Zsidin *et al.*, 2000). Chopra and Sodhi (2014:59) have proposed a two-step theoretical framework for the management of risks along the supply chain network. The frameworks discussed above are instrumental in managing the food-aid supply chain network with the intention of making them resilient. Shahbaz et al.

(2018:327) argue that effective supply chain risk management can be easily done when proper risks are identified and managed.

At times, the process of managing risks in the food supply chain network end up exacerbating other risks, as humanitarian agencies experience both ordinary and irregular risks in a bid to respond to disaster occurrences (Jahre 2017:89). It is within this realm that Chopra and Sodhi (2004) as cited by Vanany *et al.* (2009:22), posit that risks in the supply network need to be managed because if they not well managed they create a series of risks in turn ,which risks often result in deaths of disaster impacted people, and the dysfunctional economical and societal environments. In the wake of Hurricane Katrina in the United States, Blome and Schleper (2017) argue that the government and the authorities used the reactive strategy through FEMA to address disaster impacts. The Supply Chain Risk Management strategy was used in Haiti after the Haiti earthquake and in Indonesia after the Asian Tsunamis of 2005.Thus the reactive strategies have been used to reach out to the members of the society made vulnerable by disasters impacts. As noted from the literature above, disaster risk events are the major causes of supply chain disruptions, characterised by having people unable to manage disaster events and operations exhibiting failure and poor organisational performance, and risks (Lockamy 2014:757).

When communities overcome disaster impacts, they some quickly recover and hence regain their livelihoods status and begin to operate as efficient as they used to do.

2.6. Models used in Supply Chain Management

The current study seeks to establish if there is any relationship between the Mentzer Model and the SCOR Models and food-aid distribution supply chain model in Zimbabwe. The above-mentioned models have been known to furnish holistic supply chain networks for almost all supply chains in the management of risks. The following are models that have been adopted from the commercial supply chain and used in humanitarian food-aid distribution, namely the SCOR Model and the Logistics Model.

2.6.1 The Mentzer Model

The Mentzer Model is a strategic risk management framework used to manage disaster impacts and risks (Naslund and Williamson, 2010). According to Mentzer *et al.* (2001) this framework which bears his name, was pivotal in creating a systematic strategic coordination framework

that links the traditional business functions and strategies across these business functions within one organisation and across enterprises along the supply chain for the purposes of refining the long term performance of the individual companies and the supply chain as a whole. According to Naslund and Williamson (2010:17), Mentzer and his colleagues' description of supply chain management was built on an extensive literature review of traits that characterise the operations and importance of coordination of logistic activities across functions and across firms within the supply chain network. This led to the development of the conceptual supply chain management model called the Mentzer Framework.

In the framework, Mentzer presents the supply chain network as a pipeline in this framework that coordinates resource movement as supply chain flows, coordination of organisations, inter-functional coordination of business functions and the provision of value satisfaction of the final consumer. It is on the basis of the recognition of customer value and satisfaction that this framework is seen as ideal in managing humanitarian supply chains in a humanitarian context as the supply of food-aid is hinged upon coordination of stakeholders and resources towards satisfaction of the beneficiary needs.

2.6.2. The SCOR Model

The Supply Chain Council developed and endorsed the "Supply Chain Operations Reference-Model (SCOR)" as a standard supply chain management model in 1996, (Zhou et al., 2011:332). Since its inception the model has been used across-industries and been found instrumental in enhancing efficacy in business supply chain operations. Zhou *et al.* (2011:332) concur with Irfan et al. (2008:288), that the SCOR Model has been adopted and used by a variety of business enterprises, including governments, private sector, communication, manufacturing, and distribution, amongst supply-chain partners because of its cross-functional framework efficacy.

The SCOR Model has been highly praised and used in business to deliver efficiency and flexibility of business supply chains, because it promoted, flexibility, responsiveness, effectiveness through collaboration, understanding and visibility of which these became the cornerstone of the supply chain risk management strategies in use today (Irfan *et al.* 2008:288). According to Naslund and Williamson (2010:14), the model is well known for realigning supply chain processes to fulfil unachieved businesses, measure performance of the supply chain operations and well respected in capturing supply chain configurations. Having looked

at the attributes offered by the SCOR Model this research then seeks to assess the current distribution of food-aid if it matches the standards set by this framework which has been seen to have a lot of advantages for the supply chain partners.

2.7 Strategies in managing Supply chain Risks

The current study seeks to establish strategies used to mitigate supply chain risks in food-aid distribution in Zimbabwe in view of literature which provides exact supply chain risk management strategies that have been used in distribution of food-aid in disaster impacted areas around the world. It has been noted from the literature above that there is variability of the planned versus the actual quantities of distributed food-aid against the requirement due to disaster impacts thus creating a set of risks that need to be managed. The risks management strategies used are discussed in the following sections as a benchmark to the current study. Mitigation strategies that Chopra and Sodhi, (2004:53) have written about, were mainly focused on the demand and supply side risks prevalent in food-aid distribution but did not consider environmental risks in the discussion that ensued. Based on literature explored on the supply chain risk management strategies, there are more commonalities around risk mitigation strategies from several research articles (Monroe 2014:10).

The following are a list of strategies used in the management of supply chain risks in humanitarian food distribution operations, namely: coordination, collaboration or integration, postponement, inventory holding, risk transfer, flexibility (Chopra and Sodhi 2004:57. Vanany *et al.,* 2009:24).

2.7.1 Coordination strategies

Management of risks in the supply chain has become an applied science that requires coordination expertise through the application of both theoretical and physical knowledge in the provision of disaster relief. The coordination is a supply chain risk management strategy that a government that has been mandated by its constitution, uses to manage, and lead other players in managing disaster mitigation activities. Governments play a coordinating role in humanitarian relief. The Civil Protection Act of Zimbabwe gives the government authority to coordinate disaster risk management activities in Zimbabwe. Balcik *et al.* (2010) and Tomassini and Van Wassenhove (2003) concur that governments also support the humanitarian effort through the coordination of civil and military coordination in disaster relief operations (Kovács and Spens 2007:101).

In addition to the above, governments are seen to control the participation of non-governmental organisations in humanitarian relief operations. According to Day, Melnyk, Larson, Davis and Whybark (2012:32), governments have also crafted legislation to regulate the operations and the relationships of the various actors in disaster relief operations. This provides clarity of mandates and guarantees that no duties or assignments amongst humanitarian agencies overlap, and efficacy is created in the supply chain of relief aid.

As a supply chain risk management strategy to manage teams of stakeholders in disaster mitigation, Governments create laws and regulations to coordinate civil and military actions for managing humanitarian aid activities. According to Kovács and Spens (2007:516), availability of sound regulations brings sanity into the food-aid distribution operations as unnecessary bottlenecks, such as delays by government departments are ironed out. In such situations, relationship management between key humanitarian stakeholders must be righteously coordinated to ensure that food-aid deliveries are not experienced, and partners in the humanitarian supply chain are called to work together towards an efficacy of the food-aid distribution. According to Alexander (2016:268), emergencies and disasters require a coordinated food-aid distribution network, established performance metrics, holistic communication networks, and human and material resources so that urgent needs are matched with available resources. This strategy would assist in ensuring that resource gaps are reduced, and the beneficiary is assisted to become resilient again. To sum, up the coordination strategy sets up an integrated disaster relief supply chain network model that can be able to capture both the preparedness phase through to the response stages of the disaster management cycle.

2.7.2 Collaboration Strategies

When disasters occur, humanitarian agencies and private sector work in a complementary way to support the government in the holistic distribution of humanitarian aid (Saleh and Roslin 2015:587). In disaster relief operations, collaboration, entails having two or more organisations jointly working together for a common cause. Successful response relies on the ability of the local organisation to collaborate with the host government, **(**Altay 2008:137). When organisations work together, they achieve more than what could be realised when the organisations work in isolation (Lawrence *et al.* 1999:78). Humanitarian agencies with different agendas have often joined hands in food-aid distribution, but the process tends to be flawed if wrong people are tasked to do things that are new to them. In order to provide efficacy

in food-aid distribution, responsible partner, namely governments, private sector organisations, humanitarian agencies, create, share, and use resources in a more robust and useful manner, towards a common goal (Kapucu 2008:208). Yuen and Thai (2017:6) concur with the above assertions and also applaud the governments for the important role they play in connecting or linking up all humanitarian stakeholders in an integrated way during and soon after disaster events.

Assessment and analysis of reactivity of governments and humanitarian actors to disaster impacts is a form of integration test, to ascertain if organisations can work together sharing resources in disaster management. According to Ajmera and Cook (2009) supply chain integration is essential in managing disaster impacts and circumstances. In Bangladesh, the collaboration between the state and non-state actors amassed various resources as a strategy in managing disaster risks (Government of the People's Republic of Bangladesh 2010: 13). According to Tomasini and Van Wassenhove (2009:549), when disasters occur, their impact also tests the capacity of governments, private sector, and humanitarian agencies in working together. Thus, collaboration strategies enable the formalisation of coordinated partnerships in integrating partnership amongst disaster relief implementing partners. This process creates a formalised platform for resource sharing, amongst organisations working to achieve the same goal in humanitarianism, (Kamwega *et al.*, 2018:3). Wen *et al.* (2007) as cited by Naslund and Williamson (2010:19) argue that integration enables organisations to work together acting as if they belonged to one organisation with in an extended enterprise, thus reaping high rewards for job accomplishments.

Collaboration as a strategy provides connectivity amongst distribution players along the supply chain network. According to Kapucu (2006:2010), connectivity is related to the linkages between the internal functional organisational units of an enterprise and the ultimate linkage between the organisation and its external partners. Another important theme in Collaboration brings in the supply chain network the issue of simplification of logistical processes by synchronisation of the movement of goods and services to ensure an easier flow of goods and services. The coordination process takes off from the Social Network Theory as it uses networks created by society to connect food-aid supply chain members. In this respect, the operational integration aspect refers to any or all joint workflow activities, processes and decisions that are collectively performed by the group with regards to humanitarian supply chain.

2.7.3 Information Management

Information and communication strategy is part of the coordination strategy in moving food-aid to the final beneficiary. The availability of information enables holistic distribution of food-aid to take place soon after or during disaster occurrence, regardless of the type of uncertainty affecting the humanitarian supply chain (Van Wassenhove, 2009:556). The movement of food-aid should be supported by the existence of a vibrant information technology platform that assists organisations communicating requirements and needs. Tang (2006a) and Thun and Hoenig (2009) suggest that the use of Information management as a strategy is great in offering quick response to disaster victims. Products such as RFID, tracking and tracing devices can be useful in responding to actual demand rather than demand forecasts. The provision of information management services is an example of information integrating service. According to Thomas and Kopczak (2005:12), humanitarian agencies use integrated information systems technologies to support the sourcing and distribution of food-aid. The system is also used to track and monitor food and humanitarian aid movement using the commodity tracking system and pipeline management systems, so that commodity leakages can be prevented (Kamwega *et al.* 2018:1).

Existence of relationships and interactions are witnessed when organisations work together in a humanitarian relief environment, (Balcik 2010:23). This is witnessed by the sharing of important information and resources, such as beneficiary data and the baseline information on disaster impacts by Humanitarian agencies operating in food-aid. Jüttner *et al.* (2003) suggest collaboration strategies among supply chain partners in sharing relief information can expose some specific supply chain risk sources and hence prepare joint business continuity plans for both governments and humanitarian agencies. The information gathered, such as beneficiary data, extent of disaster damage and impacts, quantities of food-aid demanded will assist organisations implement a holistic food-aid distribution without flaws. According to Yadav and Barve (2016:324), information integration assists organisations in the management of interdependencies and resources amongst participating organisations. The resources include human capital, information technology and services. All organisations involved and resources are coordinated so that better results can be achieved.

2.7.4 Postponement strategy

Postponement is a strategy that organisations use to undertake food-aid demand planning. Bandaly, Satir, and Shankar (2014), Christopher and Holweg (2011), Manuj and Mentzer (2008b) and Yang and Yang (2010) as cited by Kilubi (2016:16) define postponement as the holding of stocks as strategic backup inventory and assembling actual orders lately to reduce inventory stock holding as well as logistics costs. Postponement strategies are addressed in Jüttner et al. (2003), Yang *et al.* (2004), Tang (2006a) and Tang and Tomlin (2008). According to Yang and Yang (2010) postponement may offer superior advantages over other risk mitigation strategies employed for supply chain disruptions.

An example if food-aid is donated in bulk, and the humanitarian agencies would not rush to distribute the food-aid but wait to receive packaging instructions and then pack the food-aid in sizeable distribution packs meant for the beneficiaries. In the context of disruption recovery, the postponement creates a cost-effective and time-efficient contingency plan that allows humanitarian stakeholders to avail and package the food-aid products quickly to meet the required demand. Tang (2006:38) argues that the logic behind such an assumption is that delay is a strategic move that gives logisticians time to assemble the whole distribution package for the beneficiaries and hence make one-time delivery. The process also enables stakeholders to map out intervening strategies ideal for effective complexity reduction in the disaster mitigation process. Postponement gives humanitarian agencies time to assemble resources for one-time distribution delivery. This enables logisticians to map out different channels of delivering humanitarian aid to the intended beneficiaries, despite the availability of challenges encountered in trying to reach disaster areas.

Although this strategy works well in manufacturing industries where goods are build-to-stock, the postponement strategy drives or pushes faster the packaging or final product to meet customer orders and to suit any changes in demand. The postponement strategy effectively reduces inventory obsolescence and takes out the risk and uncertainty costs associated with having undesirable products, based on the availability of an integrated and agile supply chain that is able to frequently forecasts demand through the supply chain to provide the right products for the beneficiaries.

Kilubi (2016:14) argues that postponement enables and allows organisations platforms to create food-aid reserves that would provide a buffer when late deliveries and shortage of

supplies are experienced. Although this is a cost saving method, it is contrary to the basic principles of humanitarian aid that needs food-aid to be swiftly delivered to the affected beneficiaries so as to save human life. Further delays may also lead to deaths or worsened situations.

2.7.5 Supply chain network design

For food-aid distribution to work, it has to follow some systems that would enable movement from source to final beneficiaries. The distribution process also follows a distribution process that we may call the supply design. This process is called supply design and entails availability of supplies which have to be distributed to beneficiaries. Supply chain network design is a risk mitigation strategy used in humanitarian aid to ensure that the food-aid reaches the final beneficiary .According to Klibi *et al.* (2010), the design is implemented to curb against fluctuations in food-aid commodities, its costs, transportation, storage, location and capacities of suppliers, transporters prizes, and other stakeholders in handling food-aid delivery processes.

The supply chain design sets the decisions for selecting, source of food-aid, its transportation and storage as well as transport lead times is taken into account. This also takes into consideration application of redundancy tactics, revolving around duplication of network resources in order to continue serving beneficiaries while rebuilding after a disruption (Klibi *et al.,* 2010).

Klibi *et al.* (2010) argue that having multiple food-aid storage and handling facilities tend to increase the costs in the distribution of food-aid in addition to management of excess capacity, handling, and transport costs. With respect to disruptions in inbound or outbound food-aid deliveries, Sheffi and Rice (2005) recommend the application of tracking and tracing goods in transit to detect interruptions on the smooth flow of food-aid commodities. If supply disruptions are identified, quick corrective action would be instituted across the supply chain. Klibi *et al.* (2010) suggest that availability of a supply chain design often leads to the attainment of flexibility strategies in food-aid distribution., that incorporates forms of flexibility like “resource flexibility” and ‘tactics to respond to shortage of food-aid commodities” to mitigate disaster risks in food-aid supply chain networks.

2.7.6 Flexibility

The needs of the beneficiaries do change and are always changing based on the prevailing situation. Requirements of beneficiaries change because of disaster impacts over time, and this resultantly motivates change in the way humanitarian stakeholders' response mechanism is applied to suit requirements on the ground (Rucha and Abdallah 2017:250). Thus, change propels and provides quick solutions to problems by offering flexible solutions to current beneficiary problems.

Sheffi and Rice (2005) and Tang and Tomlin (2008), concur that the availability of flexible supply chain strategies enhance efficacy in food-aid supply channel coordination. In totality, the constituent components of supply chain flexibility include procurement, distribution, and lead time management of food-aid distribution (Swafford *et al.* 2008). Flexibility also entails the use of quantity contracts in mitigating supply commitment risks, whose adoption would manage the supply and delivery requests as suppliers as per the order quantity requested. According to Tang, (2006b) the importance of using 'time-based supply contracts' is to deal with commodity prize uncertainty in a 'time inflexible contract and has been suggested in cases when costs need to be controlled.

According to Shuria, Linge and Kiriri, (2016:72), flexibility is a risk management strategy that governments and other humanitarian organisations use to manage supply chain risks. Flexibility comes in various forms that include volume, time, form, and delivery flexibility. Volume flexibility entails the ability of the organisation to change volume of food-aid required in time and also the ability to change delivery times, in order to fulfil new requirements (Rucha and Abdallah, 2017:250).

On the other hand, Stevenson, and Spring, (2007:687), suggests, that flexibility enables the organisation to use their various capabilities to distribute a diversified lot of commodities to the vulnerable beneficiaries. This takes cognisance of the exact times food-aid is required, and contract management to achieve channel coordination amongst supply chain members, (Tang 2006a).

From the above assertions, scholars who include Jüttner and Maklan (2011:247). Weiss and Hoffman, (2007), as cited by Shuria *et al.* (2016:72) argues that flexibility, is instrumental in creating resilient supply chains for both organisations and communities. Resilient supply

chains are agile, and their agility enhances organisation's aptitude to respond to demands of various forms arising from dynamic, intricate, and challenged environments.

2.7.7 Global and Local Sourcing

The use of local resources create flexible organisations. The use of local supplies, like labour, food basket and time saves operational costs of implementing food-aid distribution (Oloruntoba 2005). Jüttner *et al*. (2003) suggest 'localized sourcing' reduces supply lead times and improves humanitarian response rate. When the local community cannot cope with disaster impacts, often the global market is roped in to assist people in need of assistance. The assistance comes in various forms such as donations or cash or in-kind assistance (Kilubi, 2016). Donations have been seen to reduce risks of commodity shortages experienced if one vendor drops out, at least the other suppliers on the supply list will be available to deliver the food-aid (Kilubi 2016:16). Among the mitigation approaches, 'flexibility' approaches are aimed at reducing supply cost risks.

2.7.8 Food-aid Prepositioning

The establishment of a flexible commodity supply base in humanitarian food-aid distribution creates a commodity supply base that government will always use in order to manage strategic grain reserves for the nation. This enables the government to control the food reserves for the nation. The availability of strategic stocks of inventory as a strategy, is ideal for government to mitigate supply shortfalls due to disaster risks impacts on the supply network, (Jahre, 2017:87-88). Chopra and Sodhi (2004:59) argue that the establishment of a national commodity supply base enables timeous delivery of food supplies to disaster victims. At times, the reserves are used prior to receiving donations. Chen, Liang, and Yao, (2018:1) argue that inventory pre-positioning is an important strategy applied to critical timeous and efficient response to potential disasters occurrence to minimize disaster vulnerability impacts. According to Balcik and Beamon, (2008:102) post disaster sourcing and procurement of humanitarian relief supplies is characterised by additional challenges and supply risks, with the acquisition process from both domestic and international suppliers, charging relief supplies at high costs in time consuming and delayed environments.

Pre-positioning increases the ability of humanitarian organisations to mobilize relief supplies and deliver aid quickly, it can be financially prohibitive (Balcik and Beamon 2008:102). Availability of pre-positioned food-aid reduces delivery lead times, transport costs, and also

controls or reduces costs of reaching the beneficiaries with food-aid. Ngwenya and Naude (2016:1**)** further argue that prepositioning of food-aid can be used as a strategy to regulate shortages of supplies and also for controlling food-aid delivery costs. Regardless of location, the availability of a functional and effective supply chains is the backbone of food-aid distribution programme. Despite the advantages sung about the availability of pre-positioned food-aid, the need for critical infrastructures like warehouses is a cost to be borne by the humanitarian agencies or government. Food-aid inventory management costs include stock holding costs, such as food-aid deterioration, pilferage of food-aid, insurance costs, warehouse utilities and rentals plus many more hidden costs. Thevenaz and Resodihardjo (2010) as cited by Mbohwa, (2010:177) argue that supply chains must respond to the needs of the beneficiaries, through the provision of, search, rescue, sustain or save lives and restoration of self-sufficiency in the communities and as well save the remaining resources for future eventualities.

2.8 Risk avoidance and transfer

The risk avoidance strategies involve the actions that organisations adopt and implement to reduce or circumvent the impact of the risks in any environment. This can be done by reducing the probability of occurrence, of severity of impacts, of the disasters by taking insurance policies as a risk reduction measure. The United Nations World Food Programme (WFP), as a strategy, requires all transporters to have Goods in Transit Insurance, a policy that would be used to cover loss or damage to food-aid lost when the vehicle transporting the food-aid is involved in a road accident subjecting the food-aid to loss. Generally, insurance transfers risk to or shares it amongst members of the pool, such that when disaster occurs, the risk bearer will be indemnified to the position he was before the incident took place (Vanany *et al.*, 2009:26).

Governments and humanitarian organisations have used risk transfer as a disaster mitigatory measure Mwamjimbo *et al.* (2019:184) in food-aid supply chains. In addition to the above, WFP uses sub-contracting as a risk transferring strategy, where transporters who are given contracts to deliver food-aid have to ensure the safety of the food-aid until the food reaches the hands of the beneficiaries. Delays in entering a disaster zone until the situation is calm has been used as a supply chain risk management by other humanitarian agencies. According to Jahre (2017:83), this action of delay in entering or going into the disaster zone in fear of exacerbating further disaster to mankind referred is called risk avoidance. The reason for the delay going

into disaster risky areas is aimed at reducing the exacerbation of further disaster. Risk avoidance strategies involve activities that include the identification of supply chain risk events, assessment of the probabilities and the severity of disaster impacts, as well as prioritization of the risk events dealing with and developing actions for mitigating risks, (Vanany *et al.*, 2009:24)**.**

2.9 Supply Chain Management Performance Metrics

Part of the aim of this study was to ascertain or measure supply chain efficiency in the distribution of food aid the world over. It has been noted that in some instances, supply chain risks compromise the supply chain distribution efficiency. This can be assessed in terms of existing supply chain performance measures which have been established in supply chain literature as a basis for providing benchmarks to the current study.

Measurement of supply chain performance in food-aid distribution is an area which has attracted the attention of many researchers (Bemoan and Balcik, 2008:8). According to Gunasekarana *et al.* (2004), performance measurements and metrics are essential for humanitarian agencies because they enable humanitarian aid managers to set objectives that can be used to evaluate organisational performance. Shepherd and Gunter (2006) argue that the process of measuring the performance of supply chains stakeholders contributes to better understanding of the supply chain and enhances their overall performance and accountability.

According to Beamon and Balcik (2008), effective performance metrics are important to a humanitarian organization as they provide transparency and improve organisational operational efficiency and effectiveness. Timely transportation of humanitarian food-aid is an important key determinant of an effective food-aid distribution operation, yet in reality, infrastructure such as warehouses, roads and railways lines would have been destroyed by the disaster in some instances. The following are humanitarian supply chain management major performance metrics that Beamon and Balcik (2008:14) have identified, namely resource performance metrics, output performance metrics and flexibility metrics.

Beamon and Balcik, (2008:14) postulate that “Resource performance metrics measure the quantity, cost and level of resources used to meet the organisation’s major objectives. Resources are generally measured in terms of quantity and efficiency metric (resource utilization), systems clearly tied to flexibility and output. Food-aid distribution costs, number

of person-hours required by a Logistician distributing food-aid per month are examples of output performance metrics. Output performance metrics measure the efficacy with which supply chains are able to distribute food-aid, in response to the government and humanitarian agencies' strategic goals and to its beneficiaries' goals and values.

2.10 Empirical Studies of food-aid distribution

Disaster events have occurred in a number of countries and only a few examples have been taken in this study to highlight issues to do with humanitarian food-aid distribution. The following are case studies where supply chain risk management strategies have been applied.

2.10.1 Food-aid distribution in the United States of America

According to Rice (2011:14) nearly all disruptions caused by disasters result in one or more of these capacity losses for a period of time. In order to mitigate disaster impacts, the United States government established a national policy to ensure the management of efficient, equitable and sustainable approach to disaster drought management. This includes reduced capacity to supply, resources, manage organisational internal operations, shortage of qualified personnel and reduced financial capacity of organisations.

The United States government uses the Federal Management Agency (FEMA) to manage humanitarian aid distribution in cases of disaster occurrence and cry for humanitarian aid. Of importance to note is that FEMA possesses state-of –the-art logistics centres, spread across the United States that receive, store, distribute, and preposition disaster relief commodities, a situation only peculiar to the United States of America, (Rice 2011). FEMA is responsible for operationalising the Stafford Act (1995), with its primary mission being "Total reduction of loss of life and property, and protection of the nation from all forms of hazards, that include, terrorism, floods, volcanoes and drought, by leading and supporting the nation in a risk based comprehensive management system, (FEMA,2008). In addition to the above, the United States government uses the Stafford Disaster Relief and Emergence Assistance Act (1995) to fund, manage and regulate events related to disasters (Tadesse 2016:10). In 2005, in the aftermath of hurricane Katrina and Rita, the United States' preparedness in disaster mitigation was tested only to find out that poor administration of the disaster relief would be labelled on weaker structural controls of the disasters (Von Meding, 2012:921**).**

2.10.2 Food-aid distribution in Haiti

The Haiti earthquake of 2 January 2010 affected almost 3.5 million people with 222,570 people pronounced dead (United Nations, 2011). Coordination and collaboration strategies were used by national governments and humanitarian agencies to assist the government of Haiti save the lives of its vulnerable populations displaced by the disaster. Haiti had no warehouses to preposition or keep base stocks, a situation different from United States were every district has full logistical services ready for tackling any disaster occurrences. No prepositioning strategies were applied as the onset disaster forced Haiti to rely on external donations of humanitarian aid. The distribution process the Last Mile strategy was adopted to save lives, salvage the wounded, and bury the dead. Pettit *et al.* (2001) submits that the occurrence of the Tsunami provided evidence that logistics management is the pivot on which effective humanitarian response hinges on. Coordination from the national government, local and international humanitarian agencies provided swift response to disasters events. The government of Haiti was assisted by the international community to distribute humanitarian aid when the 2010 disaster occurred.

The Last Mile Distribution Model was adopted to distribute the food and humanitarian aid in Haiti. In the last mile distribution, the Contingency theory of best fit was applied as experienced humanitarian workers were called from all over the world to come and assist Haiti in distributing humanitarian aid to reach the needy. The strategy focused on optimizing the capacity of the facility to manage inventory and distribute humanitarian aid (Bettini *et al.*, 2014). Constraints related to transportation resources, vehicle capacities, delivery lead time were identified, and available resources were optimized through flexibility and vehicle allocation and routing decisions (Balcik *et al.* (2008). It was noted that coordination and integration strategies proved worthwhile as the country managed to be resilient after receiving assistance from the international community. This created a model that other nations could adopt when faced with challenges to supply humanitarian aid to disaster victims.

2.10.3 Food-aid distribution in Bangladesh

The Bangladesh Ministry of Disaster Management and Relief (2014:38) reports that in 1998 Bangladesh suffered flood disaster that affected and damaged almost two-thirds of the country. Immediately soon after the disaster, the government of Bangladesh with the assistance of civic

society, introduced a number of short-term relief measures to try and minimize loss of life. Statute Laws were used to establish the Vulnerable Group Feeding (VGF) programme to manage and administer food-aid. International aid agencies provided food-aid and other humanitarian aid and their distribution coordinated by the government through Vulnerable Group Feeding (VGF) programme. Despite the availability of laws to manage disaster eventualities, logistics settings are not as pronounced as those of the United States of America. Tatham, Spens and Oloruntoba ((2009:1) argue that it was advantageous for the government to collaborate with United Nations agencies, local and international non-governmental organisations in developing disaster preparedness and response strategies for managing disaster relief aid. Humanitarian agencies and international governments collaborated with the government to assist is solving the flood crisis, (Ministry of Disaster Management and Relief, 2014:38). Coordination and collaborative strategies were applied to manage disaster risk in Bangladesh.

