**BINDURA UNIVERSITY OF SCIENCE EDUCATION**

**FACULTY OF COMMERCE**

**DEPARTMENT OF ECONOMICS**

# EFFECT OF SUPPLY CHAIN VISIBILITY ON FLEXIBILITY PERFORMANCE. EVIDENCE FROM DISASTER RELIEF OPERATIONS DURING CYCLONE IDAI IN ZIMBABWE


**BY**

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**Dedications**

I dedicate this work to my family

**Abstract**

The main purpose of this research was to find out the effect of supply chain visibility on improving flexibility performance in the disaster hit areas. It highlights the devastating impact of Cyclone Idai in Zimbabwe and the subsequent challenges faced by humanitarian organizations in providing relief efforts. A simple linear regression is also used for quantitative data analysis. Qualitative data analysis was also employed. The findings indicate a positive and significant relationship between supply chain visibility and flexibility performance. Specifically technology infrastructurewas found to have the biggest effect on flexibility performance. At 5 percent level of significance, technology infrastructurewas found to positively affect flexibility performance by around 25%. The results shows that is very important to improve flexibility performance by improving the technology infrastructure. One of the main policy recommendation is the need to invest more into transport infrastructure. As area for further study, the extension of this research could increase the sample size and include other regions which were affected by Cyclone Idai which are in Mozambique and Malawi. This will improve the reliability of the results.

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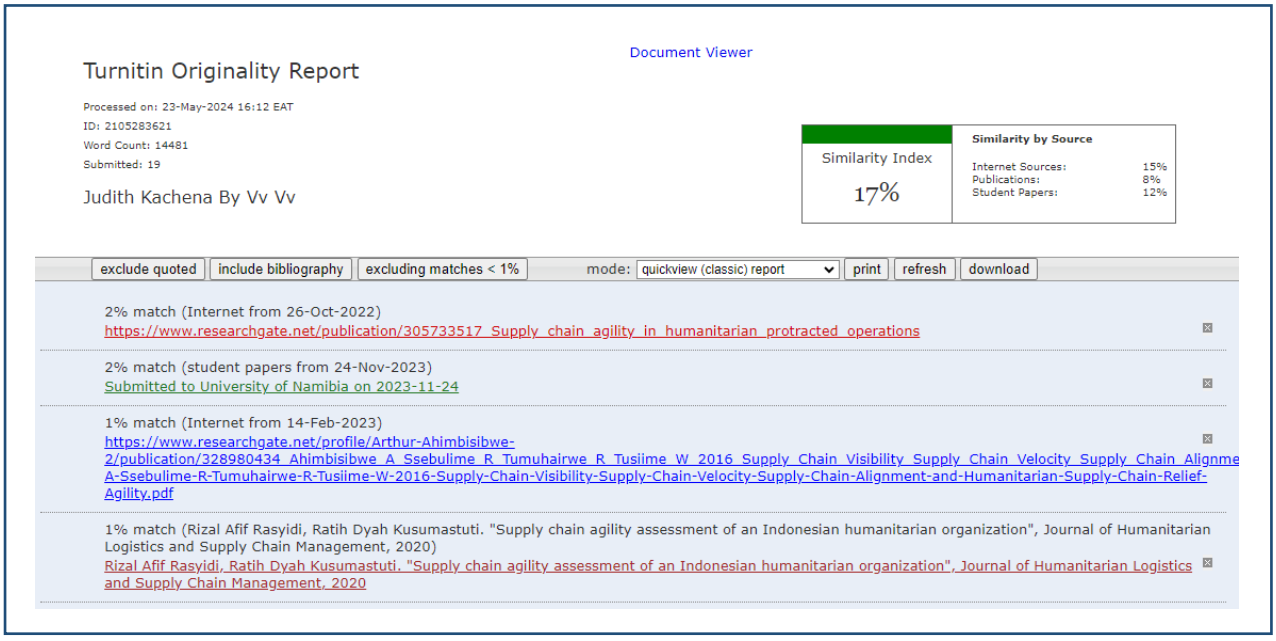