2.10.4 The Floods in Thailand

The World Bank (2011) reports that Thailand received floods with the biggest damages and loses to economic, social, and environmental spheres of the country. Charoenslip (2010) reports that collaborative network strategies were used to distribute relief aid and bottled water to disaster victims. It was noted that Coca Cola's Global Water Stewardship efforts in the provision of bottled drinking water to disaster affected communities in Thailand worked efficiently because the relief agencies collaborated in an integrated way, as neither the government nor the Coca Cola Company could do the job alone. The government, the Coca Cola Company, worked with the Thai Red Cross to distribute water to the disaster affected communities.

2.10.5 The Pakistan earthquake in 2005

In 2005 an earthquake hit Pakistan and Indian Kashmir which affected an estimated 3.5 million and left about 73 thousand people dead, (da Costa *et al.* 2012). This catastrophe was further worsened by an extremely rough terrain that made the disaster struck area inaccessible and further challenged by armed conflict in the region. Such a situation prevented the humanitarian actors to quickly assist the vulnerable people as well as speedily evacuate the wounded, control the damage and to supply medical and food products. In order to move supplies, the operation relied on road transport and helicopters to reach about 200 distribution points. Due to mud slides and too much rainfall the road and rail networks were severely damaged such that it was

very difficult to reach the delivery of food and medical supplies to the affected beneficiaries. In the same vein Pakistan suffered transport inefficiencies that prevented humanitarian agencies to effectively dispatch food and medicines to disaster impacted areas, resulting in some affected zones failing to receive aid in time (Da Costa *et al.* 2012:602). Poor transport infrastructure and shortage of transport capacity contributed heavily on the failure to reach the beneficiaries. Though helicopters were used to reach cut-off communities, it was a difficult and expensive mission, considering the magnitude of the disaster versus the number of people to be assisted, (da Costa *et al.* 2012:602). The Pakistan earthquake was similar to the Brazilian disaster in that transport was the major challenge that affected the distribution of aid to the intended beneficiaries. 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.

2.10.6 Landslides in Brazil 2011

In 2011, the mountainous region of Rio de Janeiro received torrential rainfall and hence succumbed to floods that affected almost 36, 000 people and left 900 dead (Da Costa *et al.*, 2012:603). According to Da Costa (2012:603), the following supply chain risks were encountered, including, lack of adequate transport for carrying out logistics operational activities, difficulties in the use of communication systems available due to topology, non-availability of good maps, and destroyed road network infrastructure. In addition to the above, the initial humanitarian action was affected by lack of correct information on the real extent of the disaster, looting of food-aid and insecurity in some of the affected, areas. The government quickly established communication networks in the affected areas, covering both aerial and ground reconnaissance, to rescue survivors, and also to restore road access to the disaster impacted areas (Da Costa, 2012:604). Thus, research gave insight to how the disaster impacts were managed, giving similar insights to the current study.

2.10.7 Food-aid distribution in India

Lijo and Ramesh (2012) in their research on humanitarian supply chain management in India came up with different conclusions and recommendations that could assist in food-aid distribution through implementation of the Situation Actor-Process and Learning-Action

Performance (SAP-LAP) framework. Situation Actor-Process (SAP) means a situation actor process while Learning-Action Performance (LAP) means a learning action performance.

The authors note that training and educating staff on responsive disaster mitigation and continuous quality improvement of humanitarian aid operations creates motivated disaster management stakeholders who are able to easily coordinate disaster mitigation. Their studies focus on collaborative strategies to enhance supply chain performance and consequently reduce disasters. In view of the above, the SAP-LAP methodology was good although it also had its weaknesses. Most of the time was spend by actors analysing the challenges associated with the distribution. Actors were supposed to perform their duties whilst a monitoring team would follow, analysing the situation, researching for corrective measures on all weaknesses and also included asking for the beneficiaries' voice and recommendations on how they would like the food-aid delivered to them. The fact of the matter brought out by this study is that on many occasions humanitarian stakeholders take much of their time doing things that they have not been called for nor that warrant disaster mitigation. Analysis of the above disaster enables researchers and policy makers to understand how the efficient movement of humanitarian aid and good information systems are closely related in the reduction of disaster impacts as poor information and poor planning leads to poor execution of relief aid.

2.10.8 Food-aid distribution in the Horn of Africa

International Federation of Red Cross and Red Crescent Societies (IFRC) reports that the food crisis in the Horn of Africa forced more than 13 million people in East Africa to require food-aid, (IFRC, 2011). The countries involved included Somalia, Kenya, Ethiopia, Djibouti, and Tanzania (IFRC, 2011)**.** IFRC (2011) reports that during the food-aid distribution operations, substantial lead time delays in the delivery of food-aid were witnessed .The delays were due to respect of governance and regulatory issues, following customs clearance procedures for the food-aid at the transit airports as well as the retroactive implementation of a new laws governing food-aid importation, (Kovacs and Spens, 2009:516). This was different from most other countries maybe for security reasons. In addition to the above, other supply chain challenges included lengthy customs inspections processes on relief cargo, and also stringent human resources labour laws and expatriate relief personnel application processes for visa and work permits. This required a lot of time, in addition to the time required to get the humanitarian aid assistance to be delivered to the disaster struck areas where food and relief aid need to be. Disasters could be manned by everyone and at times inexperience people who

are new to disasters are hired to assist in disaster mitigation. Well-intentioned but inexperienced Non-Governmental Organisations and inexperienced personnel poorly coordinated the distribution of food-aid (IFRC, 2011).

Lack of knowledge on the scale of disaster operations, poor coordination and poor communication were some of the supply chain management risks the stakeholders faced in the distribution of relief aid. Chari and Ngcamu (2016) report that Kenya was affected by droughts that impacted on agricultural production in the years 1999-2001 and also from 2008 till 2011, (Murigi, 2013:972).

Ever since 1970's, Kenya has experienced more than 10 recurrent severe droughts (Tadesse 2016:9). Frequent occurrences of droughts forced Kenya to draft a drought contingency plan in 1985 and the Emergency Drought Recovery Project in 1992.These were short-term project-based interventions to protect livelihoods of the Kenyan communities. The Kenyan government's initiatives aimed at provision of proactive thinking on drought management and the need for increased long-term and short-term coordination efforts towards building community resilience (Hillier and Dempsey, 2012:34). This was followed by the establishment of a "Kenya 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 (EDE CPP, 2012). The year 2016 saw the birth of the National Drought Management Authority (NDMA) established by the Kenyan Government to provide a sustainable framework for drought disaster management (Tadesse, 2016:9).

2.10.9 Food-aid distribution in Ghana

During flooding and drought periods, numerous key stakeholders including government, civil society, private sector, collaborate their efforts with immediate interventions to save lives and reduce the impact of disasters on humanity. The Ghanaian Government enacted the National Disaster Management Act to manage disaster relief operations through The National Disaster Management Office (NADMO), (Kovacs and Spens, 2009:516).According to Kovacs and Spens (2009:516), no organisation kept pre-positioned stock of relief items, such that when the 2007 drought struck international humanitarian organisations, struggled in the preparedness to gather the required food-aid and also faced challenges in securing urgent customs clearance on humanitarian food-aid. In order to curb the influx of unsanctioned food stuffs proliferating the

Ghanaian market, the government instituted policies such as the Customs Procedure Act to manage challenges associated with receiving imports in the form of humanitarian aid and the government has taken steps to educate stakeholders on procedures to take so as to minimize major hustles, Okoampa (2007)and Asante-Mensah, (2007) as cited by Kovacs and Spens (2009:516) argue that due to the shortage of in-country warehouse space, schools and hospitals have been used as alternative food distribution points .This resulted in humanitarian agencies ,like World Vision Ghana, distributing all received relief items at once upon arrival, with no means for keeping pre-positioned inventory in the country, in order to maintain the quality of food-aid .

According to Kaba (2007) and Osei-Akom, (2007), what made the distribution challenges different from other countries was that Ghana did not have clear legislation guiding operations of humanitarian relief. Mandates on the operations of national and international non-governmental organisations working with food-aid distribution inadequately addressed food aid distribution issues in Ghana (Kovács and Spens, 2009:517). There was also poor coordination of humanitarian aid, similar to what happened in the United States of America when hurricane Katrina and Rita struck the United States of America in 2005.This stalled the food-aid distribution, such that the distribution process was a mess. In a bid to control the distribution operations the government took strides to strategically empower NADMO to coordinate the food-aid distribution operations in the country. Though it was great for the government to introduce disaster food-aid distributions, no mention of food-aid project monitoring was done. Though policies are good instruments whose implementation require monitoring and evaluation for continuous quality improvements, it should be noted that at times they might act as barriers to efficient relief to disaster-affected communities. Performance metrics were also not set and would recommend if performance metrics or key performance indicators would be set so as to enable evaluators to measure the achieved performance targets.

2.10.10 Food-aid distribution in Malawi

Following the floods disaster that struck Malawi in 2011, the Logistics Cluster reported that supply chain management risks, or gaps were identified which included the destruction of road networks and flooding covering 16 out of 28 provinces (The Logistics cluster, 2015). The main obstacle to relief efforts was access to affected people, as flooded areas were not accessible because of floods which had damaged the roads and washed away bridges making it difficult for motorised transport to reach the disaster areas, (IFRCRCS, 2014:1). Air lifting was used as

an alternative mode to reach areas that remained cut off by the floods and also in carrying out aerial assessments of the disaster impacted areas, (IFRCRCS, 2014:1). It was noted that Storage was also a challenge as some of the schools normally used for temporary storage of food-aid were in accessible. There was insufficient storage capacity for commodities in affected areas and there is no interagency cargo tracking system. In addition to warehousing, there was also lack of coordinated transport support services. Some of the Supply chain management risks, as reported by the Malawi Red Cross are detailed here under. Malawi Red Cross Society reports that prepositioned relief supplies were inadequate, and therefore, required the immediate procurement of emergency commodities. Apart from the above-mentioned problem, the available beneficiary information was full of inaccuracies, such that targeting and budgeting for beneficiaries produced wrong forecasts, resulting in streamlining of operations difficult. Coordination efforts proved difficult as overlaps in programming and implementation processes were regularly reported despite the cluster coordination efforts to streamline operations in a coordinated manner. This sounded as if there was no law to guide the operations of humanitarian relief, an area that needs to be further explored by future research.

Despite receiving several donations, the Malawi Red Cross Society, local non-governmental organisations lacked logistical capacity to deliver basic humanitarian aid. The Malawi Red Cross staff were few and were overwhelmed by the stressful disaster mitigation operations. As a result, many people were displaced, and it was difficult to reach them. This required the need for more resources to track and find the beneficiaries in the disaster impacted areas. It was noted that the demand for airlifting was also increased by the need to airlift personnel, for more days that was anticipated, hence increasing fuelling, and wages for personnel working on the recovery job (IFRCRCS, 2014:1).

Poor weather and visibility also affected the rescue operations, resulting in cancellation of the scheduled airlifting of the victims. This calls for more strategies to be researched to better respond to heavy floods and rainfalls. Receipt of donations at times does not really translate to reports being circulated as some reports are inflated and give wrong information. There is also need for independent commissions to monitor and report on disaster assistance, donations, distribution monitoring reports and many more activities. At times, international organisations are audited, but audits done after distributions may be presented with falsified reports.

2.10.11 Food-aid distribution in Mozambique

Mozambique was affected by floods in 2001 and the government declared it a national disaster. The government appealed for food and humanitarian aid from the international community (GoM, 2001d). It is reported that the United Nations Agencies and several Non-Governmental organisations managed to respond to the 2001 floods because they had disaster reduction systems and contacts in place, that were established in 2000. Thus, the Social Network Theory and the Contingency theories were invoked and applied to in the management of disasters in Mozambique (Unicef, 2002d). Stakeholder coordination was implemented by the government and local and international non-governmental agencies to mitigate the disaster impacts (UNICEF 2002d).

The Red Cross of Mozambique (2000) reports that a combination of planning, prepositioning strategies enabled the Humanitarian Country Team to implement the humanitarian aid perfectly although the process was challenged by corruption. Failure to uphold the rule of law amongst citizens, and corruption hampered on the implementation of legal and judicial reforms and this also impacted on the implementation and distribution of food-aid distribution operations in the country in 2001 (SIDA, 2001b). In addition to above, cases of organised crimes and issues of corruption as well as poor management and sharing of information, challenged the coordination and distribution of food and humanitarian management in Mozambique (UNRC, 2001a) .Above all, the most daunting problem of humanitarian aid distribution was the envisaged poor communication that affected the smooth implementation of humanitarian aid programmes amongst the implementing stakeholders (The World Bank, 2000). In this regard, apart from only governments reporting, humanitarian agencies must also publish reports on assistance of such magnitude, as government reports, at times, are ring-fenced and not for open circulation.

2.11 Impact of supply chain risk management on food-aid distribution

Munyuko (2015) examines the role of the importance of supply chain risk management to organisational performance of private companies and concludes that effective supply chain risk management plays a major role in enhanced or improved organisational performance. This was also witnessed in the delivery of food-aid which requires swift deliveries to be affected so as to save human lives. According to Munyuko (2015), the demand and supply issues of commodities as main causes of supply chain risks, should be holistically managed to avoid further disruptions and also to save costs as well as enable organisations to reduce their

vulnerability to supply chain risks, whilst eliminating non-value adding activities and, hence, achieve higher levels of supply chain profitability.

Holistic application of supply chain risks management strategies have assisted governments and humanitarian organisations attain economies of scale that reduced food-aid distribution operational costs through collaboration and integration of food distribution systems. This has created a holistic supply chain network for food and humanitarian aid worldwide (Le *et al.*, 2013:783). Ethical management of food-aid distributions creates room for productivity, accountability visibility and reduces inefficiency in the food-aid distribution process (Wieland 2013:660).

In addition to the above, supply chain risk management strategies also endowed participating organisations with, capabilities, that made them like visible, accountable and famous in the facilitation of collaborative implementation of resilience to the community (Jüttner and Maklan, 2011:252).Supply chain risk management strategies also reduces disaster impacts on disaster-affected communities, hence creating resilient communities, such that communities are able to live without fear of disaster impact as they would be well-prepared to meet them. Jüttner and Maklan (2011:2550) and Töyli *et al.* (2013:312) concur that supply chain risk management can be the most influential strategies to drive the quest for the creation of disaster resilient communities that can survive disaster impacts without relying on food-aid hand-outs from governments.

2.12 Trends which have emerged from the literature

The twentieth century has seen the increased use of lean supply chain and Six Sigma approaches in manufacturing industries were adopted to reduce inventory and waste in the supply chain network (Keltz and Hillman 20017:2). However, although common in commercial supply chains, these developments are new to humanitarian food-aid distributions. Six Sigma is another new trend that has been developed and found useful in the distribution of food aid in disasters. One of the major newspaper in India, The Times, reported in December 2014 that Six Sigma management concepts are helping a non-governmental organization in India provide food to additional school children, , (Six Sigma:2014).Currently donor funds have been dwindling and this requires governments to adopt creating disaster resilient communities. In addition to the above, the advent of developments in information technology and global sourcing are some of major trends impacting on supply chain disruptions, such that

governments and humanitarian organisations are forced by the situation to combat variability with more inventory, against accepting the benefits accruing to them by adopting global sourcing strategies (Keltz and Hillman 20017:2). Government capacities in handling disaster responses need to be improved and strengthened. Successful actions in certain disasters are often not replicated in other humanitarian operations in response to new disasters, and disaster affected communities keep on re-inventing the wheel. In addition to the above, awareness of supply chain risk management knowledge should be aligned to international, national, regional best standards.

2.13 Conclusion

This study examines the impact of the application of supply chain risk management on food-aid distribution during and soon after disaster occurrences. Strategies used in managing supply chain vulnerabilities enable the government and humanitarian food-aid organisations to meet the day-to- day needs of the disaster impacted communities, although a lot of actions are still required to polish the act. Literature reviewed revealed that coordination and collaboration created flexible supply chains that are able to provide quicker solutions in responding to humanitarian emergencies. In addition to the above, disasters and emergencies, insecurity and poor and damaged physical infrastructure were the major external constraints affecting the operations of humanitarian aid organisations. Literature that has been explored in this research highly recommends the ability of the strategies in the holistic management of food-aid distribution.

The reviewed literature also identifies the following gaps.

- Lack of humanitarian relief policy and operational guidelines setting out mandates of humanitarian agents for use in disaster events.
- Lack of independent Commissions to monitor, evaluate, report and audit food-aid donations and distributions, apart from individual and organisational audits.
- Lack of clear-cut regulations to be used for expediting receipt and clearance of humanitarian aid.
- The need for the governments to adopt lean and agile strategies for managing humanitarian food-aid supply chain.
- The need to create national disaster rosters of professionals to manage food-aid distributions apart from those provided by humanitarian agencies

- Development of standards, procedures, and technical specifications for humanitarian supplies.

The following chapter explores further the supply chain risk management strategies in Zimbabwe, in Masvingo province, Mbire and Muzarabani districts of the Zambezi Basin.

CHAPTER THREE

Food-aid and Supply chain Risk Management Strategies: The Zimbabwean Scenario.

3.1 Introduction

This chapter provides an overview of the distribution of food-aid with particular reference to outcomes of emergencies that have rocked Zimbabwe over the past years. The historical background of disasters and their impacts (droughts and floods) is looked at in relationship to supply chain network of food resources during and after disaster occurrences. In addition to the above, the chapter also looks at the legal framework that guides the holistic food-aid distribution operations.

3.2. Disasters Plaguing Zimbabwe

Chapter One introduced us to natural and man-made disasters that have caused disaster risks and left scores of people vulnerable, dead, with the built infrastructure destroyed, and supply chains seriously affected. EM-DAT (2016), reports that Zimbabwe experienced eight drought disasters that affected more than 18.6 million people and led to loss of livelihoods. According to Kellett and Spark (2012) natural hazards have annually affected an average of 6.8 % of the Zimbabwean population. In view of the history of disasters impacting Zimbabwe, Bongo, Chipangura, Sithole and Moyo (2013:1) argue that drought has been fingered as the topmost hazard, followed by HIV and AIDS, crop and animal diseases, road and rail traffic accidents, veld fires, other human epidemic diseases and, finally, floods in Zimbabwe have contributed to the demand for food-aid and the consequences discussed as a benchmark of how food-aid management in Zimbabwe is managed given the gravity of risks associated with disaster occurrence and their impact on the supply chain.

3.2.1 Droughts

Benson and Clay (1994: 10) define drought as an exogenous supply-side shock that usually causes sharp decline in agricultural output. Wilhite and Glantz (1985:4) identify four types of drought common in Zimbabwe, namely: meteorological, hydrological, agricultural, and socio-economic. In this study, agricultural drought is very important as the study seeks to establish drought as the major cause of food supply chain disruptions in Zimbabwe. Mushore, Muzenda and Makovere (2013:101) argue that “Drought” is one of the most common causes of vulnerabilities which normally undermines the community and livelihoods of nations and

causes economic, environmental, and social impacts on the society. When drought occurs, food deficits become the order of the day, such that the food supply chain network is deprived of the food commodities moving along the network (Benson and Clay 1998:8). When there are not adequate supplies of food in the supply chain network the government is forced by the situation to source food resources from where ever it is available so that the nation is saved from starvation (CADRI, 2017).

Drought creates shortage of food supplies, as well as impacts on the community's day-to-day livelihood. According to Benson and Clay (1998: 8), the emergence of droughts affects man's ability to cope on their own, such that he ends up asking for a helping hand for survival. In addition to the above drought does not only affect people but also creates a multiplier effect of problems that transcends to various sectors of the economy, which in turn affects the food supply chain. It is on the basis of drought impacts on food supply chains that this study, therefore seeks to examine the impact of droughts that Zimbabwe experienced in relationship to the supply chain risk management strategies that the Zimbabwean government has used in distributing food and humanitarian aid to the disaster affected Zimbabweans.

3.2.1.1 The 1992 Drought in Zimbabwe

In 1992 Zimbabwe was struck by a severe drought, which was described as one of the worst disasters to affect Zimbabwe (Maphosa 1994: 53). This drought adversely impacted on the grain harvests, such that the Grain Marketing Board (GMB), failed to collect the planned 13, 000 tonnes of maize from the farmers. The tonnage received from the farmers was too little and only able to feed the Zimbabwean population with food for only two days (Gumbo 2006: 3; Maphosa, 1994: 53). The effects of the drought were also felt on livestock, as the drought left more than a million cattle dead. The impact of the drought affected Zimbabwe's social, environment and economic lives leading to the importation of food stocks by the government (Maphosa, 1994: 53). In addition to food shortages, the drought also affected the country's hydroelectric energy supply, at the Kariba hydroelectric power station, causing ripple effects on the operations of electric powered industries in the country (Gumbo, 2006: 3), such that agriculture based on electricity powered irrigation could not supply adequate food for the nation, thereby causing food supply risks in form of shortage in supplies.

3.2.1.2 The 1995-2008 Drought in Zimbabwe

In 1995, another drought affected Zimbabwe, at the same time the country was still nursing the wounds of the 1992 drought. This drought exposed the Zimbabwean population to further famine induced vulnerability, a situation that necessitated the government to declare the drought a state of disaster (Chigodora 1997:5). The declaration obligated the government to protect the public from the devastating drought impacts by providing food-aid. The food-aid provided by government came in three forms, namely, the grain loan scheme, food for work and free food for all programme.

The Grain Loan Scheme introduced a grain revolving loan scheme to beneficiaries who in normal terms would be able to pay back the grain loan in subsequent future years after securing a good grain harvest. According to Chigodora (1997), the Grain Loan Scheme was premised on the assumption that the following years after drought would realise bumper harvests and that beneficiaries would be able to pay pack the loaned grain to government.

The second type of loan scheme was the Free for all Food Programme (FFP), which was established to assist all vulnerable groups which included include widows, orphans, the elderly and the chronically ill persons and also those regarded very poor in the communities with no means of production were targeted. Free Food Programme also included the Child Supplementary Feeding Programme (SFP), targeted school going children, and was administered at schools, from pre-school, primary and secondary schools (Chigodora 1997:5). The last group of intervention was Food for Work Programme. The Food for Work Programme ensured that food-aid was distributed to communities and them in turn would work on developmental projects, such as roads rehabilitation, gully reclamation et cetera as seen fit by their village or ward development committees.

3.2.1.3 The 2015 to 2017 Drought in Zimbabwe

From the years 2015 till 2017, Zimbabwe and the surrounding Southern African countries were affected by another El Nino-induced drought (Southern African Development Community (SADC) and United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA) 2015:1). Critical water shortages characterised this drought, leading to starvation of both people, their livelihoods, flora, and fauna with thousands of cattle, succumbing to drought-induced deaths in the drought affected places (SADC Agromet Report, 2016:1). The ZIMVAC report notes that the 2016 drought heavily impacted on the rural population of Zimbabwe who

ordinarily have limited access to food. This resulted in a total of 2.8 million people facing food and nutrition insecurity in 2016, and in need of food-aid, to save their lives and also to allow them to further preserve their livelihoods in order to avert starvation (ZimVAC, 2016:10). In response to the disaster impacts the government and the other humanitarian stakeholders intervened by distributing the required food and non-food-aid, at the appropriate time and place to save lives (ZRCS, 2016).

3.2.2 Flood Disasters in Zimbabwe

Apart from droughts, Zimbabwe has also been affected by floods that have led to gaps in the supply of food resources in districts like, Muzarabani and Tsholotsho, Mwenezi, and Beit-Bridge (Gwimbi, 2009). International Federation of Red Cross and Red Crescent Societies report that in Muzarabani and Mbire Districts the wet season of every rainy season, spanning from January to March is often characterised by perennial flooding (IFRC/RCS, 2007). Flooding in these areas have a history of damaging built economic, social, and environmental infrastructure (IFRC/RCS, 2007:1). In the year 2000, cyclone Eline also left a wave of destruction on the environment in the South Eastern parts of Zimbabwe sweeping away people and their livelihoods. In February 2014, the Tokwe -Mukosi Dam that was under construction received more water because of torrential rainfall, resulting in the extensive flooding damaging the Tokwe-Mukosi dam (Betera, 2014:10). The Civil Protection Unit reported that 60 000 people were affected by these floods. Homes, livestock, and crops were washed away by the floods, resulting in the community requiring food assistance up to 2015.

Bote (2014), as cited by Chari and Ngcamu, (2016), reports that an additional 4 000 people, who resided downstream the Tokwe-Mukosi basin were at high risk of being swept away by the floods. The Civil Protection Department, in collaboration with both local and International organisations, enabled the government to evacuate the affected communities to safety at Chigwizi settlement area (IFRCRCS, 2014:1). In the process food and non-food items were distributed to the beneficiaries. Not much has been researched on supply chain of the humanitarian aid distributed to beneficiaries affected by the Tokwe Mukosi disaster. It is in light of these developments there is a research gap that need to be explored with regards to finding out how food and humanitarian aid is distributed in times of disasters of this magnitude.

3.2.3 Cyclones

Brown, Chanakira, Chatiza, Dodman and Zvigadza (2012) report that Zimbabwe has not been spared by cyclones like other parts of the world. According to Gwimbi (2009:16), the increase in the incidences of cyclones in Zimbabwe has been attributed to climate change. In the year 2000, Zimbabwe was hit by tropical cyclone, Eline. The cyclone caused flooding in the Zambezi basin, killing 700 people, rendering over 500,000 homeless (Gwimbi, 2009). Apart from causing loss of live to flora and fauna, the devastating cyclone also damaged social, environmental, and economic infrastructure, that include telecommunication networks, buildings, schools, clinics, roads, bridges, and power networks (FAO, 2000). The United Nations Country Team reported that the cyclone Eline caused damaged roads and also caused massive landslides in Manicaland. This blocked roads and made some parts of Manicaland Province inaccessible thereby rendering supply chain network challenges (UNCT, 2000).

3.2.3.1 Cyclone Japhet

In 2003, Tropical Cyclone Japhet so struck Zimbabwe and caused severe flooding in Guruve and Muzarabani districts (Madamombe, 2004:2). Approximately 237,000 hectares of crop fields were destroyed by the cyclone and almost 2,495 livestock got killed in south-eastern Zimbabwe and some parts of Mozambique. The cyclone made local communities vulnerable and in need of food-aid, which the government through collaborations with other humanitarian stakeholders and private sector organisations, rescued the communities to save human life and protect their livelihoods.

3.2.3.2 Cyclone Idai

The Zimbabwe Herald of March 2019 reports that Zimbabwe was struck by Cyclone Idai from 3rd March to 30 April 2019. The Civil protection Unit reported that the occurrence of the cyclone created an array of destruction in Chipinge and Chimanimani Districts of Zimbabwe. Reference of the cyclone has only been made here, although the disaster did not occur in the areas under study and did not have much to be written about.

3.3 Impact drought on the food-aid supply

Zimbabwean communities that live in ecological regions IV and V, namely Muzarabani, Mbire, Chivi, Chiredzi and Mwenezi Districts are perennially exposed to drought disaster. According to Benson and Clay (1998: 8) these regions annually receive the least annual rainfall that do not sustain meaningful crop farming.

Benson and Clay (1998: 8) also assert that the impact of droughts tend to spread throughout the economy by way of sectoral linkages and multiplier effects which result in disaster. Drought exposed Zimbabweans vulnerability in the form of famine and starvation, (Chigodora 1997: 5). The multiplier effects sectors of the economy. Drought also affected the country's supply of hydro-electric energy due to water shortages and reduced flows (Gumbo 2006: 3). Drought is known to create food shortages along the supply chain as the source is deprived of supplies. This is often followed by increased demand and supply induced inflation. When shortages of commodities become the order of the day in a community, some forms of risks present themselves in varying forms.

Floods and cyclones that affected Zimbabwe over the years have destroyed roads and built infrastructure affecting the supply chain network for general food and food-aid supply. The same scenario occurred in Malawi in January 2011, where some districts were not only accessed due to torrential rains, even after the floods had subsided (IFRC, 2012). The situation caused distribution delays, and this was far too late for relief aid to be of help to disaster victims.

3.4 Food-aid Supply chain risks

From the above, we have seen that disasters, namely droughts, floods, and cyclones highly impact on the physical food supply chain network. This as well disrupts the smooth flow of resource movement from point of source to point of consumption. Issues surrounding corruption and all forms of unethical behaviour surface wantonly in the food supply chain processes. Udbye (2014:43) argues that some of the supply chain risks mentioned above overlap with some operational organisational risks, such that what is destructive to a company's supply chain will usually spill over and cause negative financial and marketing consequences.

When disasters occur and shortages of commodities are common, risks occur in the supply chain from commodity sourcing up to final consumption of food-aid by the beneficiary. Along the food-aid supply chain transporters face multiple risks, in the form of road traffic accidents, thefts, delayed dispatches, fuel price hikes, shortage of vehicle spare parts and so forth (World Economic Forum, 2012). Mbohwa (2010:183) argues that food diversions are some of the supply chain risks associated with food-aid distribution. It is often reported that food diversions are common when food is being transported. At times transporters sell the food when on transit and shortages are witnessed on delivery at the FDP or warehouse destination. In some cases, if

the warehouse dispatch in porous and does not have strong systems to check on pilferage loaders connive with the transporter to steel bags of grains at the loading depot, and such grain would be sold some on the way before reaching the food delivery points, or during food-aid transit. These cases are common if transporters do not have vehicle and commodity tracking systems infrastructure to guard against commodity losses.

The food-aid being delivered is at times targeted by thieves, who steal with the intention to sell and profiteer from the loot. During these days when fuel has become so scarce, apart from steeling the food-aid thieves would also target to steal fuel from the vehicle delivering the food-aid. When this happens, there would be delays in reaching food-aid to the intended beneficiaries in time or in full as has been planned. A practice that is still not documented that was practised by CARE Zimbabwe was the creation of Village Food Distribution Committees. These committees were selected from the villagers by the villagers and assigned with the roles of receiving, recording, and providing for safe keeping of food-aid stocks until the food-aid is distributed to the registered beneficiaries.

Mbohwa (2010:183) cite the risk of risk of mismatch between supply and demand, of food-aid. In Mwenezi District, CADRI, (2017) reports that many roads were washed away by the floods, severely restricting access to affected communities, posing a supply chain management risk. In accessibility to disaster impacted areas delayed delivery of the much awaited and needed aid. When disasters occur, the help that the vulnerable society receives comes through the road or rail network and the road network connects all the areas of Zimbabwe. As disaster impacts on the road network, the bridges, culverts, and road shoulders are damaged and some washed away by the floods, such that vehicles cannot access the areas. Road disasters damage infrastructure injure and kill people as well as delay or lengthen the delivery lead times for effective food-aid delivery. Apart from delays created for the distribution process, food stuffs may be spoiled or contaminated by other products such as diesel fuel, chemicals, among others. The damaged food stuffs may be destroyed such that the beneficiaries would not be able to get their planned rations, or that there would be shortfalls in the quantity and quality of rations meant for the beneficiaries, (Mbohwa 2010).

Roads are the lifeline of Zimbabwean supply chain network. Road accidents lead to losses in humanitarian cargo being delivered and also loss of lives accidents. Road accidents are common disasters around the globe (Chikoto and Sadiq, 2012: 5). In this study not much is

going to be discussed on the road traffic accidents, as this would require its own research on the impact of road traffic accidents on food-aid distribution.

The effect of transportation risks on the upstream and downstream side of the food-aid supply chain can paralyze the ability of the government and humanitarian stakeholders in distributing food-aid. Giunipero and Eltantawy (2004), argue that transportation risks and their sources have the ability to paralyse the entire supply chain (Mohamed and Youssef, 2017:34). This real source of disturbance that can only be solved by strategically integrating with other logistics functions such as warehousing in order to verify its impact on logistics performance in the context of an emerging economy.

3.5 The relationship between food-aid, and supply chain risk management

There is a relationship between food-aid supply chain and risk management. According to Munro (2006:125), risks caused by droughts and floods impacts food resources and its supply chain. The Drought Relief Programme has been the government of Zimbabwe's strategy for reaching food supplies to disaster impacted Zimbabweans. Munro (2006:125) posits that "since the first post-independence droughts from 1982 till 1984, the Drought Relief Programme has been the Government of Zimbabwe's major response to drought-induced food crisis in Zimbabwe. Severe drought in several years, notably 1982-1984,1987, 1992 and 1995, impacted heavily on the livelihoods of the Zimbabwean rural population that led to drastic food shortages countrywide.

3.6 Food -Aid Distribution Legislative Framework in Zimbabwe

The provisions in the Constitution of Zimbabwe, the supreme law of the land, mandates the Zimbabwean government to protect its citizens from disaster occurrences and their impacts. It is the impact of disasters on the communities that the Constitution of Zimbabwe ascribes a duty of protection to its citizens from drought and floods induced starvation. The Government of Zimbabwe, like any other government in the world, is signatory to the World Disaster Reduction Framework, through subscribing to the dictates of the global frameworks Zimbabwe has enacted Acts and Policies to guide officials in fulfilling their Food-aid distribution mandate. Food-aid response mechanism is crafted into two legislative coordination frameworks in Zimbabwe, namely, The National Civil Protection Unit and the National Food and Nutrition Council (CADRI, 2017), that will be discussed in paragraphs to follow.

3.6.1 The Civil Protection Act (1989)

According to Mavhura (2016:607), Hyogo Framework of Action of 1995 has become the key tactical instrument for managing disaster risk at both national and local level in Zimbabwe. It is coming on board has complemented the works of the Civil Protection Act (Chapter 10.06) of Zimbabwe, by providing further buy in from the authorities. Chari and Ngcamu (2016:9), theorize that, the Zimbabwe government uses the, the Civil Defence Act of 1982 as the legal instrument in managing disasters.

According to the Zimbabwe Civil Protection Act No. 5 of 1989, the Minister of Local Government Rural and Urban Development is mandated by the state to overally coordinate all disaster mitigation strategies in Zimbabwe. The Act accords him the special powers to establish, coordinate and operationalise both the public and private emergency services, through a multisectoral and interdisciplinary approach to manage disaster impacts.

The Civil Protection Act (1989) mandates the government to protect its citizens from hazards of different nature and magnitude (CADRI, 2017:23). The Zimbabwean Civil Protection Act does not work in isolation but works with other Acts and Statutory Provisions, enacted by the Government of Zimbabwe (Chagutah, 2010). International legal frameworks like the Hygo and Sendai Frameworks have been adopted in Zimbabwe to map up strategies in managing disaster occurrences in Zimbabwean, becoming benchmarks in identifying, assessing monitoring disaster risks, and hence building a culture of safety and resilience on disaster impacted communities. Thus, this assisted Zimbabwe to create and strengthen Disaster Risk Reduction (DRR), mechanisms, at all levels of the country to include, national, provincial, district, ward, and village disaster risk mitigation strategies (UNISDR, 2009b:4).

3.6.2 The Civil Protection Unit (CPU)

The Civil Protection Unit was formed to principally provide optimal emergency preparedness and disaster prevention at the individual, community, sectorial, local authority, and national level. Section (41)(2) of the Civil Protection Act No.5 of 1989, mandates the National Civil Protection Coordination Committee (NCPCC) with the authority to carry out civil protection functions that include the provision of humanitarian aid and food security, health, Nutrition, social welfare. The authority also extends to the provision of search, rescue, and security, of vulnerable citizens soon after disaster occurrence. According to Betera (2011), Chikoto and Sadiq (2012) the Civil Protection Unit (CPU), is housed in the Ministry of Local Government,

Public Works and National Housing, to coordinate government ministries and departments, diplomatic missions, United Nations, and non-governmental organisations in managing disasters whenever a disaster occurs in Zimbabwe.

3.6.3 The PVO Act 17.05

The Private Voluntary Organisation (PVO) Act (17.05) is defined under section 2 of the Act as "anybody or association of persons, corporate or unincorporated, or any institution, the objects of which include or target at least one or more of the following objectives:

- to provide for the mental, physical, and social needs of families.
- to render charity to people or families in distress.
- to prevent social distress or destitution of persons or families.
- to provide assistance that uplifts the standard of living of persons or families.

In accordance with Zimbabwean laws any organisation that wants to work and carry out work as defined above must be registered by the Department of Social Welfare, under the Ministry of Public Service Labour and Social Welfare of Zimbabwe. Therefore, any Non-Governmental organisation to be operational in Zimbabwe, it has to register under the Private Voluntary Organisation Act (17.05). Most international organizations operate as PVOs and are supposed to have a direct memorandum of understanding or cooperation with the Government. Section 3 of the General Notice 99/2007 requires an international organization to file its application with the Registrar of PVOs. It is through operationalising the registration process of NGOs that the government can monitor and control their activities, and also to make sure that the NGOs only work on the mandates they have been registered for.

3.6.3 The Disaster Risk Management Bill (DRM)

CADRI (2017:26) notes that division of mandates amongst various institutions in disaster risk reduction management and disaster response, often create challenges in carrying out food-aid distribution interventions. This has also been compounded by shortage of skilled human resources, financial and technical resources. For this reason, a key recommendation emerging from this report is for the Government to consider bringing more cohesive in the built up of institutional architecture and coordination mechanisms for disaster risk management. The United Nations International Strategy for Disaster Reduction (UNISDR) adopted the Hyogo

Framework for Action (HFA), 2005–2015 with the intention of building disaster resilient national and local communities (UNISDR, 2005).

The acceptance of the framework by countries of the world led to Zimbabwe coming up with a Bill, the Zimbabwe Disaster Management Bill, which is yet to be formulated into an Act of Parliament (UNISDR 2009a; CADRI 2017:26).Governments are tasked by the framework to strengthen Disaster Risk Management (DRM) governance, through the implementation of contingency plans, like the disaster risk reduction (DRR) plans. When flood or drought disasters impact causes deficiencies in the food supply chain network making people vulnerable and susceptible to the risk of imminent death from starvation.

Kolen and Helsloot (2014), as cited by Mavhura, (2016:607) argue that DRR has two major challenges in their operation. Firstly, the occurrence of disasters generates an unusual threat for any community, and that, secondly, the challenges triggered by disasters are shouldered by local and central governments which already have weak legislations, (Mavhura, 2016:607). In situations where there is continual distribution of humanitarian aid and such communities are not weaned from being perennial beneficiaries, they also become a burden to governments, who alone are not able to support their operations and are facing a lot of challenges. The above-mentioned challenges have adverse effects on DRR measures developed to be mitigated as both pre- and post-disaster events.

3.6.4 The Drought Mitigation Strategy through Public Works

The Drought Mitigation Strategy document was a strategy document produced to address how the government intended to mitigate the effects of 2010-2011 drought in Zimbabwe (MoPSLSW, 2010:2). The planning and conceptualisation of disasters in Zimbabwe led to the birth of the Drought Mitigation Policy, (Chitongo, 2013:647). According to Chitongo (2013:647), the traditional approach to drought management in Zimbabwe has been reactive, based on crisis management as noted above. Suggestively, in this context disaster managers would only react after the occurrence starting from the beginning of the damage caused by the disaster.

This premise resonates well with the assertions that disasters in their phases lead to vulnerability. Thus, the Disaster Framework Model is instrumental in this study as indicated in chapter Two, because it guided this research on what is expected of the government and the

humanitarian aid actors in Zimbabwe in times of disaster occurrence. Further, it guides the government and the humanitarian actors in the formulation of policies and guidelines, which in turn informs the operationalisation of humanitarian interventions, such as food-aid distributions.

This has also been noted in the wake of disasters such as earthquake in Haiti in 2005, Japan earthquake, in 2016, Ghana drought in 2007 (Kovacs and Spens 2009). This approach has been ineffective because response is untimely, and resources poorly managed. In addition, drought response is post-impact and relief tends to reinforce the status quo in terms of resource management (Edwards and McKee, 1997). CADRI (2017:26) reports that the Disaster risk management activities in Zimbabwe are predominantly focused on response to disasters. The following are the Acts that the government has enacted, namely: The Social Welfare Assistance Act (Chapter 17.06), The Refugees Act (4.03), the National Policy on Drought Management and the Food deficit Mitigation Strategy.

3.6.5 Food deficit Mitigation Strategy (Policy)

In response to the Food insecurity of the 2009/2010 agricultural season, the government of Zimbabwe in partnership with Donors and the Humanitarian partners operating in Zimbabwe developed a Food Deficit Mitigation Strategy (FDMS, 2009). The FDMS is a four phased cycle of delivery assistance to vulnerable households and is guided by the following assumptions:

- That it is the responsibility of the Zimbabwean government to provide social protection to its citizens so that they can manage vulnerability associated with exogenous shocks.
- That since Zimbabwe is part of the international community, she can receive support from donor partners and support from donor partners is welcome to complement government effort.
- That to mitigate the effects of seasonal drought, the government of Zimbabwe will be complemented by the donor community.
- That the Grain Marketing Board (GMB) will continue to be supported to purchase grain locally.

The FDMS seeks to ensure that the effects of drought are mitigated on non-labour constrained households through public works, cash transfers and food for assets programmes .In addition to the above, the FDMS seeks to avail free food assistance to chronically ill, labour constrained older person headed household, and child headed households, in addition to increased food

access by non-resource constrained households through improved market distribution. Lastly FMDS intends to mitigate the impact of future food shortages through the rehabilitation of existing irrigation schemes. It is in the realm of the FDMS that the current food-aid distribution systems are hinged on and thus where all operational frameworks of distributing food-aid are guided from.

3.6.6 The Food and Nutrition Policy

Zimbabwe Agenda for Socio-Economic Transformation (ZimAsset), (2013:51) reports that the Zimbabwean government established the Food and Nutrition Council to create a self- sufficient and food surplus economy. The National Food and Nutrition Council (NFNC) was established and set to operate under the Office of the President and Cabinet (OPC). The Council was mandated to handle drought response issues, whilst the Metrological Services Department (MSD) assist the Council with the provision of early warning information on weather patterns to the citizens and also making the citizens aware of pending or incoming disasters (CADRI, 2017:39). Emergence of large-scale disasters require actors to convene and find solutions for the challenges created. When such events occur, the Humanitarian Country Team (HCT) always assists government respond to disasters, CADRI (2017:49) The Country Team has already established a humanitarian coordination structure consisting of several components to address humanitarian needs in times of disasters. The team consists of representatives of United Nations agencies, International Non-governmental organisations, (INGOs), such as The Zimbabwe Red Cross Society, World Vision, and the Diplomatic Missions in Zimbabwe. The HCT, in coordination with sector ministries and the DRR Committees to strategically manage disaster preparedness and response coordination. The Food and Nutrition council also works with ZIMVAC to determine the food needs of the communities in the country, (ZIMVAC 2013:51). The following paragraph looks at the main strategies that have been set and witnessed in food-aid distribution operations in Zimbabwe.

3.7 Supply chain risk management in food-aid distribution

Supply chain risk management is a field of escalating importance, in food-aid as it has assisted governments in developing strategies to identify, assess, analyse, and treat issues of vulnerability and risk in supply chains (Mohaghar *et al.* (2017.310).

As a strategy to manage and control the influx of NGOs in Zimbabwe, the government enacted the following acts and policies, namely, The PVO Act (17:05), the NGO Bill, The Food

Security Act, The Social Protection Act, the Food and Nutrition Act and the Civil Protection Act .The Acts and policies were adopted to assist the government in managing food and humanitarian aid processes. This was a good strategy that helped the government to mainstream governance in the food and humanitarian aid distribution processes in country. Challenges of unavailability of legislation governing food-aid distribution were witnessed in Uganda (Kovacs and Spens, 2009), a thing that Zimbabwe had already done. Although such legislative frameworks have been seen to be instrumental, there is still a gap on legislation that governs the importation of relief aid and also no linkages to humanitarian aid and customs operations procedures of Zimbabwe.

CADRI (2017:52) notes that although the Ministry of Public Service, Labour and Social Welfare has been given the coordinating mandate, the overall disaster response coordination it has been observed to be rather weak at community level, as a length of time is taken between food-aid request and food-aid delivery is very long. A long time is taken to reach food-aid to the communities and at times food-aid reaches the communities when it is already late, when some beneficiaries are already dead. In response to the above issue, the government has set up coordination meetings that are held monthly at district and ward level for the coordination of food-aid administration and distribution.

It has been observed that performing food-aid distribution is difficult because, individual risks created by disasters and supply chain risks are often interconnected, as a result actions that mitigate one risk ends up exacerbating another. Supply chains have become lengthier and more because of the advent of globalisation and supply chain integration in the business environment. Food-aid relief operations are said to be hampered by logistical such as, difficulties in organising or coordinating emergency response, disaster management policy (mitigation, prevention, and preparedness) (Mbohwa, 2010:177). According to Mbohwa (2010:183), WFP faces coordinating relief operations soon after the aftermath of disasters in Zimbabwe.

Wassenhove (2006:480) argues that the common elements present in any supply chain of getting the right goods at the right time to the right place and distributed to the right beneficiaries are still applicable in the humanitarian context and is always a complex task to set up an efficient supply chain system in the aftermath of a disaster as humanitarian organisations have to deal with several interventions on a global scale and often concurrently.

Chapter Two gave a snapshot of the challenges of lack of information and communication technology (ICT). It has been noted that unavailability of Information Technology hampers the transmission of data and information required for the implementation of holistic food-aid distribution.

According to Kilubi (2016:9) supply chain risks are interweaved in a way. They are characterised by having one mitigation strategy alleviating other supply chain risks. A common example might be, bundling demand reduces anticipated risks, such as inventory and capacity risks (Kilubi, 2016:9). Considering that the occurrence of disasters brings in difficult circumstances, such as the typical lack of resources, puts pressure on people, leading to high stress levels and also the need to invest in learning about disaster mitigation and the need to improve the situation through planning and implementation of a number of strategies explained below.

3.8 Supply chain risk management strategies in Food-aid Distribution in Zimbabwe

The following are strategies that have been employed in Zimbabwe to ensure food-aid reaches the intended beneficiaries.

3.8.1 Disaster Preparedness Planning

Chitongo (2013:646) posits that disaster preparedness planning have been seen as instruments of mitigating disaster induced vulnerability in Zimbabwe. These disaster risks have been mitigated through food-aid distribution and food-aid supply chain risk management. Planning helps stakeholders to be better prepare for managing disaster risks as adequate planning equips stakeholders with concepts and ideas that enable them to build up mechanism for managing the underlying hazards. Hagman (2004), as cited by Chitongo (2013:646) further notes that, through planning stakeholders are better prepared to meet the disaster and also to come up with solutions to disaster impacts.

3.8.2 Coordination and collaboration strategies of food-aid distribution

The Civil Protection Act of Zimbabwe sets the tone for coordinating disaster mitigation efforts in Zimbabwe. The Act accorded the Minister of Public Service, Labour and Social Welfare the mandate to coordinate all disaster mitigation activities in the country. Through the use of the government of Zimbabwe created the Drought Mitigation Strategy and the Food Deficit

Mitigation Strategy as tools for use in the joint and collaborative coordination of food-aid distribution in Zimbabwe. Kilubi (2016:14) underscores the importance of collaboration strategies in enhancing the ability of the supply chain to promptly respond disaster impacts. According to Rajesh, Ravi, and Rao (2015), coordination improves the capability of suppliers and other humanitarian stakeholders in performing their functions.

Hallikas *et al.* (2004) concur with Speier *et al.* (2011), that Joint planning and coordination motivated the efficacy enhanced by the works of cross-functional teams, who jointly solved supply chain risks in the food-aid supply chain (Kilubi, 2016:13). In addition, to the above the Joint management teams comprise experts, who are able to share or transfer risks through outsourcing and closing flexible contracts (Manuj and Mentzer, 2008b; Sinha, Whitman, and Malzahn, 2004). The World Food Programme (WFP) in Zimbabwe has been seen at the lead agency of the Logistics cluster amongst the humanitarian agencies in disaster relief operations, collaborating with the government, private sector, non-governmental organisations and the military to improve efficacy in disaster food-aid distribution (Mbohwa 2010: 192). According to Mbohwa (2010), The World Food Programme (WFP) has experienced all supply chain risks associated with disaster relief operations in, and outside Zimbabwe, such that the organisation brings with it valuable experience if distributing food-aid in disaster ravaged environs.

Thevenaz and Resodihardjo (2010) as cited by Mbohwa (2010:177) argue that the response phase of disaster management, lays great emphasis on search, rescue, to sustain or save lives and restoration of community self-sufficiency. The government through national and local communities have put in place the following strategies common to all humanitarian aid stakeholders that include government, non-governmental organisations, private and public-sector organisation.

3.8.3 Provision of Reliable Transport and warehousing services

The government uses the absolute transportation strategy to reach beneficiaries with food-aid. Government uses its transport department called the Central Mechanical and Equipment Department (CMED) to offer transport services for government related transportation systems. In cases where normal routes cannot be used, alternative routes have been used. Air droppings and use of rail networks have been used when the beneficiaries cannot be easily reached.

Mbohwa (2010:176) reports that because of flood disasters road networks have been adversely damaged. This was made worse because most of the rural roads previously serviced by District Development Fund (DDF), have not been adequately serviced had deteriorated due to financial challenges and lack of adequate fuel supplies between the years 2000 and 2016. Poor and damaged roads were found to be a major problem, in reaching food-aid to the intended FDPs and also contributed to the lengthened lead times between loading trucks and the actual distribution of food-aid. This propelled WFP, to take up the initiative of Food for Assets programme aimed at repairing some of the roads, in order to hasten faster and early delivery of commodities. In some cases, WFP had to reopen some of the roads previously closed due to physical deterioration, as reaching out to beneficiaries in remote areas was a mammoth task. In areas like Muzarabani which when impacted by floods, the huge distance between wards and the poor road network hampers effective response, and as such the government uses air force helicopters as a supply chain risk management strategy.

Since the Hoya River bridge was destroyed by cyclone Eline in 2000, villagers in Mutemakungu area had to travel between 15 and 25km to the nearby Hoya Business centre to collect their food-aid rations during food-aid distributions. In Mbire area, when it is raining, villagers from Makuvatsine village will not receive food-aid rations as the Hambe river cannot be crossed, because it has no bridge and normally food-aid is kept at Mahuwe township where the tarred road from Guruve ends. The air force by use of their helicopters provide a very fast response, although it will often have to deal with competing demands. As a transport strategy, The Civil Protection Act does allow for Government officials to commandeer vehicles and other resources during a disaster situation, (CADRI, 2017:52).

Poor documentation and insufficient reports on disaster impacts and food-aid requirement have been cited as supply chain risks prevalent in disaster mitigation CADRI (2017:53). These risks often lead to shortages of supplies as the figures used to request food-aid would not be giving the correct information on the ground. Inaccurate figures falsify records that donors might also be willing to receive, and see, so that they know exactly the value of their donations being supplied. In Bulilima and Mangwe Districts CADRI (2017:53) reports that there is no proper registration and demographic information breakdown of affected population, is full of discrepancies from community to local authorities and as such incorrect information was reported about the number of affected people and to their specific vulnerabilities.

According to Chopra and Sodhi (2004:54) information distortion leads to affected supply chain visibility and exaggeration of demand due to supply shortages and Increasing visibility and transparency helps continuous replenishment of stocks and collaborative planning.

Chopra and Sodhi (2004:54) argue that risks arising from micro disturbance events in the supply chain, disturb the efficient physical flows of food-aid between the various partners in a supply chain and whose source of disturbances does not include types of natural disasters. As a strategy humanitarian organisation can resort to subcontracting when they do not have adequate transport to move the food-aid. WFP mainly relies on sub-contracted transport for the distribution of the relief aid, much of which WFP has no control over the vehicle. In times of fuel shortages, WFP has to advance transporters fuel, a cost they would recover from Transporters' invoices at payment stage (Mbohwa, 2010:183).

Provision of adequate vehicles for distribution of food-aid ensures that food quickly and timeously reach the intended beneficiaries in the expected lead times. Most of the vehicles used to ferry food-aid like the 30tonner trucks also affect road networks as they also damage the poorly constructed roads. Smaller vehicles that could navigate badly damaged roads are ideal as a strategy to move food-aid t areas that bigger trucks cannot access. Delivery as one strategy adopted between WFP and the Department of Social Welfare, saves the community of its valued and precious time as the food-aid from both the government and the donor community is saved only once per month that having two or more distribution days lined up for the same beneficiaries in the same constituency twice or three times a month.

In addition to the above this also save fuel and manpower resources used in the delivering of food-aid. Apart from the saving of resources, coordination and relationships are cemented as this brings in cohesion between the government and the non-governmental organisation, dispelling mistrust between the two and creating an atmosphere of professionalism. Reliance on subcontracting, has been common in Zimbabwe since WFP did not have a fleet of lorries to transport food-aid (Mbohwa 2010). Sub-contracting and the use of external suppliers were also quite popular, but these also provide substandard delivery although handy. A disaster affects a supply chain by affecting one or more of its components. These components are either internal or external to the supply chain and can be classified as belonging to the following realms or contributors to the functioning of the supply chain (Stecke and Kumar, 2009).

3.8.4. Visibility and Transparency

Baster, Campos and Bandeira (2013:1180) confirm that information was instrumental in carrying out proper food-aid distribution despite the fact that the floods had destroyed, all built infrastructure, and the affected areas could not receive food-aid because of inaccessibility. Good examples poor communication and network challenges are provision of inadequate documentation relating to transportation, that are often produced electronically cannot reach the place they are wanted to be if there is lack of ICT infrastructure. In Muzarabani, Mbire and Masvingo and most other districts, there is network coverage provided by Net-One Econet and Telcel (Ministry of Information Zimbabwe). This often results in delays, in moving food-aid shipments and lengthening the lead times for the delivery of the food-aid. This also leads to inefficiencies and inadequacies in reporting producing poor and raw reports. As a strategy, "public awareness campaigns" on seasonal hazards (wet and dry season) are conducted regularly before the onset of each respective season using both electronic and print media. The main aim of the exercise is to minimize risks /hazards associated with the season. "People might know what disaster, hazards or risks are typical in their respective communities, but they may fail to act accordingly. For instance, community members may still be forced to chop down trees to use as firewood because they have no alternative sustainable sources of fuel,"

It has been noted the country over that disaster awareness campaigns are also limited, with limited preparation such that a reactionary action is usually taken after the disaster has already occurred, e.g. cholera or malaria outbreaks in the hard-to-reach wards. In order to improve the campaigns and knowledge awareness platforms WFP carries our pre-distribution meetings and also conveys distribution campaign information through the local community leadership such as the ward councillors and the village heads.

The visibility strategy entails the use of robust ICT equipment and Disaster communication strategy to communicate and report on disasters. According to Kilubi (2016:13), transparency and visibility enable stakeholders to communicate audibly. Visibility and transparency can be enhanced through the sharing of information using Information and communications systems and equipment (Speier *et al.* 2011; Thun and Hoenig, 2011). Information and data required for the adequate assessment and response to disaster events, is necessary for funding sources, and also relief distribution. The transmission of information from information is used a high level of transparency is necessary (Hendricks and Singhal, 2012). Byrne (200), Sheffi and Rice

(2005), as cited by Kilubi (2016:13) argue that mobile devices have been used in Kenya to transmit information in humanitarian aid, a thing new to Zimbabwe as none of these items have been used in food-aid distribution. During disasters or soon after disaster occurrences, information and communication infrastructure is often damaged leading to information and communication challenges.

3.8.5 Redundancy and Prepositioning of food-aid stocks

A supply chain management strategy that the government of Zimbabwe has established was the creation of redundancy and prepositioning of stocks of food at both national provincial and district structures for beneficiaries of Social Welfare fund (GoZ Social Welfare Act 17:06). As a strategy the country must also keep grain stocks within its reserves and in terms of legislation, in 1996, The Grain Marketing Board Act (18:14) mandated Grain Marketing Board to reserve around 500000 metric tonnes grain equivalent as strategic reserves to cushion the country during emergencies (CADRI, 2017:39).

The Grain Marketing Boards has depots country wide, that keep food stocks and it is from where the social welfare beneficiaries collect their food rations monthly at planned designated places (GMB Act 18:14). Apart from the GMB keeping stock reserves, WFP also keeps stocks to distribute to vulnerable people (WFP, 2005). This case is unlike in Ghana were even WFP, World Vision and the government keeps food-aid stocks to distribute during disasters but wait for donations, (Kovacs and Spens2009). At times, the Department of Social Welfare transports the food-aid rations in government provided vehicles for the vulnerable groups of people. In order to distribute adequate quantities of the food rations, pre-planned beneficiary and registration processes take place prior the actual food-aid distribution, followed by the actual physical verification of the beneficiaries as a pre-monitoring exercise to ascertain the correct targeting and selection of the beneficiaries as per a predetermined criterion set up by government.

CADRI (2017: 50), reports that there are no permanent warehouses at national, provincial and district level. The Department of Valuation and Estates Management in the Ministry of Local Government, Public Works and National Housing provides office accommodation to government institutions. This includes provision of warehousing facilities for the Department of Civil Protection (DCP), for storing relief supplies at national, provincial district, ward, and community level, despite them being prone to vandalism. According to Mbohwa (2010:183),

such warehouse and distribution facilities meant to store food-aid were often vandalised and contents stolen, hence creating food-aid shortages for the beneficiaries. To complement government effort in decentralising food storage deports in provinces and districts, The World Food Programme (WFP) has also set around depots or warehouses that stock food items in and around the country (Mbohwa 2010). Currently WFP has depots in Harare, Masvingo and Bulawayo, holding food-aid stock for distribution should there be an emergence that requires food-aid distribution.

According to Mbohwa(2010),The United Nations World Food Programme in Zimbabwe only keeps strategic stock positions in their warehouses in Harare, Bulawayo and Masvingo. The strategic stocks are meant to serve as the buffer stocks used for initial distribution when emergence crisis strikes before the other humanitarian Country Team assembles resources for distribution to disaster beneficiaries. According to (Kleindorfer and Saad, 2005; Rajesh and Ravi, 2015; Rajesh, Ravi, and Rao, 2015; Schmitt and Singh, 2012), as cited by Kilubi (2016:14) holding of safety stocks or redundancy (inventory) is an excellent alternative to increased storage costs, risk of obsolescence, capital waste caused by internal surplus stock, and protecting from unforeseen disruptions and demand variance caused by disaster occurrences.

The WFP Harare warehouse covers distributions to all districts and provinces in Mashonaland, whilst Masvingo covers Masvingo and Midlands Provinces and Bulawayo covering all Matabeleland Provinces including Bulawayo. The redundancy and prepositioning of food-aid stocks, as well as the establishment of Grain Reserve depots around the country is a strategy that the government of Zimbabwe has been using since time immemorial. The Ministry of health in collaboration with the World Food Programme (WFP) established a central warehouse in Harare and Bulawayo, for the distribution of therapeutic feed for malnourished children. (Chimedza 2010,) In addition to this the distribution of drugs and food-aid for HIV and AIDS patience is also distributed network, (Chingono and Mbohwa 2012).

3.8.6 Multiple Sourcing and distribution strategy

When disasters occur, supply of required food commodities is over stripped by demand, often causing a shortfall in the provision of supplies. At times, the governments fall short of resources to distribute to needy and vulnerable societies impacted by disasters. In order to get resources, coordinated appeals are used to source for food and humanitarian aid (UNCT). Noting the large

gap on resources in rebuilding roads and bridges damaged by flooding, the UN Resident Coordinator appealed to friends of Zimbabwe for their support in the ongoing rehabilitation efforts (CADRI, 2017). On 17 May 2017, The United Nations Central Emergency Response Fund (CERF) committed USD 1.6 million to assist over 32,600 flood-affected people with life-saving shelter, water, sanitation and hygiene and protection in 20 districts in Zimbabwe.

At times, the local market is reached to provide the required supplies but, on most cases, the local market is overwhelmed and other external markets such as provincial, regional, and global markets are reached when demand is not met. Global sourcing as a strategy reduces the risk of failure to provide supplies that people want. Kilubi (2016:14) notes that the use of both multiple and global sourcing strategies assures the nation of adequate supplies of food-aid commodities, as well as the implementation of flexible contracts can be another way to reduce supply chain risks by using alternative suppliers. Global sourcing also saves the donor fund in the provision of resources on a cost-effective basis. Knemeyer, Zinn, and Eroglu (2009); Ritchie and Brindley (2007a, 2007b); Thun and Hoenig (2011) concur that if one vendor drops out because of quality or other delivery problems, at least, one other supplier will still be available to ensure that the delivery of required food-aid is available whilst maintaining slack in utilisation.

In addition to the above, Mwenezi, Chiredzi, Mbire and Muzarabani districts do not have prepositioned emergency relief items and rely mainly on donations from the private sector or aid agencies should disasters occur (CADRI, 2017). It was also reported that in some parts of Chiredzi, Muzarabani and Mwenezi districts some communities are often cut off during or after flooding and also because of bad and inaccessible roads. No institutionalized early warning system for flood water run-off exists in upstream neighbouring districts (IFRC, 2015).

3.8.7 Alternatives to Food-aid distribution

When disasters occurs, donations of various forms pour into a country and various forms of aid are supplied (Kovacs and Spens, 2009). In addition to the above, some of the donations received in kind are not in synch with what was required at a given time, for example rice donations, were received, rather than the required maize or cereal grains, and also that some donations were in adequate resulting in the implementation of food rationing, or use of cash and vouchers (WFP, 2005). Such receipts require a holistic distribution framework. In some cases, the aid that is received is not appropriate to a certain culture flowing into the beneficiaries. At times ports of entry are full of commodities, some of which never requested and some already expired

food stuffs. Such risks need to be controlled. As such the government set out strategies such as the Ministry of Agriculture act on agricultural (food-aid) imports where some types of foods are not allowed into the country. Yes, people need food-aid, but not all forms are acceptable as per country standards.

According to Makumbe, Linganiso and Karodia (2014:2), the past decade has witnessed the World Food Programme (WFP) assisting millions of food-insecure Zimbabweans by distributing food-aid, reaching peak levels in 2009 as a result of hyper-inflation and shortages of food and other commodities on the market. During this time one of the greatest challenges that WFP faced was overcoming the lead time between receipt of donations and subsequently occurring of disasters after appeals were made (WFP 2005).

Makumbe *et al.* (2014:1), note that the a few years ago, the World Food Programme (WFP) has transitioned from food-aid to food assistance, leading to the introduction of three modes of humanitarian aid disbursement modalities in the form of; in-kind food distribution, cash and voucher transfers. This study revealed that there is no one right transfer modality. According to Makumbe *et al.* (2014:2), the relative effectiveness of the three different modalities depended heavily on contextual factors that include, the severity of food insecurity in the economy, the functioning of markets for grains and other foods. Harvey (2005) as cited by Makumbe *et al.* (2014:2) proponents of cash and voucher-based humanitarian, argue that these approaches are cost-effective and timely, and allow recipients greater choice and dignity, as they provide beneficial knock-on effects on local economic activities.

Assistance given in the form of cash need to be monitored so that the beneficiaries spend the money on the recommended commodities. In this case the few respondents who received cash indicated that they all used it for the intended purpose. Cash can be spent on non-essential items, such as alcohol or cigarettes. However, individuals and households appear to make careful and strategic decisions about how to use this additional income for the best interests of the household (SCUK *et al*., 2005: 27). The potential effect of injecting cash into the market is an increase in prices of goods, affecting both beneficiaries and non-recipients of the cash transfer (Harvey, 2005). However, in-kind aid can also distort the market: food-aid can depress the local price of food, thus hurting local producers (Makumbe *et al.*, 2014:13).

3.8.8 Establishment of Disaster Monitoring and Management Strategy

At times people need to be given advance warnings as to the occurrence of disasters so that they plan ahead. The Zimbabwe Meteorological Services Department (MSD) usually gives rainfall forecasts, working in collaboration with the Department of Civil Protection Unit contingency plans have already been put in place to curtail the disaster impacts in cases of disaster occurrences, though limited resources draw back the implementation of proactive measures through awareness campaigns (OCHA ROSA, 2014: 6).

3.8.9 Insurance

Insurance reduces individual loss exposure thus spreading risks by collecting premiums from many individuals and paying for damage caused by natural disasters that is very large for individual households and companies. WFP requires transporters to have Goods in Transit Insurance (GIT) before they are contracted to transport food-aid (WFP). The transporters will insure against loss of commodities whilst in transit, and no transporter is awarded a contract to transport food-aid if he does not have a valid Goods in Transit Insurance specifically for carrying food-aid.

When warehouses dispatch food-aid quantities to a predetermined number of beneficiaries, all the food-aid should reach the beneficiaries and all the registered beneficiaries should receive food-aid. Food-aid shortages normally occur due to attack by pests, pilferage, stock contamination, deterioration, and accidental damage to food-aid. In order to maintain the quality of food-aid WFP contracts superintendence firms to check and manage quality of food-aid and also insurer food-aid against accidental losses due to varying forms of risks .In addition to the above, WFP contracts Transporters with a valid In Transit Cargo insurance, to insure against losses incurred when food-aid cargo is in -transit. I have also witnessed cases where on steep roads, some thieves would offload grain stocks from moving vehicles travelling uphill or downhill at low speed. This also causes losses to quantities of food-aid due for distribution. Kovacs and Spens (2009) argues that this has been instrumental in safeguarding humanitarian aid commodities, and also ensuring that the beneficiaries are not short-changed in receiving their entitlements.

3.8.10 Resourcing Humanitarian Staff as a strategy

Most people in charge of Humanitarian Logistics and WFP Implementing Partners were found to have no formal training in Logistics (Mbohwa, 2010:183). Many people were said to have

started their careers with a background of Accounting, Social Sciences, Development Studies, Agriculture or Law. A few had corporate experiences of logistics management that had nothing to do with disaster management and food-aid distribution.

Chingono, and Mbohwa (2010:184) cite that human resources implementing humanitarian aid suffer skills shortage in addition to lack of vendor support systems that often integrate WFP's beneficiary database's system to supply chain risks associated with disaster and relief operations in Zimbabwe. In addition to the above, political interferences in food-aid distribution has also been cited as a major food-aid supply chain risk. The moment a disaster is politicised, like the Tokwe Mukosi disasters, there was no free entry to the disaster-prone areas and the communication process for reporting and sourcing of donations is crippled. A need assessment-based staff development programme has been developed; however, it is hampered by lack of funding.

3.8.11 Outsourcing, Procurement and Flexibility

Governments as major humanitarian aid stakeholders may not have more than adequate resources to assist disaster struck communities alone. They may have vehicles, human and capital resources and strategic plans that are invoked when disasters occur, but they are not adequate as disaster requirements often outstrip current and existing budgets, such that governments are often overwhelmed by the emergence of even minute disasters. In such cases flexibility as a strategy if often adopted to enable the government to acquire additional capacity to fight disasters and their impact. Flexibility helps organisations build responsive processes to respond to any external changes, (Kilubi, 2016:14).

Outsourcing has been seen as another way to increase flexibility. Services are outsourced to third party service providers to enhance flexibility and reduce strain on available resources. Choi and Krause (2006), as cited by Kilubi, (2016:14) argue that the use of outsourcing as a supply chain strategy that has been observed to increase the flexibility of supply chain management operations external providers bring in extra capacity and proficiency in addition to the available scope. Outsourcing as a strategy has been used by WFP in Zimbabwe to source for implementing partners and transport operators as well as warehousing and superintendence services.

The institution of ethical procurement is a supply chain risk management strategy. It also looks at holistic and professional sourcing and handling of all goods and services acquired, in a transparent manner. Donations received, and commodities bought for the beneficiaries must not be diverted for personal use. Thus, ethical procurement as a strategy is meant to shun corruption and misuse of resources intended for the vulnerable. To buttress ethical conduct in procurement, the government has introduced the Public Procurement Act that all state enterprises as well as the government should follow and perform their procurement functions in line with the confines of the new public procurement guidelines.

3.9. Impact of supply chain risk management on food-aid distribution

The disaster mitigation strategies in the form of supply chain risk management strategies were generally not effective in reducing food shortages and hunger, in disaster impacted areas (Mushore *et al.*, 2013:105). It has been observed that recurrent drought and shortage of food supply and delays in food commodities supply exacerbate rural poverty. Delays in food-aid distribution can be lessened by prepositioning stocks, although at a cost. Thus, the cost benefit analysis of positioning food stock needs to be weighed against transporting food-aid from major warehouses. If food-aid distribution works in tandem to food for work projects, this also assists the communities in developing their areas, especially if work is carried on road rehabilitation, to make the area accessible. In addition to the above, implementation of supply chain risk management strategies enhances the performance of food-aid distribution.

When Non-Governmental organisations and the government provide food hand-outs in times of need, this creates dependency syndrome amongst households (Mushore *et al.*, 2013:105). In order to make the rural households not be dependent on free hand-outs, the government introduced the Food for Work Programme, in which able-bodied and fit young man and women work to receive food hand-outs. Food for work activities, though not sustainable due to lack of integration and cooperation among stakeholders and the households need to be aligned to community development and road network maintenance to improve supply chain networks.

3.10 Conclusion

Chapter three discussed the common types of disasters, whose occurrences have caused vulnerability amongst Zimbabweans hence calling for food-aid distribution. It also focused on the supply chain risk management strategies and the legislative framework used by the Government of Zimbabwe and other humanitarian stakeholders in food-aid distribution in

Zimbabwe. Notable among the strategies were established legislative Acts enacted to provide a smooth flow of humanitarian aid towards satisfying beneficiary needs. The following Chapter addresses the research design and methodology of this study.

CHAPTER FOUR

Research Design and Methodology

4.1 Introduction

This chapter discusses the research methodology undertaken throughout this research towards fulfilment of the research objectives stated in Chapter 1. The chapter provides an overview of research philosophies and discusses the research strategies and methods of data collection used in this research. The rationale behind the choices made on the research approaches, and data collection methods is discussed.

4.2 Research Philosophy

The philosophical underpinning for the research methodology are drawn from the philosophy of pragmatism. Research philosophy is defined by Saunders, Lewis and Thornhill, (2007:101) as "a belief about the way data about a phenomenon should be collected, analysed and used. Walliman, (2011) and Galliers (1991) concur that there are two forms of research philosophies namely positivist and interpretivist. According to Walliman (2011:175) positivism is "an epistemological stance that maintains that all phenomena, including social, can be analysed using scientific method, and can be measured and, analysed if only one knew enough, the causes and effects of all phenomena could be uncovered.

Therefore, based on the above, this research took a Positivist approach to gather and analyse data. Positivism is a research approach that seeks to gather and analyse data using the quantitative methods in a structured way. Interpretivism, also known as phenomenologist, relates to the provision of useful insight into how human beings understand their own situations. The two philosophies can work independently but when combined they form a paradigm called pragmatism, (Saunders, Lewis, and Thornhill, 2009: 119). Both these paradigms were applied as the study used the mixed method to gather data.

4.2.1 Positivism

Positivism is an organized way of doing research based on observable facts. Babbie (1995: 48) argues that positivism goes beyond the measurement of rational human behaviour, as the human beings seek to identify or quantitatively measure and evaluate any phenomena and to provide rational explanation for it (Neville 2007:6). According to Walliman (2011: 21), positivism aims at developing a unique, real, and sophisticated description of any chosen aspect

that is accurate regardless of what people think; it builds facts on what is already known. It is from the realm of the above assertions that this research is going to adopt the positivist attitude in collecting and analysing data. Considerations by Walliman (2011), on the assumptions around fixed, measurable, and knowable realities around reality are appreciated. The positivism paradigm is appropriate for such type of study where the research findings from various districts can be generalized to different situations.

However, the major weakness is that it is limited in understanding social processes such that supply chain and disaster issues that are qualitative may not be captured. Such descriptive issues that need verbal description are obtainable from the participants through interviews and observations rendering the positivism paradigm inadequate for this research. This way of doing research also analyses the steps the study has taken in positively evaluating the laws and policies logically driven by the provision of food-aid in Zimbabwe.

4.2.2 Interpretivism

Interpretive approaches are particularly concerned with understanding behaviour from the participants' own subjective frames of reference (Neville, 2007:6). According to Galliers (1991:55-64) interpretivist researchers assume that reality constantly changes and can be known only indirectly, through people's interpretations. Respondents accept the possibility that there are multiple versions of reality. In order to improve on validity and reliability, although the main thrust of this research is based on positivism, it will be partly blended with the interpretivism as insight in the respondent's experience is sought to qualify the findings of the questionnaires.

Walliman (2011: 21), posits that, interpretivism maintains the view of the world that we see as a creation of the mind based on our perceptions as well as influenced by our preconceptions. One strategy supported by advocates of this approach is paying attention to common sense, as it provides useful insight into how human beings understand their own situations and enables the researcher to introspect on how people construct and understand their situations intuitively (Mason 1996:6). Interpretivism has therefore, become an inadequate slant as some issues to do with disaster risks are quantitative and have created gaps in the way mankind understand them. Interpretivists come up with personal and detailed hence they may not be generalised. The weaknesses of interpretivism and positivism paradigms rendered them inappropriate for this

research leading the researcher to apply pragmatism. This study has adopted interpretivism as the researcher intends to integrate human interest in the way food-aid is distributed.

4.2.3 Pragmatism

Following the inadequacy of the positivist and interpretivism paradigms, this study followed the pragmatic approach. The pragmatists seek to adopt a position that is real, useful, and relevant in the world, (Saunders *et al.*, 2009: 119). The pragmatic philosophical worldview accords the researcher the freedom to gain meaningful, realistic insights in food-aid distribution operations in Zimbabwe. The mixed methods approach enabled this researcher to choose suitable methods that provided solutions to specific research questions, aligned to a specific research model. With the pragmatic paradigm, words, pictures, and narratives were used to add meaning to quantitative data while numbers were used to add precision to words, pictures, and narratives (Johnson and Onwuegbuzie, 2004). This researcher was able to get answers for a wide range of research questions because of the use of various research paradigms. In addition to the above this study also seeks to evaluate whether the current beliefs of people in need of food-aid are really pragmatic compared to the actual events happening on the ground.

4.3 Research design

The research design is the conceptual structure within which a research is conducted (Kothari 2004). In this study, the exploratory design was used to gather data for the research, because of the advantages that it offers to researchers. Sekaran (2003) posits that the use of exploratory design enables the researcher to gather primary and secondary data on the topic under discussion timeously and cost-effectively at minimum cost. Exploratory research uses questionnaires and interviews, to collect data from respondents.

The use of interviews enabled the researcher to gain deeper insights and understanding into supply chain challenges and strategies used in managing food-aid supply chain flows. Interviews go hand in glove with observations. According to Sekaran (2003:119).One of the advantages that it offers is that it is quicker and less biased method of exploring and gathering of primary and secondary data. A part of the exploratory design face to face interviews will be used to complement the gap that will be left by the questionnaire as the interviews will further investigate the supply chain strategies used to manage food-aid supply risks. The advantage of this investigative strategy is that it is flexible and adaptable to new dimensions or change direction as provided by the new data (Sekaran, 2003; Stake, 1995; Saunders, 2003).

In addition to the above the researcher adopted the descriptive design in the data gathering process. The descriptive design enabled this researcher to gain meaningful insights into the food-aid supply chain management strategies employed by the government and other humanitarian stakeholders in distributing food-aid to intended beneficiaries. The researcher utilised observation notes and interview transcripts to record proceedings from qualitative data gathering. The researcher partly relied on observation to assemble a comprehensive description of the impact of the supply chain risks in food-aid distribution. According to Walliman (2011), the use of observation techniques in carrying out semi-structured interviews, is ideal in filling the gap left unanswered by the questionnaires.

In addition to the extraction of information on how humanitarian stakeholders are managing containing and addressing supply chain risks. This further qualified some of the respondents' assertions the questionnaire will produce. Accordingly, this research being exploratory and scientific in nature as was strengthened by complementarities from the qualitative methodologies that increased reliability on the findings of the questionnaire. This resonates well with Walliman (2011) who posits the importance observation complements reliability and completeness of data.

In order to enhance reliability and completeness of the collected data, the researcher used the triangulation technique to complement research questionnaire with observations and interviews. The triangulation approach allows combining the best of both qualitative and quantitative methods and overcoming their weaknesses providing a more complete understanding of the research problem (Saldanha and O'Brien, 2014; Creswell, 2014: 17).This research adopted a mixed methodology (Quantitative and qualitative) approach to cross-check on information from the two different approaches, based on the premise that no single method will adequately solve problems emanating from various explanations that are rivalry in nature (Cohen, Manion and Morrison, 2007). The mixed research method combined the best of both paradigms thus overcoming the weaknesses of each approach. The use of mixed research methods enables the researcher to increase the reliability and validity of the research instruments, as well as providing the most complete or insightful understanding of the research problem (Creswell, 2014: 4). Creswell and Clark (2007: 30) argue that the quantitative approach makes use of closed questions that relate variables to each other. The interviews were

recorded on site as the researcher made visits to the districts to meet the District Disaster Relief Committee members.

4.4 Research methodology

The researcher instituted a two-phase method to gather data from the respondents. In the first instance a research questionnaire was administered followed by the personal interview process. These two methodologies are discussed separately in this chapter. In phase one, data was collected using a quantitative approach in which government stakeholders and humanitarian workers were requested to complete a questionnaire. Once all the questionnaires were gathered and interviews done then the data was analysed, and research findings published in chapter five.

4.5 The Research Instruments

The research instruments are the tools researchers use to obtain data or information on a topic of interest under investigation. The following research instruments will be discussed, namely, supply chain risk management questionnaire, interviews, and observation. A series of a five Likert structured questions were asked in the questionnaires and responses were chosen from five options given. The researcher self -administered the questionnaires allowing him time to clarify any unclear areas and issues of ambiguity the respondents might have with some of the questions. This researcher pleaded with some of the respondents to participate in the research in order to have a high response rate (Walliman 2011: 71).

4.5.1 Supply chain risk management questionnaire

A five-Likert scale designed questionnaire was used, collect responses from the respondents. The questionnaires were self-administered to allow the researcher ample time to understand the contents of the questionnaire to clarify any doubts and ambiguity arising from the research instrument that the respondents might have, emanating from some of the questions. In order to have a high response rate this researcher had to convince the respondents that the research was meant for academic purposes and would not be used against them for divulging information to strangers. According to Walliman, (2011:71), some respondents need to be persuaded to participate in the research.

4.5.2 Interviews

According to Kahn & and Canell, (1958) as cited by Saunders et al., (2007:310) defines an interview as ‘purposeful discussion between two or more people’ There are three types of

interviews normally used in research, viz; 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 from the members of the District Drought Relief Committees. An interview schedule was used on all the targeted respondents, where the same 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 105 humanitarian stakeholders that include Government officials, representing the District Drought Relief Committees, whose selection was based on the experience and knowledge in dealing with food-aid in the districts under study. The level of involvement of the interviewees resulted in the generation of rich data.

In-depth one-on-one interviews were conducted with members of the District Drought Relief Committee (DDRC), comprising of the District Administrator, (DA) The Social Welfare Officer, the Police, NGO representatives, and some WFP Logisticians operating in the districts. The above mentioned officers were instrumental in giving the accurate information on food-aid operations as they are the people mandated by the state to implement food-aid and humanitarian relief programmes in their districts as enshrined in the Food Deficit Mitigation Strategy Framework and also the Local Government Management Framework**.** To obtain facts and descriptive information, the researcher asked questions and recorded responses on a voice recorder. There was room for probing and clarification and responses were assured to be from the correct source with the requisite knowledge on food-aid supply chains. The verbal interactions assisted in obtaining quality responses and accurate data. The structured interview followed the chronology of the interview guide so as to avoid deviation from most of the research study. The challenge with these face-to-face interviews was that some respondents especially government employees felt uneasy about the anonymity of their responses (Sekaran and Bougie 2009: 233). However, the respondents were assured that the interviews were purely for academic purposes and the identity of respondents was protected. Observations of non-verbal cues from the respondents were also noted.

4.5.3 Observations

This researcher adopted the observations technique during the administration of the questionnaires and interviews to increase the reliability of this study. Observations were used

because they gave access to situations and elements that were not captured by questionnaires and interviews. Natural observer strategy was employed to allow for observations of the appearance of materials, buildings, plants, and animals (Walliman 2011: 101). Observations were carried on the subjects being interviewed and also on the physical environment, so as to enable the researcher to have a true picture of the impact of risks on the food-aid supply chain network. The observation process also took place when the researcher was talking to respondents and also in studying the terrain and environment in which food-aid passes through till it reaches the final beneficiary. This was done to understand the challenges encountered in sourcing, through to the distribution process of food-aid to beneficiaries and also to cross tabulate the findings with strategies already implemented. Observations enabled this researcher to gather a wide range of data to achieve the objectives of this research.

The researcher also made observations during visits to Chiredzi, Chivi, Masvingo, Mbire Mwenezi, Muzarabani, Zaka, districts Department of Social Welfare, District Councils and the GMB depots to capture some of the disaster risks encountered in the distribution of food-aid. This also assisted the researcher to capture some of the disaster risk reduction measures being implemented by the government and other humanitarian stakeholders in food-aid distribution operations. During interview process, this researcher took voice recordings of the proceedings which were used as evidence of the effects of disasters, preventive and preparedness measures.

According to Walliman, (2011: 101) use of video or photographs can be used to provide evidence of data collected. This researcher identified the variables to be observed and was able to collect in-depth information about disaster risks, their impact on disaster risks on food-aid supply chain and disaster risk reduction strategies resulting in strong validity of observational research findings in all the seven districts under study. Normally data obtained from observations is more reliable and freer from respondent bias (Sekaran and Bougie, 2009: 253). The researcher made brief notes while observing the appearance of the food-aid storage facilities and trucks that are used to ferry food-aid as they appeared and after completing the observation detailed notes were made in narrative form (Kumar, 2011: 135).

4.6 Data collection procedures

This researcher sought permission from the Ministry of Public Service, Labour and Social Welfare (Department of Social Welfare), The Ministry of Local Government, through the Provincial and District Administrators offices, NGOs such as Care Zimbabwe Plan

International and The Zimbabwe Red Cross Society. The researcher distributed a total of One hundred and forty questionnaires to Humanitarian stakeholders. Appointments were made with government officials and non-governmental organisations staff through telephone and through the District Administrators offices in the seven districts. The researcher explained, to the respondents, the importance of answering truthfully and assured them of confidential treatment of information gathered. The interviewer-administration of questionnaires to the humanitarian stakeholders was fast and responses were instantly gathered.

4.7 Target population

Kolb (2008:192) defines a population as a group of elements which share similar characteristics defined by a researcher. For the structured questionnaire, this researcher's target population was made up of 105 humanitarian stakeholders who constitute the District Drought Relief Committees in the selected seven districts in Zimbabwe, namely Chiredzi, Chivi, Masvingo. Mbire, Muzarabani, Mwenezi and Zaka as shown in table 1, below. The population of this study were selected by default based on their functions and varying skills in the development structure of their organisations in the districts.

4.7.1 Population Size

Population is a group of elements that share the same characteristics as defined by a researcher (Kolb 2008:192).In this study the target population was 105 Humanitarian Aid workers comprising of government workers, civil society (NGOs) and United Nations personnel dealing with food and humanitarian aid distribution in Zimbabwe.

4.7.2 Sample Size

This researcher used a sample size of 80% of the Humanitarian Aid stakeholders. The sample size was reached at by using the Krejcie and Morgan (1970: 607) model. The model simplified sample size decision by providing a table that researchers use to determine a sample size when all the factors are considered. After deriving the sample size, it was divided using proportional allocation for the six selected milk producing regions. Response Rate/Percentage: Expected to receive 100% of responses from the respondents.

Singh (2007:102) defines sampling as a “process of selecting suitable units’ representative of the population from which it is taken for the purpose of determining parameters or characteristics of the whole population”. According to Singh (2007:115) “sampling is done to

achieve at least two brad activities, namely, to estimate a population parameter and to test a hypothesis. Sample size plays an important role in determining how closely the sampling distribution represents a normal distribution.

Non-probability sampling was selected for this research. Kothari (2004:59) asserts that non-probability sampling does not create room for estimation bias for the population and postulates that each item in the population has equal chances of being included in the sample. According to Kothari (2004:59), non-probability sampling is also known as deliberate sampling, purposive sampling, and judgement sampling. In this type of sampling, objects for the sample are consciously chosen or deliberately selected by the researcher; his choice regarding the items remains supreme. Based on the above attributes, non-probability sampling method was used in the selection of respondents to the questionnaire.

The following respondents who have profound knowledge and experience in food-aid distribution were selected as interviewees, namely, District Administrators, District Council Chief Executive Officers, Logistics Officers from World Food Programme, and staff from the Department of Social Welfare Officers (responsible for Drought Mitigation). At least an average of 15people constituted the DDRC, as indicated by the provision of the Food Deficit Mitigation Strategy document, (MOPSLSW 2010).

The researcher used Purposive sampling, as it allowed him to reach a targeted sample quickly and subjects were selected based on their expert knowledge and involvement in food-aid distribution, as members of the District Drought Relief Committees within their district of operation. The humanitarian aid employees chosen were expected to have expert knowledge by virtue of having been in the business for a long-time and are well positioned to provide reliable data. The purposive sample of the humanitarian aid workers assisted this researcher to collect data about food-aid supply chains that was pertinent and relevant to the study and helped avoid collecting irrelevant data without value to the study

Table 4. 1:Composition of Research Population.

Composition of the District Drought Relief Committee	**Designation**	**Number per District**	**Grand Total for 7Districts**
Ministry of Local Government, Public Works, and National Housing	Chair	1	7
Ministry of Public Service Labour and Social Welfare	Secretary	1	7
Ministry of Women Affairs	Member	1	7
Ministry of Health and Child Care	Member	1	7
Ministry of Primary and Secondary Education	Member	1	7
Ministry of Transport and Infrastructural Development	Member	1	7
Ministry of Finance and Economic Development	Member	1	7
Grain Marketing Board	Member	1	7
NGOs-FAO, WFP, Red Cross, Care, Plan, LGDA, etc.	Member	2	14
Zimbabwe Republic Police & President's Department	Member	2	14
District Council	Member	2	14
Ministry of Home Affairs (ZRP)	Member	1	7
Total Population		**15**	**105**

Source: MOPSLSW (2010)

Sekaran and Bougie (2009:285), concurs with the above that purposive sampling technique, enables the researcher to deliberately choose respondents who have the appropriate information to address the research topic. As such the respondents, from the list in the table above, were chosen on the merit of the rich information they possessed required for the study under review. The purposive sample was done through identification of the respondents that were directly tasked by the government of Zimbabwe to manage drought relief and food-aid operations at district level. The above people also responded to the questionnaire whose structure id detailed below.

4.8 Content of the structured questionnaire

The questionnaire consisted of four (4) sections that included, demographics ,supply chain risks, supply chain performance measures and supply chain strategies used in managing risks along the supply chain network, and described as follows;

Section A: Demographic Information:

This section covered questions on demographic information, with regard to participant respondents' gender, age, experience level of education and location. The purpose of that information was to establish if there is a relationship between biographic data and prevalence of disasters, impact of disasters, disaster risk reduction strategies and the effectiveness of disasters reduction strategies.

Section B: Supply Chain Risks.

The section looked at a list of possible food-aid supply chain risks in Zimbabwe. Questions in this section dealt with risks that affect the food-aid supply chain.

Section C: Supply Chain Performance Measures.

Impact of supply chain risk management on food-aid distribution was discussed in this section.

Section D: Supply chain risk management as a strategy.

In this section the questionnaire gathered information on the five sets of strategies used in food-aid supply chains in Zimbabwe (Flexibility, prepositioning, stock management, insurance, financial, and governance). The effectiveness and challenges of strategies were explored.

Both qualitative and purposive questions were used to check on validity of the questionnaire through the administration of the face to face interview questions.

4.9 Reliability of data

The Cronbach Alpha test was adopted by this researcher to test if the research questionnaire was reliable after having been subjected to reliability and validity tests. According to Sekaran and Bougie (2009: 205), the Cronbach Alpha is "a system used to test the reliability by conducting tests to measure internal consistency and reliability of the research instrument". The results that are produced indicate that "the higher the co-efficient; the more reliable the research instrument is or vice versa". Cronbach's Alpha values greater than or equals to 0.70 are considered appropriate for social science data, (Sekaran and Bougie, 2009: 205).

4.10 Validity of data

In order to ensure the validity of data collected, the research carried out a pilot study in six of the districts under investigation. The activity carried out is supported by Saunders *et al.* (2009: 146), who posit that the essence of carrying out a pilot study is to ensure that the questionnaire is in line with any issues raised by the respondents participating in the pilot study, as well as testing the perceived validity and reliability of the questionnaire. The processes carried out were a pre-test of the actual research data collection exercise. Walliman (2011:175) defines a pilot study as "a pre-test of a questionnaire or other types of surveys on a small number of cases in order to test the procedure and quality of responses. "In order to test the procedures and quality of responses of the questionnaire, a pilot study of the research instruments was carried out in Chiredzi, Chivi, Masvingo, Mbire, Mwenezi and Zaka districts. Carrying out the test for face validity of the research instrument during the pilot study allowed this researcher to make corrections on ambiguous questions as well as typographical errors in the questionnaire. A total of 30 respondents were used in the pilot survey in order to avoid the problem of ambiguity of the questions. The 30 respondents were divided equally amongst the districts receiving food-aid.

The pilot survey was used as a guided basis for testing content validity. This researcher also tested the content validity of the research instruments to determine whether the full content of a construct is represented in the measure or are some dimensions left out. Content validity ensured that the questions in the questionnaire were in line with the scope and aims of the study. Walliman (2011:178) describes validity as "the ability of the information to correctly draw conclusions from the situation under discussion using the rule of judgement" and being able to measure what it is supposed to measure. Expert judges will participate in the examination of the content validity of the research instruments to come up with content validity ratio (Sekaran and Bougie, 2009: 206). The pilot test and content validity ratio led this researcher to determine whether the instruments in this research were valid and reliable or not.

4.11 Ethical principles and considerations

This researcher was honest throughout the research process to give credibility to the outcomes of this study (Walliman 2011: 43). All sources of ideas, concepts, theories, used in the thesis, were acknowledged. This researcher also sought informed consent from participants so that they choose freely whether to participate or not in the survey (Walliman, 2011: 43; Sekaran and Bougie, 2009: 260). From the above, the researcher notes and respects that consent must

not be a product of force or manipulation that involves undue inducement but must be voluntary.

The researcher developed an informed consent form and acknowledged that participants' rights have been protected during data collection and participants were required to sign before they engage in the research. Participation was purely voluntary, and participants were asked to sign voluntary consent forms. The information given by participants shall be treated as confidential to guard the privacy of the participants (Sekaran and Bougie, 2009: 259-261).

This researcher sought for permission, from the Ministry of Public Service and Social Welfare (Department of Social Welfare), and also from the Ministry of Local Government, and Publics Works' Provincial Administrators Offices in the Provinces and districts, to carry out the study. Permission was also sought to access information from gatekeepers in the Humanitarian Sector. In addition to the above informed consent was sought from participants so that they could choose freely whether to participate or not in this research (Walliman, 2011: 43; (Sekaran and Bougie, 2009: 259-261). The information gathered from the participants was treated as confidentiality, to guard the privacy of the participants (Sekaran and Bougie, 2009: 261). Where possible the researcher had to protect the identity of participants (Creswell, 2014: 74) by using pseudonyms. This allowed participants to contribute freely to the study as well as disclose all necessary information that is pertinent to this study.

4.12 Data analysis and interpretation

Qualitative data collected from in-depth interviews with District Social Welfare Officers, The Zimbabwe Republic Police (ZRP), Humanitarian stakeholders and District Administrators was analysed according to various themes and patterns emerging from the objectives of this study. These themes were as follows; supply chain risks prevalent in Zimbabwe, supply chain risk management strategies used in the management of food-aid supply chains and impact of risk management as a strategy on performance of the food-aid supply chain.

Quantitative data analysis of questionnaires will be carried out using STATA (version 16). Descriptive and inferential statistics were used in analysing data. Descriptive statistics enabled this researcher to analyse and derive useful information such as percentages, frequencies mean and standard deviations. Inferential statistics are used to infer something about the population from which the sample was drawn based on the information summarized in the descriptive

statistics. Inferential statistics will be used to measure the impact of strategies on food-aid distribution in Zimbabwe. During data analysis and interpretation, the researcher, as far as possible, provided an accurate account of the data collected. At all costs, the researcher was not found engaging in any scientific misconduct such as suppressing, discriminating, or misrepresenting any information to suit his needs or those of participants. Ordinary Least Squares (OLS) regression and co-variate as well as multiple regression analysis will be done. The OLS regression's disadvantages is that it provides inconsistent estimates of the parameters as the population increases. The Tobit model was used to test the robustness of the models.

4.13 Conclusion

This chapter described, in detail, the research design and methodology used in this study and gave justifications for the choice of this research design and methodology. The data collection instruments were explained and described. The study was carried out using a mixed approach which employed both quantitative (semi-structured questionnaires) and qualitative (observation and interview schedules) methods. The quantitative method used questionnaires administered on humanitarian stakeholders and the quantitative methods used involved conducting interviews and observations with food-aid. The reasons for using both qualitative and quantitative methods were elaborated. Chapter five focuses on data analysis, presentation, and discussion of the research findings.

CHAPTER FIVE

Data analysis presentation and discussion

5.1 Introduction

This study assesses the effects of supply chain risk management strategies in food-aid distribution in Masvingo Province, Mbire and Muzarabani Districts of the Zambezi Basin in Zimbabwe in order to improve efficiency and effectiveness of the supply chain in disaster management.

Various statistical techniques are used to substantiate the findings, including correlation, Ordinary Least Squares (OLS) and Principal Component Analysis (PCA). Stata Version 16 software was used to run the analyses. The analysis of this study is structured in a way that attempts to answer the following objectives of this research:

- To explore risks prevalent in humanitarian food-aid supply chain distribution in Zimbabwe.
- To establish supply chain risk management strategies that have been employed to address supply chain risks.
- To assess the relationship between supply chain risk and food-aid distribution efficiency in Zimbabwe.
- To assess the effectiveness of supply chain risk mitigation strategies in achieving efficiency in food-aid distribution.

This data presented in this study is intertwined with data analysis and the discussion. In addition to the above, Literature cited in Chapters 2 and 3 was used to support, confirm, or reject the findings from the data collected and presented in the form of tables.

5.2 Sample description and response rate

The population under consideration was derived from the members of the District Drought Relief Committee (DDRC) as enshrined in the Drought Mitigation Strategy Document (Ministry of Public Service and Social Welfare 2009). The average size of the DDRC is 15 people representing government departments and NGOs operational in the district under study. Thus, the survey respondents were purposively sampled and given questionnaires to complete. The following Table5.1, outlines a synopsis of the sample descriptions and response rate in all the districts under study.

Table 5. 1: Sample Descriptions and response rate

Study Area	Number of questionnaires distributed	Number of correctly completed questionnaires	Response rate
Chiredzi	15	12	80%
Chivi	15	12	80%
Masvingo	15	10	67%
Mbire	15	12	80%
Muzarabani	15	13	87%
Mwenezi	15	13	87%
Zaka	15	10	67%
Total	**105**	**82**	**78%**

A total of 105 questionnaires representing fifteen (15) questionnaires were distributed to each of the seven (7) districts shown in Table 5.1. Out of the 105 total questionnaires distributed, 82 were correctly completed and returned, giving an overall response rate of 78%. While there are no strict rules on response rates, at least 70% is generally regarded as acceptable. A rate of 78% is high enough. Masvingo and Zaka had the lowest response rates (67%) while on the other hand, Muzarabani (87%) and Mwenezi (87%) had the highest. Given a range of 67% - 87% for the response rates, the study responses can be judged to be representative of the opinions of the respondents in each of the areas. The following table shows the response rate for each of the districts. Thus, the overall response rate underscore the fact that, this study comes in during the establishment of the Second Republic in Zimbabwe, where the political landscape is quite charged. This environment brings out issues of food-aid distribution, and the partisan supply chain risk management in food and humanitarian aid distribution were the right to food-aid, choice, participation to which political parties dominate in areas of study. Thus, as said above, this would also affect the response rate to the questionnaire on the study on food-aid distribution. From the analysis, it can be noted that food-aid supply chain is pinned on political affiliations despite the Government's directive that food-aid is for all deserving vulnerable citizens. On issues of responding to the research questionnaires, the researcher sensed that some of the respondents did not like responding to the questionnaire because of fear of political reprisals that emanates from the point that political minefields make people reluctant to talk to strangers.

5.2.1 Response on Supply chain risks

The majority of respondents (57%) strongly agreed that operational risks had been affecting food-aid distribution in their area, 27% agreed, 9% expressed neutrality, 6% disagreed while 2% strongly disagreed. Respondents gave largely similar responses for governance risks as for operational risks, save that the proportion of those that disagreed was 50% lower for governance than operational risks. Most of the respondents (63%) strongly agreed that environmental risks affected the distribution of food-aid in their area, 29% agreed, 5% were neutral, 2% disagreed while the remaining 1% strongly disagreed. In summary, there was a high level of agreement and very low levels of strong disagreement with the notion that operational, governance and environmental risks affected how food-aid was distributed in their area of operation.

Table 5. 2: Descriptive Statistics for Supply Chain Risks

	Level of agreement				
Supply chain risks	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Operational risks	57%	27%	8%	6%	2%
Governance risks	58%	27%	10%	3%	2%
Environmental risks	63%	29%	5%	2%	1%

5.2.2. Response Rate on Supply chain risk management strategies

The results in Table 5.3: reveals that 87% of the respondents at least agreed that the flexibility strategy had a significant impact on how aid is distributed to disaster victims in their area of operation, 9% were neutral and 4% at least disagreed. For the prepositioning strategies, 49% strongly agreed that the strategy had a significant impact on food-aid distribution, 34% agreed, 11% were neutral, 5% disagreed and 1% strongly disagreed.

On the impact of the collaboration strategy, a very high proportion of respondents agreed that the strategy affected the allocation of food-aid (92%). There were similar levels of agreement for the financial and insurance strategies, with approximately 50% strongly disagreeing, about 40% agreeing, approximately 10% neutral and the remainder disagreed or strongly disagreed. Over 60% of the respondents strongly agreed that the governance strategy had an impact on food-aid allocation, 25% agreed, 10% were neutral, 1% disagreed and 2% strongly disagreed.

Overall, very high proportions of respondents agreed that supply chain risk management strategies had a strong impact on the distribution of food-aid. The highest level of agreement was on the collaboration strategy while preposition had the lowest. For the flexibility, collaboration and financial strategies, no respondent strongly disagreed that the strategies had no impact on the allocation of food-aid to disaster victims.

Table 5. 3:Descriptive statistics for scrm strategies

Supply chain risk management strategies	**Level of agreement**				
	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Flexibility	46%	41%	9%	4%	0%
Prepositioning	49%	34%	11%	5%	1%
Collaboration	71%	21%	7%	1%	0%
Financial	48%	40%	10%	2%	0%
Governance	62%	25%	10%	1%	2%
Insurance	50%	37%	9%	2%	2%

5.3 Reliability analysis

The Cronbach's alpha coefficient was used to calculate and measure the internal consistence and the reliability of the questionnaire, including various the scales used in this study. According to Ciudad-Gómez and Valverde-Berrocoso (2014), most commonly accepted lower limit of Cronbach's alpha is 0.7, and scales with higher reliability are more preferred to those with lower scores, whilst scales with a lower number expectedly have lower coefficients than those with more items. In this study the results, presented by each of the coefficients is higher than 0.70, which demonstrates that the items in each of these scales are correlated. Thus, the reliability in these scales is sufficiently high that further analysis can be done with these scales. Appendix A.9 summarises the alpha coefficients for each of the scales in the study.

5.4 Background characteristics

The demographic profile of the study respondents is summarised in Table 5.2. Sixty percent (60%) of the respondents were male while the remaining 40% were female. The majority of the respondents were in the 31 – 35 year age group (56%) while those aged less than 25 years were the least prevalent (4%). Almost 2 in 3 respondents were educated to degree level, with only a few having professional certificates (2%). The results in Table 5.2 also indicate that

experience in humanitarian food-aid varied widely, with the single largest group having between 6 and 10 years' experience (39%) and over 20 years for the smallest group (1%). These results imply that the respondents were sufficiently educated and experienced to provide valuable insights into the study. The average proportion of respondents from each of the targeted areas was 15%, with Muzarabani and Mwenezi being marginally more than average while Masvingo and Zaka were below average.

Table 5. 4: Background characteristics

Dummies	Variable	Mean	Standard deviation	Min	Max
Gender dummy	Gender (0 if Male, 1 if Female)	1.40	0.493	1	2
Age dummy	≤ 25 years	0.04	0.189	0	1
	26-30 years	0.10	0.299	0	1
	31-35 years	0.56	0.499	0	1
	36-40 years	0.18	0.389	0	1
	≥ 41years	0.12	0.329	0	1
Education dummy	Professional certificate	0.02	0.155	0	1
	Professional Diploma	0.29	0.458	0	1
	Degreed	0.59	0.496	0	1
	Post graduate qualification	0.10	0.299	0	1
Experience dummies	<6 years	0.22	0.416	0	1
	6 - 10 years	0.39	0.491	0	1
	11 - 15 years	0.27	0.446	0	1
	16 - 20 years	0.11	0.315	0	1
	21 years and above	0.01	0.110	0	1
Region dummies	Chiredzi	0.15	0.356	0	1
	Chivi	0.15	0.356	0	1
	Masvingo	0.12	0.329	0	1

	Mbire	0.15	0.356	0	1
	Muzarabani	0.16	0.367	0	1
	Mwenezi	0.16	0.367	0	1
	Zaka	0.12	0.329	0	1

Based on the occurrence of disasters, the research sought to establish whether supply chain risks and disasters had an impact on food-aid distribution efficiency. Descriptive statistics for food-aid distribution efficiency are summarised in Table 5.5 below. Surveyed respondents agreed that the right quantity and quality of food-aid is distributed to the beneficiaries as shown by the lowest mean scores of 1.463. In addition, they affirmed that delays in food-aid distribution were reduced. One of the Senior Principal Social Welfare Officer lamented that "*…efficacy in the distribution of food-aid depended on many facets, namely, availability of food, aid, financial resources, motor vehicles, trained manpower et cetera. The department is understaffed and normally there is only one person to man the district. Apart from carrying out Social Welfare activities, the same officer does the logistics of food-aid distribution. Secondly, the government only distributes grain, and no other supplies such that this makes the distribution inadequate. In as far as transport is concerned, the department does not have vehicles to transport grain to the beneficiaries and at times communities are asked to provide money or transport to ensure that their food-aid is delivered."…there is in place a policy framework that guides the implementation of food-aid distribution exercise in all provinces and districts but lack of human and financial resources to implement the distribution hampers everything. Secondly there is no harmonised policy that forces government agencies to work together ,and as such department or agencies seem to compartmentalise their programmes,say,Department of Agriculture ,Department of Social Welfare and the Department of Community development in varying ministries seem to work on their ministry mandates although working on the same subject matter in the same district. This alludes to policy inadequateness creating governmental operational gaps."*

There were higher levels of disagreement with the responsiveness of humanitarian agencies when there are variations in demand (mean score of 1.768). Respondents also disagreed that government is flexible and able to respond to variations in demand (mean score of 1.878). The variability in respondents' opinions ranged from 0.689 for the availability of the right transport for delivering food-aid to 0.967 for the distribution of food-aid to the rightful beneficiaries.

Interviews from two Programme Officers from NGOs doing food-aid distributions concurred that "…*New beneficiaries identified this month will receive their entitlement two or three months after being identified. This follows a proves of vetting and verification for eligibility as a beneficiary, thus following the registration process also causes delays and inflexibility in the process of determining supply chain efficiency*."

Table 5. 5:Food-Aid Distribution efficiency descriptive statistics

Variables	Mean	Standard Deviation	Min	Max
Right quantity of food-aid is distributed to the beneficiary	1.463	0.706	1	4
Right quality of food-aid is distributed to the beneficiary	1.463	0.804	1	5
Delays in Food-aid distribution are reduced	1.598	0.783	1	4
Availability of up to date beneficiary registers	1.646	0.961	1	5
Food-aid distributed to rightful beneficiaries	1.683	0.967	1	5
All Food Distribution points are accessible	1.692	0.916	1	4
Right type of transport is available to deliver food-aid	1.659	0.689	1	4
Government flexibility and ability to respond to variations in demand	1.878	0.961	1	5
Humanitarian agencies ability to respond to and accommodate variations in demand	1.768	0.920	1	5

5.5 Risks prevalent in humanitarian food-aid distribution in Zimbabwe

This section discusses the supply chain risks prevalent in humanitarian food-aid supply chain distribution in Zimbabwe. Since the Likert scale was used in the study, it is important to note that higher scores imply a higher level of disagreement with the given statement. Thus, the most prevalent risk is one with the lowest mean score. The risks were subdivided into three categories, namely, operational, governance or political, and environmental risk as informed by literature on supply chain risks.

The items which comprise operational risk are summarised in Table 5.4. The most prevalent risk in this category was theft, followed by shortage of warehouses, shortage of storage facilities, poor information, transportation risks and contamination of food. Variability in the responses was generally uniform, with the exception of food-aid contamination which had the highest variance.

Table 5. 6:Operational Risks prevalent in food-aid distribution.

Variables	Mean	Standard deviation	Min	Max
Shortage of storage facilities	1.65	0.986	1	5
Transportation risks	1.68	0.941	1	5
Pilferage/theft	1.59	0.874	1	5
Poor and inadequate Information	1.68	0.873	1	4
Shortage of warehouses	1.63	0.854	1	5
Contamination of food-aid	1.95	1.285	1	5

Shortage of the following resources, namely, transport, warehouses, storage facilities and information resource constraints render collaboration ineffective. The Social Welfare Department lamented the lack and shortage of transport to transport food-aid to the various distribution points across the country. One Principal Social Welfare Officer said in an interview that, *"... transportation is a major challenge as it is difficult to get the required transport to service the dirt roads that have been severely damaged by disasters and also by lack of service due to shortages in resources.* This is in concurrence with the results of the studies in Darfur region ,where because of lack of resources, such as warehouses, transport et cetera, and knowledge on coordination and collaboration ,most government personnel did not have adequate skills and capacity to manage disaster relief, making it difficult for the government to implement humanitarian aid distribution and also prevented the implementation of effective engagements between government and NGOs in collaborative initiatives (Yagub 2014: 570).This is further explained by Oloruntoba and Gray (2006: 116) that "lack of planning in humanitarian supply chains results in inefficiencies, such as poor pre-plan stocks, congestion at warehouses caused by unplanned deliveries, and poor information management and uncoordinated inter-organisational collaboration for information systems". On issues of food-aid contamination , the information gathered from a number of logistics officers during the interview not that *"...food-aid is contaminated normally on transit as at time if not properly*

checked by inspectors at food loading bays transport that has been used to ferry hazardous substances may also be used to carry food-aid there by putting the food-aid at risk of being contaminated, On several occasions trailers that have been assigned to ferry food-aid ,having been used to carry sulphur and other hazardous substances have been returned back from Beitbridge WFP warehouse so as to guard against contamination of food-aid…"

Operational risks also include poor coordination of resources. In disaster settings as the number of parties increase, they also need to be coordinated. This resonates well with the assertions by Murray (2005) Long and Wood aver (1995)that "lack of coordination is a risk that often leads to confusion at the last mile distribution of humanitarian aid, because there are so many different agencies ,suppliers and different actors with their own different ways of operations and structures in managing food-aid distributions (Kovacs and Spens 2009:103).

Table 5.8 shows the items which make up governance risk. The most prevalent risk in this category was bureaucracy in government operations while the legal framework for food-aid distribution was the least prevalent. Prior studies have shown that the functionality and operations of NGOs in Zimbabwe is often stifled by unfriendly government policies (Brown et al. 2012: 19). Bureaucracy and political partisanship in food-aid distribution had the least variance while the remaining variables had approximately the same variation. In terms of bureaucracy government runs the show, it is the government that registers all non-governmental organisations, controls food-aid distribution operations, gives a go ahead for non-government players to operate in certain areas and also manages the import of all food-aid relief, such that no organisation can source food-aid for distribution without government clearance and blessings. Interview with an officer in Muzarabani pointed out that *"... there are some politically influential people who influence the food-aid distribution to be drawn along political party lines, opposition supporters are denied food-aid ,and this is contrary to government policy,… affected persons do not also report to the police in fear of being further victimised.* "The above assertions are also backed by literature that

"Some politically influential individuals use their own political influence to drive policy decisions to their own advantage in order to get benefits they reap from government programmes" (Mudimu 2003: 5). This finding is statistically valid and is in line with previous studies such as da Coster et al (2012:605) in their study in Brazil, and also confirmed a similar study on coordination in humanitarian supply chains in relief settings by Balcik et al. (2009:29)

where the authors recognise the important role played by the legal framework in influencing transport and operational costs that are instrumental in implementing and managing disaster supply chains.

Table 5. 7:Governance risks prevalent in food-aid distribution

Variables	Mean	Standard deviation	Min	Max
Political partisanship informing food-aid distribution	1.65	0.894	1	5
Politics (Bureaucracy in Government operations)	1.48	0.724	1	5
Corruption	1.57	0.917	1	5
Inflexibility of humanitarian organisational structures and policies	1.79	1.027	1	5
Laws and regulations governing food-aid distribution	1.7	1.002	1	5

Environmental Risks have also been noted to be a hindrance in the supply of food-aid. Damage on the environment affects the movement of food-aid commodities from source to the final beneficiaries. In Mwenezi one interviewee mentioned that "*…damages caused by floods destroy the road networks, built infrastructure, factories, industries, communication networks such that the whole supply chain is dysfunctional. In Mwenezi, on most cases soon after the rains Matetsi is not reachable and often the marooned villagers are isolated from other communities…"*Environmental risk encompassed excess demand, poor road network, disruption risks and damaged infrastructure as shown in Table 5.9. Excess demand had higher variability when compared to the rest of the variables.

Table 5. 8:Environmental risks prevalent in food-aid distribution

Variables	Mean	Standard deviation	Min	Max
Damaged infrastructure	1.43	0.770	1	4
Disruption risks	1.46	0.632	1	4
Excess demand	1.56	0.931	1	5
Poor road network	1.52	0.741	1	4

According to Chopra and Sodhi (2004:54), disruptions that happens on food-aid supply flows anywhere in the supply chain are unpredictable and rare but often quite damaging on the environment. So, the effectiveness of supply chain risk mitigation strategies on disruptions should be undertaken to achieve efficiency in food distribution. Increased incidences of disaster on environment causes shortage of products and impacts on industry to affect the supply chain of products. According to Chari and Ngcamu (2016) disaster risks in Bangladesh led to serious losses in the dairy industry and also reduced the supply of milk products to near shortages and productivity in the dairy industry. The results are consistent with those by previous scholars (Anseeuw *et al.* 2012: 27) where they attribute the reduction in dairy supplies to disruption of the environment where dairy farming activities take place.

Principal component analysis (PCA) was employed to develop a risk index. This procedure takes advantage of the correlation between the items to extract a few components from the many items, which represent the underlying constructs. Thus, the original items were replaced by the extracted components. A lower value of the index represents higher risk while the converse applies. The risk index was standardised so that it can be compared to other indices. This will ensure that the index is scaled to lie between 0 and 1. Table 5.10 summarises the distribution of the risk index.

Table 5. 9:Composite supply chain risks prevalent in food-aid distribution

Variable	Mean	SD	Min	Max
Supply chain risk index	0.273	0.247	0	1

The study investigated whether the risk index significantly differed by gender using the t-test. According to the t-test, respondents' valuation of supply chain risks did not significantly differ by gender ($p = 0.3470 > 0.05$) (Appendix A.10).

F-tests were used for age category, education level, experience, and area of operation because they each have more than two categories. In the case of a significant result, Bonferroni post hoc tests were used to identify the specific groups that had different risk levels. The mean risk index differed by age category ($p = 0.0106 < 0.05$), with the significant difference being between those less than 35 years and those aged at least 41 years (Appendix A.11). In the same vein, there were significant differences in the risk index by educational status ($p = 0.000 <$

0.05). According to the Bonferroni test, the differences were between respondents with post graduate qualification and each of those with Professional diplomas and Degree qualifications (Appendix A.12). Appendix A.13 shows that there was not enough evidence of risk index differences by years of experience in humanitarian food-aid distribution ($p = 0.0678 > 0.05$).

Respondents with 6 – 10 years' experience in food-aid distribution are likely to have high supply chain efficiency than those who have less than 6 years' experience. Similarly, those with over 10 years' experience were likely to have less efficiency than those with less than 6 years' experience. *Interms of experience interviewees expressed that most of the experience they have is in line with their line of work(Social work) and not supply chain, despite the fact that they often take part in actual food-aid distribution and stock management as well as participating in meetings to do with drought relief in the DDRC meetings*.

The values of the risk index are summarised in Appendix A.16 and are as follows in decreasing order: Masvingo (0.58), Chiredzi (0.39), Mwenezi (0.34), Zaka (0.19), Chivi (0.16), Mbire (0.15) and Muzarabani (0.14). The risk index significantly differed by area of operation ($p = 0.000 < 0.05$), with the differences being observed between Masvingo and Mbire ($p = 0.000$), Masvingo and Muzarabani ($p = 0.000$) and Masvingo and Zaka ($p = 0.002$) (Appendix A.17).

5.6 Strategies used to manage supply chain risks in food distribution

A summary of the main supply chain risk management strategies that were employed to address supply chain risks are discussed in this section. Items in each scale were summed up to make up the score for each strategy.

The flexibility strategy had a mean score of 8.62 and a standard deviation of 2.72. When the items in the strategy were summed, the scores ranged from 5 to 18 as summarised in Table 5.10.

Table 5. 10:Flexibility Strategy

Strategy	Mean	SD	Min	Max
Flexibility	8.62	2.72	5	18

The prepositioning strategy had an average score of 10.35, with a relatively high variability of 3.85 as summarised in Table 5.11.

Table 5. 11:Prepositioning Strategy

Strategy	Mean	SD	Min	Max
Prepositioning	10.35	3.83	6	23

The average score for the collaboration strategy was 8.39, with a standard deviation of 2.71. The lowest score was 6 while the highest was 16 (Table 5.12).

Table 5. 12:Collaboration Strategy

Strategy	Mean	SD	Min	Max
Collaboration	8.39	2.71	6	16

The results in Table 5.13 summarise the descriptive statistics for the financing strategy. The mean score was 11.52 and the scores varied widely between 7 and 20.

Table 5. 13:Financial Strategy.

Strategy	Mean	SD	Min	Max
Financing	11.52	3.27	7	20

The average score for the insurance strategy was 6.71, with a standard deviation of 2.77.

Table 5. 14:Insurance Strategy.

Strategy	Mean	SD	Min	Max
Insurance	6.71	2.77	4	18

The governance strategy had a mean score of 7.82. The minimum score was 5 while the maximum was 21, as shown in Table 5.15.

Table 5. 15:Governance Strategy.

Strategy	Mean	SD	Min	Max
Governance	7.82	3.37	5	21

A lower relative mean score implies that the strategy is more prevalent, and the converse applies. Therefore, the most commonly used strategy is Insurance, followed by governance, then collaboration, flexibility, prepositioning, and financing. The variability in the strategy is generally similar, with the highest variation in prepositioning and lowest in flexibility.

Insurance provides a hedge against risks and reduces individual loss exposure for both communities, individuals and organisations, reimbursing policy holders for damage caused by natural disasters. ZIMNAT Insurance Company and a number of insurance companies provide for insurance to cover risks of loss caused by disaster events. Tsikirayi, Makoni and Matiza (2013: 8) in a study they carried out, found that out of a total of 25 registered insurance companies in Zimbabwe, that can provide cover to any insurable losses that Zimbabweans, corporates and individuals can take to insure their assets, livelihoods and so forth.

The concept of flexibility is highly appreciated in the study. Interview results from the 7 District Administrators and three Social Welfare Officers interviewed posit that *"…despite a lot of variability in demand for food-aid ,flexibility enables the government and other humanitarian stakeholders to meet demand of the required food-aid ,got through government release of grains from GMB depots or got from Humanitarian Country Team through appeals for donations…"*The above assertions resonates well with the findings of ,Rucha and Abdallah (2017:250),that "the needs of the beneficiaries do change and are always changing based on the prevailing situation .Although beneficiary requirements change over time, humanitarian stakeholders need change their response mechanism to suit requirements on the ground, This is done to provide quick solutions to problems through the provision of flexible solutions to current beneficiary needs. Flexibility strategies, discussed in Sheffi and Rice (2005) and Tang and Tomlin (2008), posit that availability of a flexible supply chain strategy implemented through having flexible supply contracts with suppliers enhances the operations of achieving supply channel coordination. This process when implemented in food-aid distribution it enhances food-aid channel coordination.

As regards to the provision of solutions to shortages in transport and prohibitive high costs of transporting food-aid, almost all the DAs interviewed report that "..*at times the government has resorted to reliance on other government departments to provide transport to ferry food-*

aid ,such as use of The Central Mechanical Equipment Department (CMED)vehicles and the army vehicles…"

The seven District Administrators echoed the same sentiments on coordination mechanisms that the government has put in place as enshrines in the Civil Protection Act (1989). The Civil Protection Act (1989) mandated the government of Zimbabwe to coordinate all forms of humanitarian assistance in disaster relief. This has been done through collaborations amongst government, private sector and NGOs with the government providing an enabling environment for successful private-public partnerships (Forbes 2010: 13). The above findings are further explained by the fact that the government has the mandate to distribute food relief to its citizens (Civil Protection Act 1989), and at times this is done through partnerships and collaborations through NGOs and the Humanitarian Country Team (HCT), through FAO and WFP. According to the Drought Mitigation Strategy and the Zimbabwe Food and Nutrition Policy, the government is also responsible for the welfare elderly people, orphans and destitute residing in urban areas to observe humanity, in the implementation of humanitarian action, and this is further explained by Tomasini and Van Wassenhove (2009:20) ,who define " humanitarian action as observance of humanity, neutrality and impartiality when carrying out humanitarian operations, "as the basic important humanitarian principles that forming Zimbabwe's disaster management policy.

5.7 The relationship between supply chain risk and food-aid distribution efficiency

Ordinary Least Squares (OLS) regression was used to investigate the nature and magnitude of the relationship between food-aid distribution efficiency and supply chain risk factors, while also controlling for the effect of demographic variables. The demographic variables employed in the model are gender, age, education level, years of experience in food-aid and the study area. The same variables were used to run a Tobit regression model in order to test the robustness of the OLS model.

5.7.1 Supply chain performance index

Principal component analysis (PCA) was employed to develop a supply chain performance index. The performance index was standardised so that it can be compared to other indices. This will ensure that the index is scaled to lie between 0 and 1. Table 5.17 summarises the distribution of the performance index. An analysis of the demographic variables reveals that respondents aged at least 41 years were likely to have a lower supply chain performance than

those who are less than 36 years, which is statistically significant at 99% level. Mbire had a significantly higher supply chain performance than Chiredzi (comparison group) at 95% significance level. Respondents with 6-10 years and at least 11 years' experience reported higher food distribution efficiency than those with less than 6 years' experience (95% significance level).

Table 5. 16:Composite Supply Chain Performance Index.

Variable	Mean	SD	Min	Max
Supply chain performance index	0.242	0.229	0	1

5.8 Operational risk

The results in Table 5.17 confirm that the results are comparable, with the same coefficients and marginally different standard errors. Forty one percent (41%) of the variation in supply chain efficiency is explained by the variables in Table 5.15 as shown by the R-squared value.

An analysis of the demographic variables reveals that respondents aged at least 41 years were likely to have a lower supply chain performance than those who are less than 36 years. This result was statistically significant at 99% level. Mbire had a significantly higher supply chain performance than Chiredzi (comparison group), when measured at the 99% significance level. There were no other significant results for the remaining demographic variables at the 95% and 90% levels. Tobit regression results show the same pattern and relatively lower standard errors.

According to Table 5.17, there is a negative association between operational risk and food-aid distribution as revealed by the respective beta coefficients of 0.027. A unit increase in operational risk is associated with a 2.7% increase in supply chain efficiency. Thus, a higher operational risk score reduces the food-aid distribution efficiency.

The table below shows the relationship between operational Risks and Food -Aid Distribution efficiency.

Table 5. 17:Ordinary Least Squares and Tobit Estimates: The relationship between Operational Risk and Food -aid distribution efficiency.

Variables	OLS results	Tobit results
Operational risk	-0.027 (0.01)***	-0.027 (0.009)***
Gender	-0.042 (0.066)	-0.042 (0.06)
Age category		
36 - 40 years	-0.082 (0.09)	-0.082 (0.081)
>=41 years	0.284 (0.116)**	2.69 (0.009)***
Educational level		
Degree or higher	0.042 (0.068)	0.062 (0.68)
Experience level		
6 - 10 years	-0.165 (0.101)	-0.165 (0.092)*
>=11 years	-0.14 (0.094)	-0.14 (0.085)
Area of operation		
Chivi	-0.051 (0.119)	-0.051 (0.108)
Masvingo	-0.228 (0.148)	-0.228 (0.134)*
Mbire	-0.315 (0.117)***	-0.315 (0.106)***
Muzarabani	-0.102 (0.12)	-0.102 (0.108)
Mwenezi	-0.031 (0.125)	-0.031 (0.113)
Zaka	-0.043 (0.116)	-0.043 (0.105)
Constant	2.607 (0.182)	2.607 (0.165)
Observations	78	78
R-squared	41	1.14

***, Significance level is 0.01; **, Significance level is 0.05; *, Significance level is 0.1Robust standard errors are in parenthesis.

5.9 Governance and Political risk

The results in Table 5.18 confirm that the results are comparable, with the same coefficients and marginally different standard errors. Forty one percent (41%) of the variation in supply chain efficiency is explained by the variables in the model as shown by the R-squared value. According to Table 5.16, there is a negative and statistically significant association between governance risk and food-aid distribution as revealed by the beta coefficient of 0.033 and a low p-value. A unit increase in governance risk is associated with a 3.3% decrease in supply chain efficiency. Thus, a higher governance risk score reduces the food-aid distribution efficiency.

Mbire respondents had a higher food-aid distribution efficiency than those from Chiredzi, with the result statistically significant at 95% level. Respondents with 6-10 years and at least 11 years' experience reported higher food distribution efficiency than those with less than 6 years' experience (90% significance level).

Table 5. 18:Ordinary Least Squares and Tobit Estimates: The relationship between Governance Risk and food-aid distribution efficiency.

Variables	OLS results	Tobit results
Governance risk	-0.033 (0.012)***	-0.033 (0.011)***
Gender	-0.042 (0.066)	-0.042 (0.060)
Age category		
36 - 40 years	-0.086 (0.090)	-0.086 (0.081)
>=41 years	0.327 (0.117)***	0.327 (0.106)***
Educational level		
Degree or higher	0.083 (0.065)	0.083 (0.059)
Experience level		
6 - 10 years	-0.176 (0.101)*	-0.176 (0.091)*
>=11 years	-0.155 (0.093)*	-0.155 (0.084)*
Area of operation		
Chivi	-0.097 (0.117)	-0.097 (0.106)
Masvingo	-0.161 (0.140)	-0.161 (0.127)
Mbire	-0.309 (0.118)**	-0.309 (0.107)***
Muzarabani	-0.116 (0.119)	-0.116 (0.108)
Mwenezi	0.012 (0.123)	0.012 (0.112)
Zaka	-0.052 (0.115)	-0.052 (0.104)
Constant	2.593 (0.186)	2.593 (0.168)
Observations	78	78
R-squared	41	1.14

***, Significance level is 0.01; **, Significance level is 0.05; *, Significance level is 0.1

Robust standard errors are in parenthesis

5.10 Environmental risk

The results in Table 5.19 confirm that the results are comparable, with the same coefficients and marginally different standard errors. Forty seven percent (47.8%) of the variation in supply chain efficiency is explained by the variables in the model as shown by the R-squared value.

According to Table 5.19, there is a negative and statistically significant association (99% level) between environmental risk and food-aid distribution as revealed by the respective beta coefficient of 0.066. A unit increase in environmental risk is associated with a 6.3% increase in supply chain efficiency. Thus, a higher environmental risk score reduces the food-aid distribution efficiency.

Table 5. 19:Ordinary Least Squares and Tobit estimates: The relationship between Environmental risk and food -aid distribution efficiency.

Variables	OLS results	Tobit results
Environmental risk	-0.066 (0.016)***	-0.066 (0.014)***
Gender	-0.029 (0.062)	-0.029 (0.056)
Age category		
36 - 40 years	-0.096 (0.085)	-0.096 (0.077)
>=41 years	0.355 (0.11)***	0.355 (0.1)***
Educational level		
Degree or higher	0.048 (0.062)	0.048 (0.056)
Experience level		
6 - 10 years	-0.196 (0.093)**	-0.196 (0.085)**
>=11 years	-0.19 (0.085)**	-0.19 (0.077)**
Area of operation		
Chivi	0.007 (0.114)	0.007 (0.103)
Masvingo	-0.071 (0.128)	-0.071 (0.116)
Mbire	-0.251 (0.112)**	-0.251 (0.102)**
Muzarabani	-0.072 (0.113)	-0.072 (0.102)
Mwenezi	-0.076 (0.118)	-0.076 (0.107)
Zaka	-0.008 (0.109)	-0.008 (0.099)
Constant	2.455 (0.174)	2.455 (0.157)
Observations	78	78
R-squared	47.83	1.34

***, Significance level is 0.01; **, Significance level is 0.05; *, Significance level is 0.1

Robust standard errors are in parenthesis

5.11 Overall risk index

The study also reveals the interconnectedness of the operational, governance and environmental risks. The results are consistent with those of the previous researchers (Chopra and Sodhi 2004:54).

The results in Table 5.20, confirm that the results are comparable, with the same coefficients and marginally different standard errors. Forty five percent (45.3%) of the variation in supply chain efficiency is explained by the variables in Table 6 as shown by the R-squared value.

An analysis of the demographic variables reveals that respondents aged at least 41 years were likely to have a lower supply chain performance than those who are less than 36 years. This result was statistically significant at the 99% level. Mbire had a significantly higher supply chain performance than Chiredzi (comparison group) when measured at the 90% significance level.

According to Table 5.20, there is a negative and statistically significant (99% significance level) association between the risk index and food-aid distribution as revealed by the respective beta coefficient of 0.059 and the p-value. A unit increase in the risk index is associated with a 5.9% increase in supply chain efficiency. Thus, a higher risk index score reduces the food-aid distribution efficiency.

Table 5. 20:Ordinary Least Squares and Tobit estimates: The relationship between the risk index and food-aid distribution efficiency.

Variables	OLS results	Tobit results
Risk index	0.059 (0.016)***	0.059 (0.014)*
Gender	-0.03 (0.064)	-0.03 (0.058)
Age category		
36 - 40 years	-0.09 (0.087)	-0.09 (0.078)
>=41 years	0.307 (0.112)***	0.307 (0.101)*
Educational level		
Degree or higher	0.036 (0.065)	0.036 (0.059)
Experience level		
6 - 10 years	-0.157 (0.097)	-0.157 (0.088)¥
>=11 years	-0.131 (0.09)	-0.131 (0.081)
Area of operation		
Chivi	-0.034 (0.115)	-0.034 (0.104)
Masvingo	-0.215 (0.137)	-0.215 (0.124)*
Mbire	-0.279 (0.114)*	-0.279 (0.103)*
Muzarabani	-0.075 (0.116)	-0.075 (0.105)
Mwenezi	-0.041 (0.12)	-0.041 (0.109)
Zaka	-0.016 (0.112)	-0.016 (0.101)
Constant	2.849 (0.133)	2.849 (0.12)
Observations	78	78
R-squared	45.33	1.26

***, Significance level is 0.01; **, Significance level is 0.05; *, Significance level is 0.1

Robust standard errors are in parenthesis

5.12 Effectiveness of supply chain risk mitigation strategies in achieving efficiency in food-aid distribution.

In order to ensure that the right quantities and quality of food-aid reach the beneficiaries, the effectiveness of the supply chain risk mitigation strategies are measured. Of concern was the ability of the government to supply a full basket of commodities to its beneficiaries. The seven Social Welfare Officers and the District Administrators echoed the same sentiments "…*that food-aid that the government is providing is not adequate as the government is only offering grain and not the full food basket that comprises, grain, pulses and cooking oil. "This situation*

is different from what the NGOs are giving to the beneficiaries, who provide a full basket of commodities to the beneficiaries.

5.13 Regression analysis using summated scales

This section analyses the effectiveness of supply chain risk mitigation strategies in achieving supply chain efficiency, which is represented by supply chain performance scores. OLS and Tobit regression results showed comparable estimates (Table 5.21), hence indicating the robustness of the results. Approximately 55% of the variation in the supply chain efficiency is explained by the independent variables shown in Table 5.21, as represented by the adjusted R-square value.

From the analysis of the demographic variables, there were no significant gender, age, and education associations with supply chain efficiency. Respondents with over 10 years' experience in food-aid distribution were associated with significantly higher (95% level) supply chain efficiency scores when compared to those with less than 6 years. In addition, Mbire respondents exhibited higher supply chain efficiency when compared to those from Chiredzi, at 99% significance level. Similarly, Muzarabani respondents were associated with a higher supply chain efficiency than those from Chiredzi (95% significance level).

The results reveal only the flexibility strategy has a statistically significant association (99% level) with supply chain efficiency, after controlling for the effect of all the other variables in the model. A higher flexibility score reduces supply chain efficiency.

Table 5. 21:Ordinary Least Squares and Tobit estimate: The relationship between supply chain management strategies and food aid distribution efficiency.

Variables	OLS results (Supply chain management strategies	Tobit results (Supply chain management strategies)
Flexibility strategy	0.044 (0.012)***	0.044 (0.01)***
Preposition strategy	0.01 (0.009)	0.01 (0.008)
Collaboration strategy	-0.005 (0.013)	-0.005 (0.011)
Financial strategy	-0.002 (0.012)	-0.002 (0.01)
Insurance strategy	0.018 (0.014)	0.018 (0.012)
Governance strategy	0.015 (0.012)	0.015 (0.01)
Gender	-0.059 (0.062)	-0.059 (0.054)
Age category		
36 - 40 years	0.026 (0.093)	0.026 (0.08)
>=41 years	0.182 (0.109)	0.182 (0.094)*
Education category		
Degree or higher	0.083 (0.061)	0.083 (0.052)
Experience in humanitarian food-aid		
6 - 10 years	-0.176 (0.096)*	-0.176 (0.083)**
>=11 years	-0.193 (0.087)**	-0.193 (0.075)**
Area of operation		
Chivi	-0.152 (0.112)	-0.152 (0.097)
Masvingo	-0.182 (0.124)	-0.182 (0.107)*
Mbire	-0.321 (0.105)***	-0.321 (0.091)***
Muzarabani	-0.225 (0.109)**	-0.225 (0.094)**
Mwenezi	0.001 (0.115)	0.001 (0.1)
Zaka	-0.052 (0.107)	-0.052 (0.092)
Constant	2.271 (0.207)	2.271 (0.179)
Observations	75	75
R-squared	0.549	1.637

***, Significance level is 0.01; **, Significance level is 0.05; *, Significance level is 0.1

Robust standard errors are in parenthesis

Model adequacy was tested using a variety of regression diagnostics ((Appendices A.1 – A.8, A.18 – A.25). The main assumptions to be tested include specification, linearity, normality,

multi-collinearity, and influence. The Shapiro-Wilk test showed that the studentised residuals were normally distributed ($p = 0.320 > 0.05$). According to the Breusch-Pagan / Cook-Weisberg test, the assumption of homoscedasticity was not violated in this model ($p = 0.603 > 0.05$). The highest variance inflation factor was 3.12, which is higher than 10 according to a rule of the thumb. Thus, there is no indication of multi-collinearity among the independent variables. The Ramsey RESET test also suggests that the model may have some omitted variables ($p = 0.030 < 0.05$). Linearity was assessed using scatter plots of studentised residuals against two randomly chosen predictors. The graphs did not indicate any clear departure from normality. A plot of studentised residuals against leverage did not show any points with both high influence and leverage.

5.14 Regression analysis using factor scores

This section presents the results of the same analysis done in Table 5.22, with the difference being the use of principal components instead of summated scores. Similar to the above section, only the flexibility strategy was significantly associated with greater supply chain efficiency. The coefficients are both positive, indicating lower supply chain efficiency for this strategy. Due to marginally lower standard errors for the Tobit regression, OLS had slightly less significant results.

Table 5. 22:Ordinary Least squares and Tobit estimates: The relationship between supply chain management strategies and food-aid distribution efficiency ,using Factor Scores.

Variables	OLS results (Supply chain management strategies)	Tobit results (Supply chain management strategies)
Flexibility strategy	0.207 (0.058)***	0.207 (0.050)***
Preposition strategy	0.022 (0.043)	0.022 (0.037)
Collaboration strategy	-0.022 (0.06)	-0.022 (0.052)
Financial strategy	0.017 (0.066)	0.017 (0.058)
Insurance strategy	0.009 (0.049)	0.009 (0.042)
Governance strategy	-0.021 (0.05)	-0.021 (0.043)
Gender	-0.076 (0.078)	-0.076 (0.068)
Age category		
36 - 40 years	0.273 (0.114)**	0.273 (0.099)***
>=41 years	0.164 (0.130)	0.164 (0.114)
Education category		
Degree or higher	0.14 (0.077)*	0.14 (0.067)**
Experience in humanitarian food-aid		
6 - 10 years	-0.062 (0.115)	-0.062 (0.100)
>=11 years	-0.119 (0.105)	-0.119 (0.091)
Area of operation		
Chivi	-0.223 (0.143)	-0.223 (0.125)*
Masvingo	-0.185 (0.157)	-0.185 (0.137)
Mbire	-0.209 (0.134)	-0.209 (0.117)*
Muzarabani	-0.324 (0.139)**	-0.324 (0.121)**
Mwenezi	0.319 (0.133)**	0.319 (0.116)***
Zaka	0.063 (0.137)	0.063 (0.119)
Constant	0.702 (0.159)	0.702 (0.138)
Observations	79	79
R-squared	0.4539	0.8929

***, Significance level is 0.01; **, Significance level is 0.05; *, Significance level is 0.1

Robust standard errors are in parenthesis

Model adequacy was tested using a variety of regression diagnostics (Appendices A.1 – A.8, A.18 – A.25). The main assumptions to be tested include specification, linearity, normality, multi-collinearity, and influence. The Shapiro-Wilk test showed that the studentised residuals were normally distributed ($p = 0.148 > 0.05$). According to the Breusch-Pagan / Cook-Weisberg test, the assumption of homoscedasticity was not violated in this model ($p = 0.410 > 0.05$). The highest variance inflation factor was 2.87, which is higher than 10 according to a rule of the thumb. Thus, there is no indication of multi-collinearity among the independent variables. The Ramsey RESET test also suggests that the model has no omitted variables ($p = 0.145 > 0.05$). Linearity was assessed using scatter plots of studentised residuals against two randomly chosen predictors. The graphs did not indicate any clear departure from normality. A plot of studentised residuals against leverage did not show any points with both high influence and leverage. The above analysis indicates that the assumptions of the model were satisfied. This model may be preferred to the one which uses summated scores because it satisfies all the OLS regression assumption.

5.16 Conclusion

This chapter uses data collected from survey questionnaires assess the effects of supply chain risk management strategies in food-aid distribution in Masvingo Province and Muzarabani District of the Zambezi Basin. The analysis was done using descriptive analysis, Ordinary Least Squares regression, Tobit regression analysis and principal component analysis. A frequency analysis revealed that the most prevalent risks in humanitarian food-aid supply chain distribution in Zimbabwe are damaged infrastructure, disruption risks and bureaucracy. The supply chain efficiency was assessed using OLS, first using summated scales and second using principal components. In both cases, the results show that the flexibility strategy had a significant impact on supply chain efficiency. The most commonly adopted strategies for addressing supply chain risks were insurance, governance, collaboration, and flexibility. The relationship between supply chain risks and supply chain performance reveals a weak and positive association.

CHAPTER SIX

Conclusions and Recommendations

6.1 Introduction

The main purpose of this research is to assess the impact of supply chain risk management in food-aid distribution in Zimbabwe. From the background of the study, literature and history has revealed that disasters have negatively affected the social, economic, and humanitarian environment in Zimbabwe. Food supply chains are reduced to zero levels, subjecting the communities to vulnerability, and in need of food-aid. Based on this problem, this research sought to find out supply chain risks prevalent in food and humanitarian aid, assess supply chain risk management strategies in use in food-aid distribution and also analyse the impact of supply chain risk management on the performance of food-aid distribution operations.

6.2 Disaster Phase Model

Disaster risks were found to be negatively impacting on food-aid supply chain networks. Interviews carried out with humanitarian stakeholders established that natural disasters have badly impacted on food supply chains, creating shortages and unpredictability of food-aid supply, hence affecting the efficient food-aid distribution operations.

6.3 The Crunch, and the Pressure and Release Models

While the Disaster Phase Model presents a disaster management cycle, the crunch model, and the Pressure and Release Model, were developed to help understand the progression of community vulnerability to disasters. The two models are very similar in their scope. They identify sources of vulnerability and trigger events, the combination of which, will lead to a disaster.

6.4 Supply Cain Models

Supply chain initiatives in food-aid distribution followed the Mentzer Model of humanitarian supply. Sources of food-aid and resultant beneficiaries are identified in practice as outlined in the Mentzer Model. The model should be applauded as it models the current humanitarian way of food-aid distribution in Zimbabwe. The only weakness found was that the implementors were only doing business as usual without taking time to produce lessons learnt on the food-aid distribution modalities by the department of Social Welfare. 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 importance of insights required in moving humanitarian food-aid and the need for it to be cost effective so that many beneficiaries can be reached out to and also donor funds spend responsibly in a cost effective manner.

6.5 SCOR Model

The study assesses how coordination, governance and contingency strategies' impact on food-aid distribution chains based on the collaborative framework propounded by Shepard (2012: 8). The SCOR Model has not been followed in the food-aid distribution in Zimbabwe as the thrust of the model is to improve of efficiency in delivery of supply chain initiatives.

The Disaster Management DDR functions in Zimbabwe. It is on the basis of the Disaster Reduction framework that the CP Act of 1979 has been formulated that the Sendai Framework and the Hyogo protocols have been adopted by Zimbabwe the CPU in Zimbabwe has been transformed into a Disaster Reduction unit that does not only await management disasters but also creates provision for managing disaster impacts through the operations of the Food and Nutrition Act ,the ZIMVAC and the food-aid distribution through various modalities, such as the food for work, food for assets and free food for all modalities.

Despite the fact that there is the Disaster Management Framework in Zimbabwe, the Food-aid and the ZIMVAC platforms that government has created are not effective hence Zimbabwe must create a resourced and accountable Humanitarian Commission with independent operations such as other commissions which understands disaster and humanitarianism to process ,created to carryout humanitarian interventions in sync with the provisions of DRM and CPU and also accountable to the Zimbabwean Constitution.

6.2 Conclusion

This part of the research provides a recap of the research objectives together with the themes outline in the introductory chapters. The researcher uses a mixed method approach to meet its four objectives already outlined. In addition to the use of the mixed method, a five-Likert scale questionnaire on humanitarian food-aid risks, Supply Chain Risk Management strategies.

Observations were also made from the sourcing process of humanitarian food-aid up to when the final beneficiary receives the food-aid. This study concludes that rural communities' dependent on subsistence farming are mostly vulnerable to drought and floods as well as human epidemic diseases. The political and economic situation has also overally affected the food-aid distribution exercises as in some areas, unethical practices among political heavyweights have often disturbed food-aid distributions or have created false registers of the would-be beneficiaries.

Environmental risks emanating from disaster occurrence and infrastructural damage risks were found to be negatively impacting on the performance of the transport mode of supply chain networks. Interviews with government Social Welfare Officers who hire transport for distributing food aid for their beneficiaries, it was established that floods and droughts, impacted on food -aid transportation ,leading to spiralling costs distribution costs.

As witnessed over the years this researcher, having worked as a Humanitarian Aid worker for more than 10 years, has experienced and seen a number of thefts on food-aid intended for the vulnerable beneficiaries happening. Theft is a supply chain risk which on most cases results in understatement of food rations, shortfalls in allocated and distributed food-aid commodities, wrong quantity received and distributed which would, in turn, inadequately satisfy beneficiary rations, et cetera.

Areas like Kanyemba, in Mbire, Mutemakungu and Kaitano in Muzarabani and Matetsi in Mwenezi have food-aid sources and warehouse established far away from the disaster zones. Emergence Commodity Warehouses should be established at district ward level to accommodate humanitarian disaster relief assigned to particular wards and to act as buffer stocks before the arrival of more aid. The Government of Zimbabwe is encouraged to further explore establishing a single government entity responsible for the coordination of all aspects of multi-hazard disaster risk management (prevention, mitigation, preparedness, response, recovery and reconstruction) placed within a suitable government body that will fully allow it to exert its mandate, has adequate convening power of all relevant government institutions and partners, and is accountable for effective implementation of its mandate (CADRI, 2017:27).

Governments must waive tax payment on transport companies that provide humanitarian assistance freely at no charge as this would also encourage collaborations from society who strongly believe in public private partnerships humanitarian aid to the nation when disaster strikes, but when assisted government must not be complacent.

The Village Food-aid Management Committees must also receive training on how to manage food-aid supplies at district level. The village Coordinating committees would be a great team to develop road networks in the communities that they live as this will also assist in work actively on disaster risk reduction activities in the villages.

What is noteworthy in this study is the level of education amongst the members of the DDRC, but there was lack of supply chain and logistics education to complement their work. The department of Social Welfare responsible to offer support services to beneficiaries could not effectively carry out their mandate due to lack of financial resources and manpower. In addition to the above, whilst the Department of Social Welfare was distributing grain alone, NGOs were distributing a complete basket of cereals, pulses, and oil. At time cash and vouchers were given out but these could be traded in against some other resources other than food-aid.

Existing coordination platforms created by government and the Humanitarian Country Team were noted to be inadequate to boost the performance of the humanitarian relief, especially after the wake of Cyclone Idai, in Zimbabwe. A lot of donations were received but the distribution part had several gaps that need to be addressed. Unfounded reports highlighted the rotting of food-aid against a background of starving vulnerable beneficiaries.
Lack of specialised supply chain was another challenge aired by several members of the District Drought Relief Committee members.

6.3 Recommendations for future researchers

This research has raised many areas that can be explored in future researches. Based on issues raised in this study, the following are some suggestions for further research.

- Increasingly, experience from various countries shows that division of mandates for disaster risk reduction management (DRM), and disaster response specifically, across various institutions can hamper efficacy of interventions when there is shortage and limitation in human, financial and technical resources (CADRI, 2017:26). For this

reason, a key recommendation emerging from this report is for the Government to consider the built up of a more cohesive institutional architecture and coordination mechanisms for disaster risk management, such as creation of stand-by pool of Disaster management Team experts with various expertise, such as coordination, logistics, medical, financial, among others.

- Whilst the Department of Social Welfare and The District Administrator's Office has played a pivotal role in coordination and distribution of food-aid, they need logistics and supply chain training from agencies like WFP to equip them with Logistics and supply chain knowledge for improved food-aid distribution.
- Grassroots politics (levelled against political heavy weights using food-aid to champion their cause and firm) should be shunned and perpetrators of this act should be arrested. Laws should be put in place to protect vulnerable beneficiaries from people playing politics on food-aid.
- A variety of supply chain risks have been mentioned in this study, individual supply chain risks can be further interrogated in future research, to help understand the concept of coordination in food-aid and humanitarian operations so as to mitigate against single supply chain risks.
- A study comparing Zimbabwe's experience against other countries such as Mozambique and Malawi on supply chain risk management during disasters occurrence to provide empirical evidence on whether supply chain risks and risk management strategies have similar or different impact on countries that are at different economic and political dimensions.
- Disaster risk reduction platforms should also be programmed to create resilient communities than to create societies only sustainable on the basis receiving food-aid.
- Community-based disaster risk reduction initiatives starting from office at ward level, run by a committee involving government officials and local community members coordinating the implementation of disaster risk reduction strategies is recommended.
- District Offices should be set to disseminate information on disaster early warning data to the local communities.
- Despite the fact that Government ministries take a leading role in promoting collaborative relationships, the government must do much to dispel rumours of lack of accountability on donations.

- There is very little that can be achieved in reducing disaster risks without government contribution. Government should therefore create an enabling environment for partnership.
- The state and NGOs should overcome their historical differences and share information. The government generally perceives NGOs as regime change agencies while on the other hand NGOs accuse government of engaging in partisan politics.
- NGOs should also play a role in policy formulation in all forms Humanitarian distribution.
- There should be clear linkages between the Department of Local Government and Social Welfare department which provide services to vulnerable beneficiaries.
- Harmonization of policies, so that they several departments be merged under one Government Department is also recommended. Policies that strictly govern the conduct and activities of humanitarian aid agencies should be housed in one ministry that speaks to food-aid distribution as there seen to be confusion between local government and Social welfare.
- It is recommended that Communities should be encouraged to establish comprehensive insurance policies to insure their assets and livelihoods is recommended. The establishment of insurance policies will hedge the communities against risk of losing all their belongings as what happened during cyclone Idai in Chipinge and Chimanimani Districts of Zimbabwe.
- There should be available strong and local Disaster Early Warning Signs data in all communities in Zimbabwe to prepare communities to be resilient to floods, droughts, and cyclones. It is therefore recommended that the Government should try to improve transmission of intended messages to stakeholders through frequent contacts, early warning signs about disaster risks and how humanitarian aid can be distributed.

These high risks should get funding for collaborative strategies from government. Drought and floods and more recent cyclones are such disaster risks that have affected communities leaving them either dead or vulnerable and also making countries poor. More funding should be directed towards construction of dams and boreholes to irrigate pastures and improve on milking parlours on hygiene issues.

There is need to research on integrated supply chain risk management strategies in drought and flood disaster management in Southern Africa. Further research is necessary in the areas highlighted above. However, this researcher hopes that this thesis has provided some insights into prevalent supply chain risks that have affected and impacted on food or humanitarian aid distribution against strategies that have been used to manage such risks. After all, the thesis has delved into a virgin area that had not been researched in Zimbabwe.

6.4 Limitations of the study

Like any research, this research had its limitations and raises as many questions as it answers. This section discusses these limitations. The constituent components of the DDRC Team is determined by the number of government departments operational in a district. Some of the members who form part of the DDRC were not willing to participate in the research based on fear despite the assurance given to them by the researcher that their contribution to this study would be kept a secret. Due to resource constraints, time, and fuel in particular, some far away areas like Kanyemba in Mbire, Mutemakungu and Hoya in Muzarabani, Matetsi in Mwenezi and Chikwalakwala in Chiredzi could not be reached so as to reach some of the DDRC members.

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Appendix 1: Survey Questionnaire

Dear Participant

My name is Peter Ngarize and I am studying for a Doctor of Philosophy Degree in Public Management with the Durban University of Technology. This questionnaire seeks to assess the effects of supply chain risk management strategies in food-aid distribution in Masvingo Province and Muzarabani District of the Zambezi Basin in Zimbabwe in order to improve efficiency and effectiveness of the supply chain in disaster management.

You are hereby invited to complete this questionnaire. The questionnaire would help us improve the management of food-aid distribution operations to the vulnerable society in Zimbabwe.

All the information gathered in this research is for academic purposes only and will be treated with utmost confidence.

I would like to thank you in advance for your time and effort in completing this questionnaire. Should you require additional information concerning this study or further clarity, you may contact the researcher as per the following details: e-mail ngarizep@gmail.com, or Mobile number +263776088862

Thank you
Yours Faithfully

Peter Ngarize

Please tick/circle the most appropriate response in the boxes provided below:

SECTION A: Demographic Information:

1. **Gender of Respondent**

Male	Female
1	2

2. Age of respondent

≤ 25 years	1
26-30 years	2
31-35 years	3
36-40 years	4
≥ 41years	5

3. Highest level of education

Secondary School education	1
Professional certificate	2
Professional Diploma	3
Degreed	4
Post graduate qualification	5

4. Experience in Humanitarian Food-aid

≤ 5 years	01
6-10years	02
11-15years	03
16-20years	04
21years and above	05

5. Area of Operation.

The following table shows area of operations where this research is undertaken. Kindly indicate your place of operation by placing a check mark (√) or circle the appropriate box below.

Chiredzi	01	Muzarabani	04
Chivi	02	Mwenezi	06
Masvingo	03	Zaka	07
Mbire	04		

Section B: Supply Chain Risks

Below is a list of possible food-aid supply chain risks in Zimbabwe divided into three main areas, namely operational, governance and environmental risks. In your opinion, please rate how strongly you agree or disagree that the following supply chain risks have been affecting food-aid distribution in your area, place a check mark (√) or circle the appropriate box below.

Operational Supply chain risks	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1. Transportation risks	01	02	03	04	05
2. Shortage of storage facilities	01	02	03	04	05
3. Pilferage/theft	01	02	03	04	05
4. Poor and inadequate Information	01	02	03	04	05
5. Shortage of warehouses	01	02	03	04	05
6. Contamination of food-aid	01	02	03	04	05
7. Excess demand					
8. Transportation risks	01	02	03	04	05
Governance Supply chain risks					
9. Politics (Bureaucracy in Govnt operations)	01	02	03	04	05

10.	Political partisanship informing food-aid distribution	01	02	03	04	05
11.	Laws and regulations governing food-aid distribution	01	02	03	04	05
12.	Shortage of warehouses	01	02	03	04	05
13.	Transportation risks	01	02	03	04	05
14.	Inflexibility of humanitarian organisational structures and policies	01	02	03	04	05
	Environmental Supply chain risks					
15.	Poor road network	01	02	03	04	05
16.	Political partisanship informing food-aid distribution	01	02	03	04	05
17.	Damaged infrastructure	01	02	03	04	05
18.	Disruption risks	01	02	03	04	05

Section C: Supply Chain Performance Measures.

Below is a list of possible performance measures used in the food-aid distribution in Zimbabwe. In your opinion indicate how strongly you agree or disagree that the following performance measures the efficiency of food-aid distribution in your area. Place a check mark (√) or a circle in the appropriate box below.

Performance metrics ensure	Strongly Agree	Agree	Uncertain	Disa gree	Strongly Disagree

19.	Right quantity of food-aid is distributed to the beneficiary	01	02	03	04	05
20.	Right quality of food-aid is distributed to the beneficiary	01	02	03	04	05
21.	Delays in Food-aid distribution are reduced	01	02	03	04	05
22.	Availability of up to date beneficiary registers	01	02	03	04	05
23.	Food-aid distributed to rightful beneficiaries	01	02	03	04	05
24.	All Food Distribution points are accessible	01	02	03	04	05
25.	Right type of transport is available to deliver food-aid	01	02	03	04	05
26.	Government flexibility and ability to respond to variations in demand	01	02	03	04	05
27.	Humanitarian agencies ability to respond to and accommodate variations in demand	01	02	03	04	05

D Supply chain risk management.

Supply Chain Risk Management (SCRM) is "the implementation of strategies to manage both every day and exceptional risks along the food-aid distribution, based on continuous risk assessment in order to reduce vulnerability and ensuring the continuity" of food-aid distribution. The following are the supply chain risk management strategies used in food-aid

distribution, namely, flexibility, prepositioning, collaboration, financial, insurance and governance.

Flexibility:

Flexibility is a strategy that is used to measure an organization's ability to accommodate volume and schedule fluctuations from suppliers, producers, and customers or beneficiaries. There are various forms of flexibility, namely:

- Volume Flexibility-Ability to respond to different magnitudes of disasters.
- Delivery Flexibility-Time taken in responding to disasters
- Mix Flexibility - Ability to provide a variety of commodities.

In your opinion What is the impact of flexibility strategies on the distribution of food-aid to disaster victims in your area?

Flexibility strategy	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
28. Enhances timely response to humanitarian needs	01	02	03	04	05
29. Governments and other Humanitarian stakeholders are accommodative of variations in disaster driven policies	01	02	03	04	05
30. Government has developed food-aid distribution capacities at all levels	01	02	03	04	05
31. Sudden and excess demand for humanitarian aid is easily met by	01	02	03	04	05

	government and civic society					
32.	Local authorities easily interact with civic society in food-aid distribution	01	02	03	04	05

(ii)Prepositioning of Relief Items.

In your opinion indicate how strongly you agree or disagree that prepositioning prepares humanitarian stakeholders to undertake a quicker response in distributing food-aid in your area

Prepositioning strategy		Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
33.	Is based on the availability of adequate stocks of food-aid	01	02	03	04	05
34.	Enables Governments and other Humanitarian stakeholders to maintain food-aid reserves	01	02	03	04	05
35.	Reduces supplier failure to deliver food-aid	01	02	03	04	05
36.	Lead time for commodity supply is reduced	01	02	03	04	05
37.	Minimises distances travelled by beneficiaries to collect food-aid	01	02	03	04	05
38.	Stabilizes commodity supply costs	01	02	03	04	05

(iii). Collaboration

Collaboration is any joint activity by two or more organisations that is intended to produce more public value than what could be realised when the organizations work in solitude. In your opinion indicate if this has been very important during food-aid distribution in your area.

Collaboration strategies ensure:	Very important	Important	Uncertain	Somehow important	Not important at all
39. Consorted Team work provides timely response to disaster calls	01	02	03	04	05
40. Improved Timely response to disaster calls	01	02	03	04	05
41. Availability of a variety of skills from different agencies	01	02	03	04	05
42. Equitable distribution of tasks amongst humanitarian stakeholders	01	02	03	04	05
43. Availability of resources	01	02	03	04	05
44. Respect of collective strategic planning and buy in is sought before policy implementation	01	02	03	04	05

(iv) Financial Strategy

Use of finance as a strategy enables the government and other humanitarian stakeholders to distribute food-aid to needy beneficiaries in Zimbabwe. In your opinion indicate how strongly you agree or disagree that financial strategies important in the distribution of food-aid in your area?

With Financial strategies	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree

45.	Disaster budget is key	01	02	03	04	05
46.	Costs are controlled through Financial controls	01	02	03	04	05
47.	Use of financial controls in spending resources	01	02	03	04	05
48.	Use of correct procurement procedures	01	02	03	04	05
49.	Food-aid distribution tracking is essential to curtail misappropriation of food-aid	01	02	03	04	05
50.	Food-aid distribution processes are audited	01	02	03	04	05
51.	Misuse of resources is curbed	01	02	03	04	05

(iv). Insurance

Insurance is a safeguard against risks (such as, fire, theft, accidents, climate, floods, etc,) that may befall food-aid distribution operations leading to losses of food-aid. In your opinion indicate how strongly you agree or disagree that insurance is important in distribution of food-aid in your area?

Insurance and hedging ensures that:		Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
52.	Food-aid commodity losses are minimised	01	02	03	04	05
53.	Insured losses are easily recovered	01	02	03	04	05
54.	All food-aid distribution is activities are guaranteed of success	01	02	03	04	05

55.	Insurance guarantees sustainable food-aid relief and distribution	01	02	03	04	05

(v) Governance Strategy

Governance of food-aid distribution includes the management of institutions, formal and informal arrangements, structures, stakeholders (to include, public and private and, civil society). In your opinion indicate how strongly you agree or disagree that the following governance strategies affect food-aid distribution in your area. Place a check mark (√) or a circle in the appropriate box below.

Governance as a strategy		Very important	Important	Uncertain	Somehow important	Not important at all
56.	Governments and humanitarian stakeholders are accountable to donors	01	02	03	04	05
57.	Local and International NGOs are accountable to governments	01	02	03	04	05
58.	Audited Financial reports are produced timeously	01	02	03	04	05
59.	Local and International NGOs are responsible for their actions	01	02	03	04	05
60.	Stakeholders views are acknowledged and implemented	01	02	03	04	05

Thank you.

Appendix 2- Interview Schedule

Interview Guide: PhD. Public Management

INTERVIEW SCHEDULE FOR NGO AND GOVERNMENT PERSONNEL

Date of Interview: _____

Place of interview _____

Introduction

- Researcher introduces self
- State estimated Time line (duration of interview)
- Motivation for conducting interview

QUESTIONS

SECTION A: DEMOGRAPHICS

1. Which organisation do you work for?
2. How long have you been with the organisation?
3. What is your position in the organisation?

SECTION B: IMPACT OF DISASTER RISKS ON HUMANITARIAN SUPPLY CHAIN PERFORMANCE

4. Are there any operational risks affecting the distribution of food-aid?
5. Did the risks impact on food-aid distribution in your area?
6. What strategies have been used in mitigating supply chain risks in your area?
7. How has the performance of organisations impacted on the distribution of food-aid?
8. Have your supply sources been affected by disasters? If yes in which form?

SECTION C: MITIGATION STRATEGIES FOR NATURAL HAZARDS

9. What strategies have been used for mitigating supply chain risks in food-aid distribution?
10. What strategies can be adopted to improve the operations of food-aid distribution?
11. Does the Government acknowledge the view of civic stakeholders directly involved in food-aid distribution and other disaster response management?
12. Are Non -Governmental organisations free to directly interact with beneficiaries without government involvement?

Section D: Challenges

13. What challenges have been met in food-aid distribution?
14. What areas do you think require improvements?
15. What are your recommendations for future developments in food-aid distribution?

Thank you

Appendix 3- Letter of Consent

Statement of Agreement to Participate in the Research Study:

 I hereby confirm that I have been informed by the researcher, **Peter Ngarize** about the nature, conduct, benefits, and risks of this study-Research Ethics Clearance Number: **FREC REF: 55/18FREC**,
 I have also received, read, and understood the above written information (Participant Letter of Information) regarding the study.
 I am aware that the results of the study, including personal details, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
 In view of the requirements of research, I agree that the data collected during this study can be processed in a computerized system by the researcher.
 I may, at any stage, without prejudice, withdraw my consent and participation in the study.
 I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
 I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

Full Name of Participant ----------

Date ---------- Time ----------

Signature/ ----------

I Peter Ngarize confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

----------	----------	----------
Full Name of Researcher	**Date**	**Signature**

Appendix 4- Clearance to carry out Research- Interview Schedule

Official communications should Not be addressed to individuals

Telephone: Harare 703711/3 790721/4
Telegraphic Address: 'WELMIN
Fax:790543/703714/707316

ZIMBABWE

MINISTRY OF PUBLIC SERVICE LABOUR AND SOCIAL WELFARE

THE DIRECTOR OF SOCIAL SERVICES
P.O. Box CY 429, Causeway, HARARE
Compensation House ,Corner Fourth Street and Central Avenue,25 Central Avenue, HARARE

Ref: SW 12/5

11 August 2017

DEPARTMENT OF SOCIAL WELFARE
16 AUG 2017
P.O. BOX CY 429, CAUSEWAY
ZIMBABWE TEL: 04-790721/4

PETER NGARIZE
6300, ZIMTA PARK
MUTARE

Dear Sir

RE: REQUEST FOR PERMISSION TO CONDUCT AN ACADEMIC RESEARCH ON FOOD AID RELIEF ASSISTANCE IN MASVINGO AND THE ZAMBEZI BASIN; ZIMBABWE

Receipt of your letter dated 10 June 2017 with the above referenced subject is acknowledged.

Please be advised that permission is hereby granted for you to conduct research in Masvingo Province and the Zambezi Basin on the topic entitled; **An assessment of supply chain risk management in food aid and relief operations in Zimbabwe**.

May you be advised that the permission is granted on condition that the research is for academic purposes only as you pursue your PhD in Supply Chain and Disaster Management with the Durban University of Technology. In that regard, the research shall not be for publicity and in case of child protection, identity has to be protected at all costs.

You are kindly requested to submit a copy of your final research document to the Ministry of Public Service, Labour and Social Welfare upon completion.

N. MASUKA
Secretary for Public Service, Labour and Social Welfare

Telephone: 796450/60
Telegrams: "SECLAB"
Private Bag 7707/7750
Causeway

ZIMBABWE

MINISTRY OF PUBLIC SERVICE, LABOUR
AND SOCIAL WELFARE
Compensation House
Cnr Fourth Street and Central Avenue

HARARE

Ref: SW/12/5

09 July 2019

Mr. Peter Ngarize
6300, ZIMTA Park
Mutare

REQUEST FOR PERMISSION TO CONDUCT AN ACADEMIC RESEARCH ON FOOD AID RELIEF ASSISTANCE IN MASVINGO AND THE ZAMBEZI BASIN: ZIMBABWE: MINISTRY OF PUBLIC SERVICE, LABOUR AND SOCIAL WELFARE

Reference is made to your application letter dated 05 July 2019.

Please be advised that permission is hereby granted for you to conduct research in Masvingo Province and the Zambezi Basin on the topic entitled; **An assessment of supply chain risk management in food aid and relief operations in Zimbabwe.**

May you be advised that the permission is granted on condition that the research is for academic purposes only as you pursue your PhD in Supply Chain and Disaster Management with the Durban University of Technology. In that regard, the research shall not be for publicity and in case of child protection, identity has to be protected at all costs.

You are kindly requested to submit a copy of your final research document to the Ministry of Public Service, Labour and Social Welfare upon completion.

E.C. Gapara
Director – Human Resources
For: SECRETARY PUBLIC SERVICE, LABOUR AND SOCIAL WELFARE

MINISTRY OF LABOUR AND SOCIAL WELFARE
HUMAN RESOURCES DEPARTMENT
09 JUL 2019
09 JUL 2019
P.O. BOX 7707, CAUSEWAY
HARARE TEL: 04-790871706532

Correspondence should not be addressed to individuals

Telephone: 263351/2/3/2266111
Fax : 2266110
Email address: pamasvingo1@gmail.com

ZIMBABWE

Reference:
MINISTRY OF LOCAL GOVERNMENT, PUBLIC WORKS AND NATIONAL HOUSING
Provincial Administration
Benjamin Burombo House
P.O. Box 595
Masvingo

17 July 2019

DISTRICT ADMINISTRATOR
MIN. OF LOCAL GOVT. PUBLIC
WORKS & NATIONAL HOUSING
- 1 AUG 2019
P.O. BOX 199, CHIREDZI
ZIMBABWE

The District Development coordinator
Chivi
Chiredzi
Masvingo
Mwenezi
Zaka

AUTHORITY TO CARRYOUT RESEARCH ON FOOD AID RELIEF ASSISTANCE IN MASVINGO AND THE ZAMBEZI BASIN: ZIMBABWE: MR PETER NGARIZE PhD STUDENT: DURBAN UNIVERSITY OF TECHNOLOGY.

The above matter refers.

Mr. Peter Ngarize was authorised to carry out an academic research on the topic entitled "An assessment of supply chain risk management in food aid and relief operations in Zimbabwe".

DISTRICT ADMINISTRATOR
MIN. OF LOCAL GOVT. PUBLIC
WORKS & NATIONAL HOUSING
06 AUG 2019
P.O. BOX 10, MWENEZI
ZIMBABWE

May you please assist him carryout his academic research.

PROVINCIAL ADMINISTRATOR
MIN. OF LOCAL GOVT. PUBLIC
WORKS & NATIONAL HOUSING
10 JUL 2019
RECORDS & INFORMATION
P.O. BOX 595, MASVINGO

Chigaba M
For: Acting Provincial Development Coordinator – Masvingo

Appendix 5: Editorial Technical Report

Mount Pleasant Dr
P.O. Box MP 167 Mount
Pleasant
Harare
Zimbabwe
Direct Line: (263-4) 333675
Phone: (263-4) 303211 ext. 1211
Telefax: (263-4) 333675

Department of English

UNIVERSITY OF ZIMBABWE

8th January 2020

REF: Technical Editor's Report on Mr. Peter Ngarize' Thesis

TECHNICAL EDITOR: Prof. Ruby Magosvongwe (DPhil, UCT)

Chairperson, Department of English, Faculty of Arts, UZ.

TITLE OF THESIS: An Assessment of the Impact of Supply Chain Risk Management in Food-Aid Distribution in Zimbabwe

I proofread the thesis which bears the title above to enhance the formulation of thoughts, bring out the contemplated meaning and enhance the readability thereof. Generally, the thesis was informative, well thought-out, and readable but I found the following mistakes so glaring and effected corrections as a remedy. The thesis contained serious punctuation errors one of which was the excessive use of commas most of which were incorrectly placed. Another punctuation error focused on the use of common nouns where a proper noun would create the desired meaning, for example, "Zimbabwean government" instead of, "Zimbabwean Government" or "Government of Zimbabwe" (GoZ).

The thesis also had serious omissions with regards to the use of the hyphen. There was a need to hyphenate certain phrases to improve the flow of ideas. For instance, the phrase, "day to day" should be punctuated as follows, "day-to-day." Compound nouns like "food- aid" also needed to be hyphenated and rendered as "food-aid". I have also corrected commonly confused words, such as "compliment" instead of "complement" when referring to related measures which should enhance each other. I have also effected corrections where certain words were read as two instead of a single word, for instance, "in accessible" instead of, "inaccessible."

Having effected the necessary corrections and adjustments in terms of vocabulary and cogent expression, I feel that the thesis flows seamlessly and focuses on a very timely and pertinent research area of the need to devise efficient ways of enhancing Food-Aid Distribution mechanisms in Zimbabwe in the wake of disasters. The thesis adds a unique contribution that will help not only the Government of Zimbabwe, but NGOs and other stakeholders in the region and beyond by taking preemptive mechanisms when handling disasters of unprecedented magnitude in order to timeously alleviate and leverage pain among the affected communities.

Appendix 6: Turnitin Report

turnitin | ephorus

Document title	An_assessment_of_the_impact_of_supply_chain_risk_..
Submit date	Mon 13 Jan 2020 04:10:31 PM CET

3%

1% http://ir.dut.ac.za/bitstream/10321/1101/1/LETOOANE_2013.pdf
1% http://www.arabianjbmr.com/pdfs/RD_VOL_1_12/1.pdf
1% The impact of collaborative strategies on disaster risk reduction in Zimbabwe dairy supply chains in 2016
1% http://researchspace.ukzn.ac.za/bitstream/handle/10413/533/Krause_Samantha_2009.pdf?sequence=3&isAllowed..
1% Found at: UOZ University of Zimbabwe (Manjengwa Prosper Msc Thesis Power Quality Assessment and Mitigation..
1% http://spectrum.library.concordia.ca/974787/1/Bandaly_PhD_F2012.pdf
1% Building a Natural Disaster Risk Index for Supply Chain Operations
1% https://hicl.org/publications/2015/20/1.pdf
1% Found at: UOZ University of Zimbabwe (In Search Thesis_Sept2017_r2.doc, 11/01/2017)
1% http://eprints.aston.ac.uk/16174/1/Accepted_version_IJLRA.pdf
1% Found at: UOZ University of Zimbabwe (Manjengwa Prosper Msc Thesis Power Quality Assessment and Mitigation..
1% http://training.fema.gov/EMIWeb/edu/Comparative%20EM%20Book%20-%20Chapter%20Zimbabwe's%20Emerg..
1% Facility location in humanitarian relief: a review
1% A community-based approach to supply chain design
1% Zimbabwe's Drought Relief Programme in the 1990s: A Re-Assessment Using Nationwide Household Survey
1% https://www.researchgate.net/publication/321257581_Supply_chain_integration_value_creation_through_managin...
1% Found at: UOZ University of Zimbabwe (CHAKAUYA BASTIE R9916335.docx, 12/17/2012)
1% Risk-agility interactive model: a new look at agility drivers
1% Found at: UOZ University of Zimbabwe (Dissertation Full Draft - NF Chanaka.docx, 07/30/2014)
1% Challenges of adopting ICT solutions in a Nigerian healthcare SME
1% Disaster Management and Private Sectors
1% Found at: UOZ University of Zimbabwe (Dissertation Final doc Pamela Ndoro [R144849F].docx, 02/27/2017)
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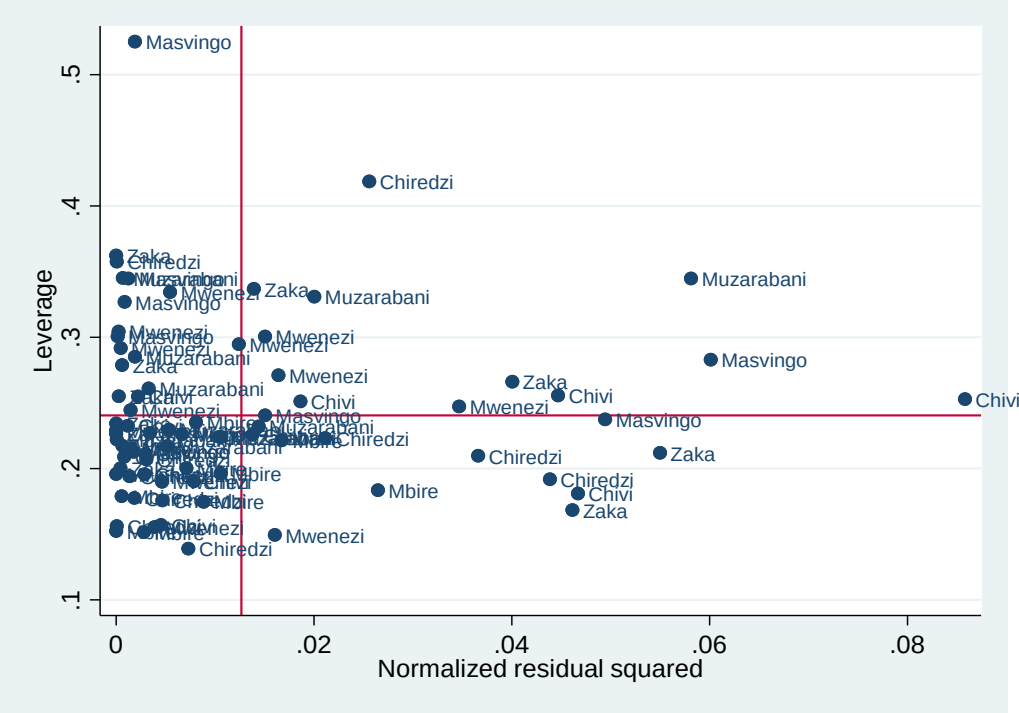
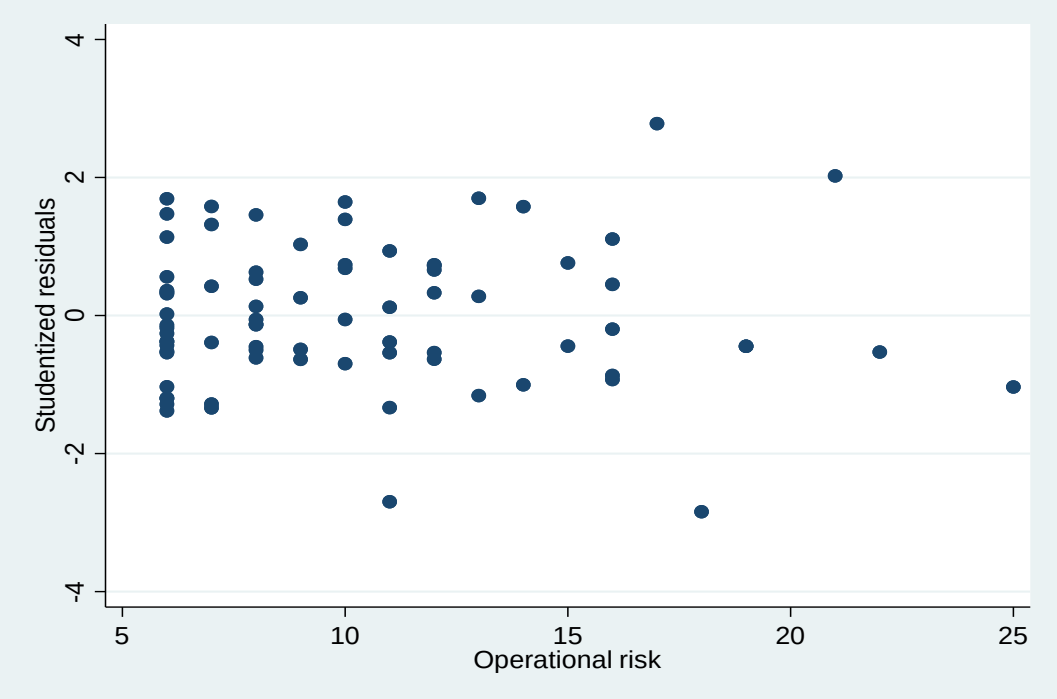
1% Found at: UOZ University of Zimbabwe (Nyasha N'onzwe, R144676T , Masters in Social Work - N'onzwe - R1446...

APPENDIX A

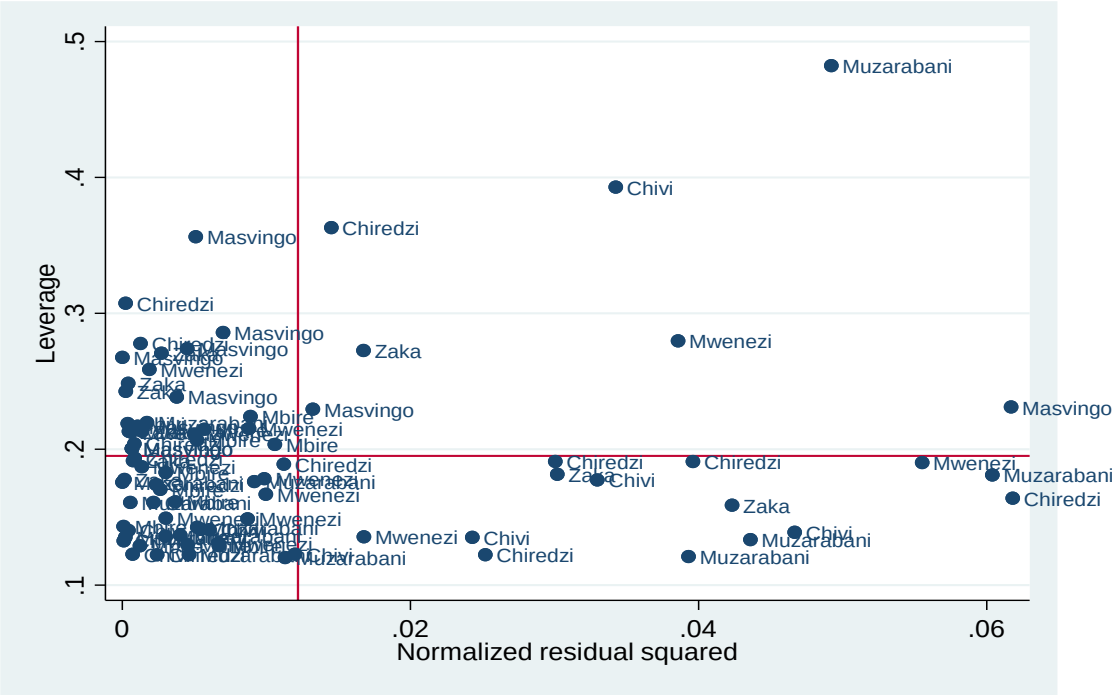
Appendix A.1: Test of residuals and influence



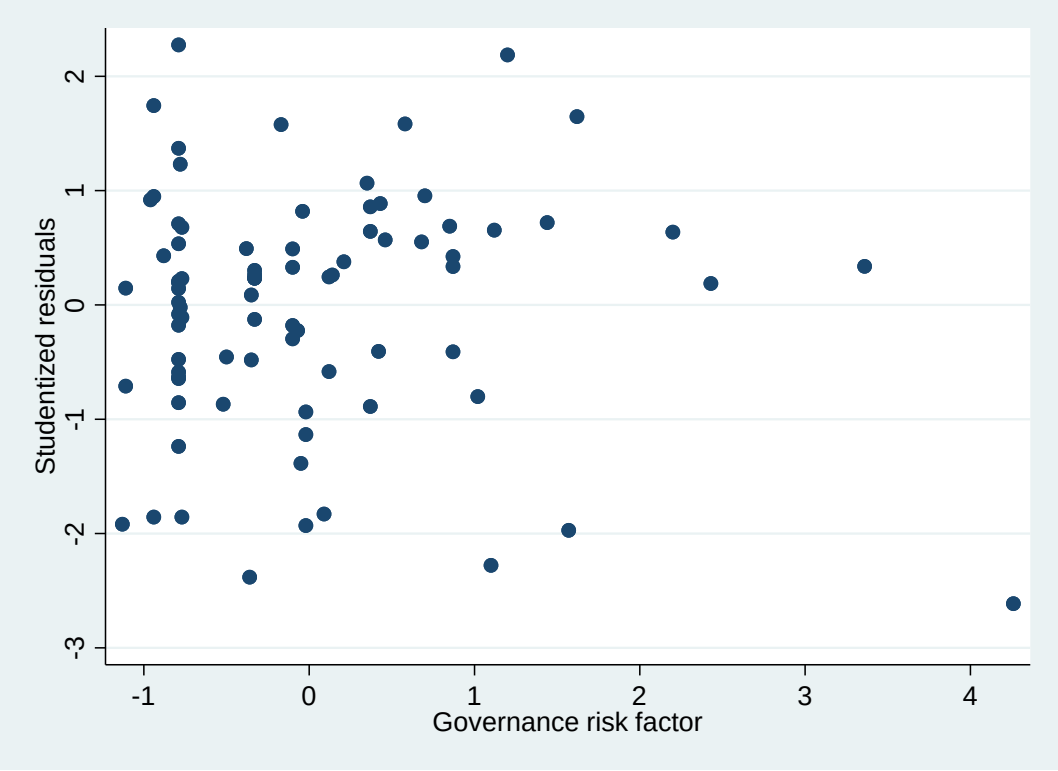
Appendix A.2: Linearity test



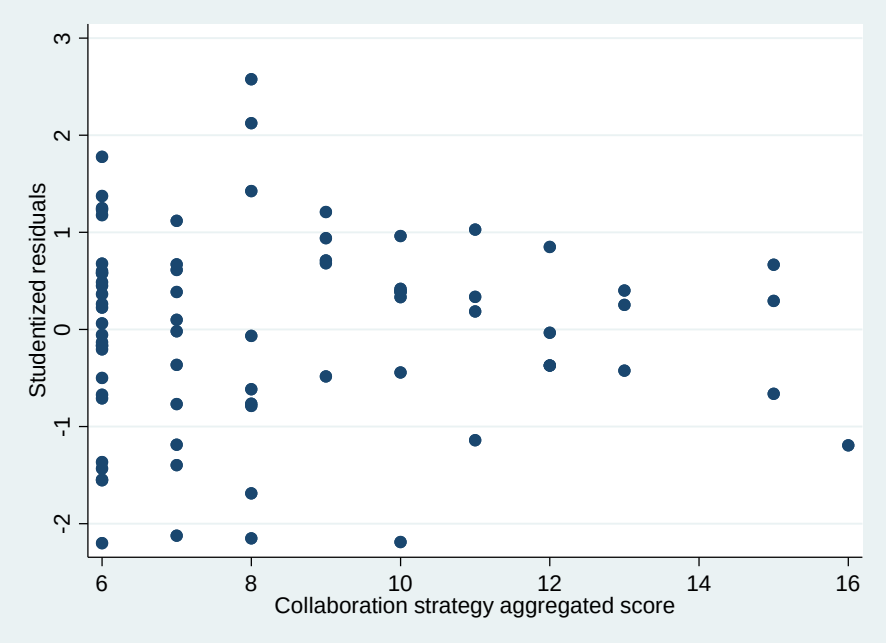
Appendix A.3: Influence test



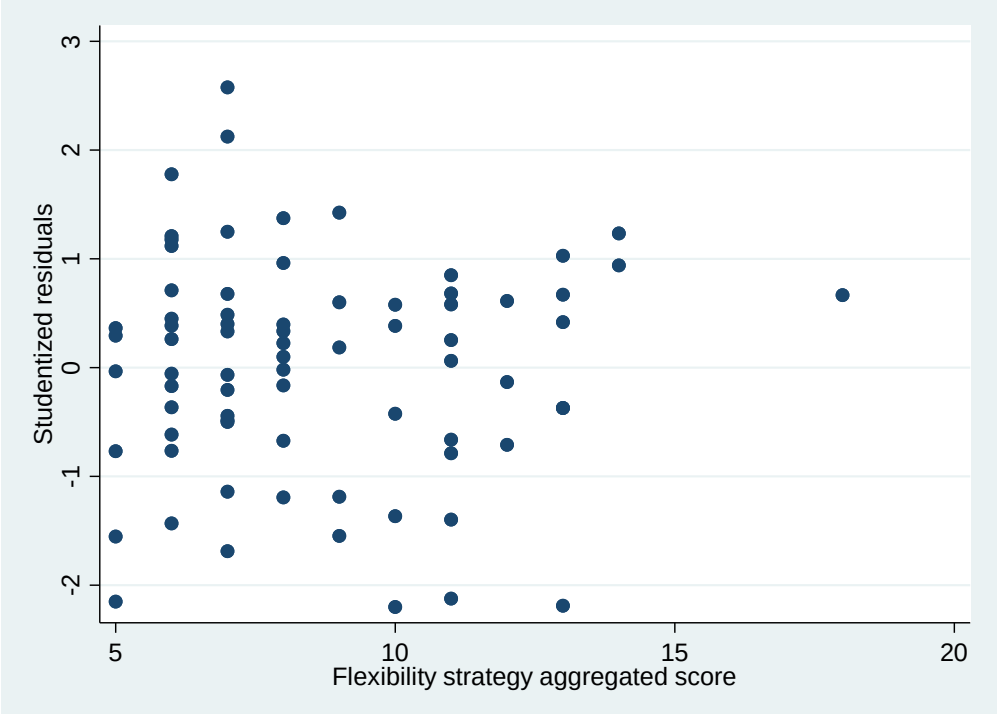
Appendix A.4: Linearity test



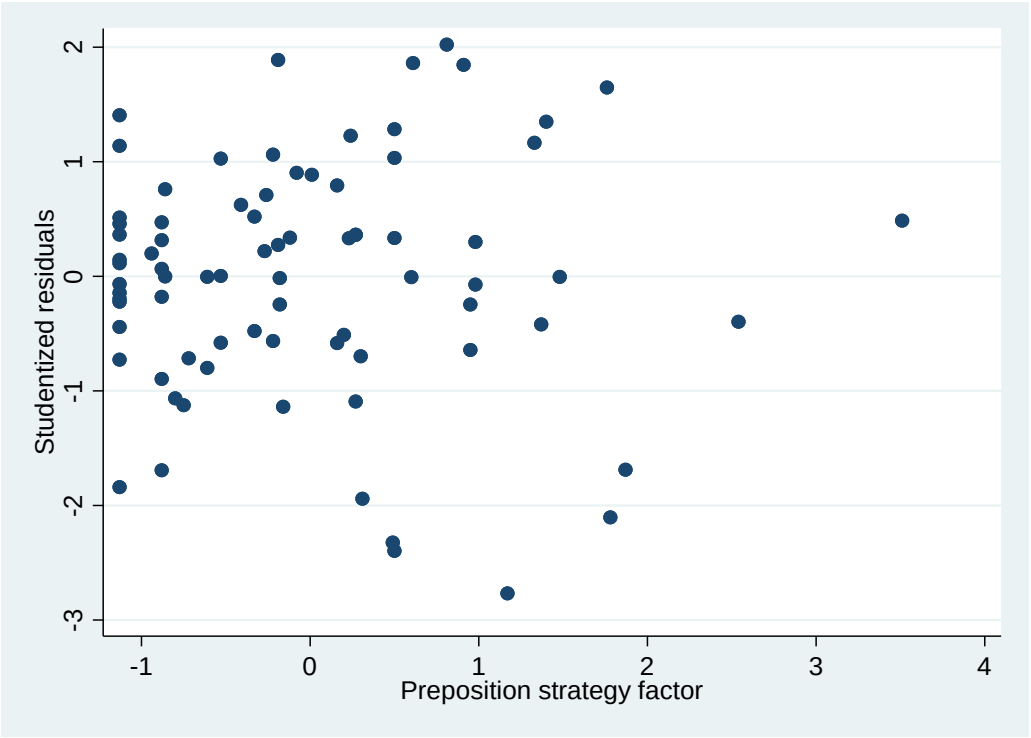
Appendix A.5: Linearity test



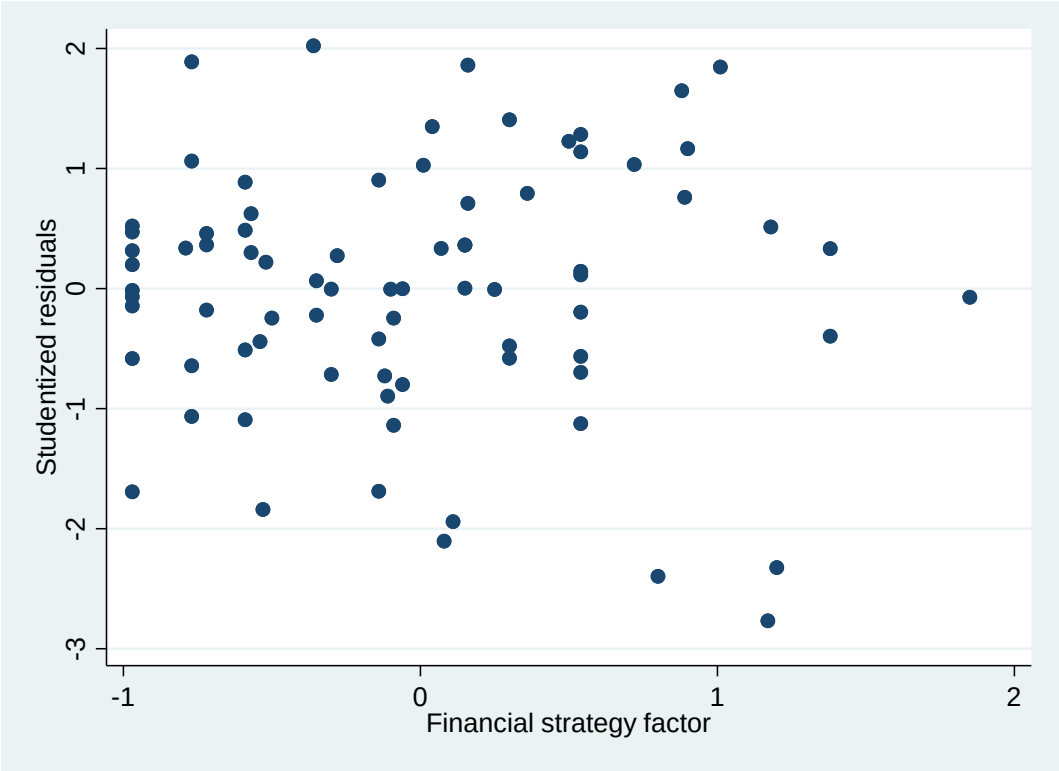
Appendix A.6: Linearity test



Appendix A.7: Linearity test



Appendix A.8: Linearity test



Appendix A.9: Reliability scores

Scale	Number of items	Alpha
Supply chain risks	15	0.874
Supply performance metrics	9	0.874
Flexibility strategy	5	0.705
Prepositioning strategy	6	0.839
Collaboration strategy	6	0.749
Financing strategy	7	0.756
Insurance strategy	4	0.837
Governance strategy	5	0.841

Appendix A.10: Risk index differences by gender

Gender	Observations	Mean (Std. Err)
Male	49	0.20 (0.354)
Female	33	-0.3 (0.387)

Appendix A.11: Risk index differences by age of respondent

	<35 years	36 - 40 years
36 - 40 years	1.06	
>41 years	2.26*	1.19

Appendix A.12: Risk index differences by educational status

	Professional certificate	Professional Diploma	Degree
Professional Diploma	-0.44		
Degree	-0.01	0.43	
Post graduate Qualification	4.10	4.54*	4.11*

Appendix A.13: Risk index differences by level of experience

	<5 years	6 - 10 years
6 -10 years	-1.33	
11 years	-1.56	-0.23

Appendix A.14: Risk index differences by educational status

	Professional certificate	Professional Diploma	Degree
Professional Diploma	-0.44		
Degree	-0.01	0.43	
Post graduate Qualification	4.10	4.54*	4.11*

Appendix A.15: Risk index differences by level of experience

	<5 years	6 - 10 years
6 -10 years	-1.33	
11 years	-1.56	-0.23

Appendix A.16: Risk index differences by area of operation, descriptive statistics

Area of operation	Observations	Mean	Min	Max	Standard deviation
Chiredzi	12	0.39	0.02	0.86	0.225
Chivi	12	0.16	0.00	0.71	0.213
Masvingo	10	0.58	0.27	1.00	0.267
Mbire	12	0.15	0.00	0.59	0.168
Muzarabani	13	0.14	0.00	0.49	0.174
Mwenezi	13	0.34	0.05	0.70	0.193

Zaka	10	0.19	0.00	0.63	0.197

Appendix A.17: Risk index differences by area of operation

	Chiredzi	Chivi	Masvingo	Mbire	Muzarabani	Mwenezi
Chivi	-2.14					
Masvingo	1.83	3.97*				
Mbire	-2.31	-0.17*	-4.14			
Muzarabani	-2.37	-0.22*	-4.20	-0.05		
Mwenezi	-0.42	1.73	-2.25	1.90	1.95	
Zaka	-1.86	0.28*	-3.69	0.45	0.51	-1.44

Supply chain risk and supply chain performance using summation scores – model 1 diagnostics

Appendix A.18: Shapiro Wilk normality test

Variable	Obs	W	V	z	Prob>z
Residual	78	0.979	1.408	0.748	0.227

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

chi2 (1) = 0.68

Prob > chi2 = 0.4102

Appendix A.19: Variance Inflation Factors

Variable	VIF	1/VIF
Gender	1.28	0.78
Age category		
2	1.46	0.69
3	1.71	0.59
2.educrec	1.18	0.85

Experience category		
2	2.77	0.36
3	2.31	0.43
Area of operation		
2	2.31	0.43
3	2.88	0.35
4	2.2	0.45
5	2.36	0.42
6	2.31	0.43
7	1.82	0.55
Operational risk	2.04	0.49
Governance risk	1.29	0.77
Environmental risk	1.95	0.51
Mean VIF	1.99	

Ramsey RESET test using powers of the fitted values of log_ factor_ supply performance

Ho: model has no omitted variables

F (3, 57) = 1.87

Prob > F = 0.1447

Model 2 – Supply chain risks and supply chain performance – using factor scores

Appendix A.20: Shapiro – Wilk normality test

Variable	Obs	W	V	z	Prob>z
Residual	82	0.970	2.132	1.661	0.048

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

chi2(1) = 0.06

Prob > chi2 = 0.8007

Ramsey RESET test using powers of the fitted values of log_ factor_ supply performance

Ho: model has no omitted variables

F (3, 63) = 1.52

Prob> F = 0.2168

Appendix A.21: Variance Inflation Factors

Variable	VIF	1/VIF
Gender	1.34	0.75
Age category		
2	1.74	0.58
3	1.73	0.58
2.educrec	1.18	0.85
Experience category		
2	2.87	0.35
3	2.41	0.42
Area of operation		
2	2.26	0.44
3	2.52	0.40
4	2.13	0.47
5	2.15	0.47
6	2.25	0.44
7	1.91	0.52
Factor flexibility	1.52	0.66
Factor preposition	1.61	0.62
Factor collaboration	1.62	0.62
Factor financial	1.83	0.55
Factor insurance	1.88	0.53
Factor governance	1.79	0.56
Mean VIF	1.93	

Model 3 – Supply chain risk management strategies and supply chain performance

Appendix A.22: Shapiro – Wilk normality test

Variable	Obs	W	V	z	Prob>z
Residual	75	0.981	1.239	0.467	0.320

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

chi2(1) = 0.27

Prob > chi2 = 0.6028

Ramsey RESET test using powers of the fitted values of log_ factor_ supply performance

Ho: model has no omitted variables

F (3, 53) = 3.21

Prob> F = 0.0303

Appendix A.23: Variance Inflation Factors

Variable	VIF	1/VIF
Gender	1.35	0.74
Age category		
2	1.79	0.56
3	1.81	0.55
2.educrec	1.14	0.88
Experience category		
2	3.12	0.32
3	2.62	0.38
Area of operation		
2	2.29	0.44
3	2.60	0.39
4	2.16	0.46
5	2.15	0.46
6	2.04	0.49
7	1.92	0.52
Flexibility score	1.53	0.66
Preposition score	1.58	0.63
Collaboration score	1.75	0.57
Financial score	1.92	0.52
Insurance score	1.96	0.51
Governance score	1.90	0.53
Mean VIF	1.98	

Model 4 – Supply chain management strategies and supply chain performance – using factor scores

Appendix A.24: Shapiro – Wilk normality test

Variable	Obs	W	V	z	Prob>z
Residual	79	0.976	1.611	1.044	0.148

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

chi2(1) = 0.68

Prob > chi2 = 0.4102

Ramsey RESET test using powers of the fitted values of log_ factor_ supply performance

Ho: model has no omitted variables

F (3, 57) = 1.87

Prob> F = 0.1447

Appendix A.25: Variance Inflation Factors

Variable	VIF	1/VIF
Gender	1.34	0.75
Age category		
2	1.74	0.58
3	1.73	0.58
2.educrec	1.18	0.85
Experience category		
2	2.87	0.35
3	2.41	0.42
Area of operation		
2	2.26	0.44
3	2.52	0.40
4	2.13	0.47
5	2.15	0.47
6	2.25	0.44
7	1.91	0.52

Factor flexibility	1.52	0.66
Factor preposition	1.61	0.62
Factor collaboration	1.62	0.62
Factor financial	1.83	0.55
Factor insurance	1.88	0.53
Factor governance	1.79	0.56
Mean VIF	1.93	