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# CHAPTER ONE

# INTRODUCTION

## 1.0 Introduction

Supply chain visibility plays a crucial role in disaster relief operations, facilitating the efficient flow of goods and information during critical times. This study aims to investigate the impact of supply chain visibility on flexibility performance, focusing on the relief efforts following Cyclone Idai which hit Zimbabwe in 2019. By examining the utilization of supply chain visibility technologies and practices, as well as their influence on response time, resource allocation, and overall operational effectiveness, this research seeks to provide empirical evidence on the relationship between visibility and flexibility in disaster contexts.This chapter will present the background of the study, problem statement, objectives and research questions of the of the study, the relevance of the study and the chapter summary.

## 1.1 Background of the study

Cyclone Idai devastated Zimbabwe in 2019, highlighting the crucial role of effective disaster relief operations. These operations rely heavily on a resilient supply chain to deliver critical aid quickly and efficiently to those in need. The two Zimbabwean districts of Chimanimani and Chipinge in Manicaland Province were the most affected by that natural disaster which left a devastating trail of destruction in infrastructure and human life. Zimbabwe recorded 102 deaths, and over 200 people were injured while about 250 people were missing by March 19, 2019 (Chari &Novukela 2023; OCHA 2019).This research explores the relationship between supply chain visibility and flexibility performance in the context of disaster relief operations during Cyclone Idai in Zimbabwe. Cyclone Idai was a powerful tropical cyclone that made landfall in March 2019, affecting several countries in South Eastern Africa, including Zimbabwe, Mozambique, and Malawi. Zimbabwe experienced severe flooding and extensive damage to

infrastructure, resulting in significant human suffering and the need for immediate disaster relief operations.

**Supply chain visibility**

Supply chain refers to the ability to track and monitor the movement of goods, information, and resources throughout the supply chain network. It involves having real time information about inventory levels, order status, transportation, and other relevant data points. Supply chain visibility enhances transparency and enables stakeholders to make more informed decisions, improve coordination, and respond effectively to disruptions. It involves having visibility into various aspects of the supply chain, such as inventory levels, order status, transportation, and other relevant data points.

Supply chain visibility provides transparency by offering real time insights into the movement of goods, enabling stakeholders to have a clear understanding of the location and status of products at any given time. It allows organizations to track shipments, monitor inventory levels, and identify potential bottlenecks or delays in the supply chain. It proactive decision making that is with supply chain visibility, organizations can make informed and proactive decisions based on real-time data. They can react quickly to changes in demand, supply, or external factors, such as disruptions or market fluctuations. This helps in optimizing inventory levels, improving order fulfilment, and reducing lead times. Additionally, visibility across the supply chain enables better coordination and collaboration between different stakeholders, such as suppliers, manufacturers, distributors, and customers. It promotes effective communication, enhances information sharing, and facilitates timely responses to issues or changes in the supply chain.Supply chain visibility allows organizations to provide better customer service by offering accurate and timely information about order status, delivery dates, and product availability. This helps in meeting customer expectations, reducing order fulfilment errors, and improving overall customer satisfaction.

Also, supply chain visibility plays a crucial role in risk management. It allows organizations to identify and mitigate potential risks or disruptions in the supply chain, such as supplier delays, transportation issues, or natural disasters. By having visibility into the supply chain, organizations can implement contingency plans and alternative strategies to minimize the impact of disruptions on operations.Cost efficiency is also related to supply chain visibility. Improved

visibility enables organizations to optimize their supply chain operations, reduce unnecessary costs, and improve overall efficiency. By having a clear view of inventory levels, organizations can avoid overstocking or stockouts, optimize transportation routes, and minimize excess inventory holding costs.

Overall, supply chain visibility is essential for organizations to effectively manage their supply chain operations, enhance flexibility, and respond efficiently to changes and disruptions. It enables organizations to make data-driven decisions, improve collaboration, and provide better customer service, ultimately leading to improved operational performance and competitiveness.

**Flexibility Performance**

Flexibility performance in the supply chain context refers to the ability of a supply chain to adapt and respond quickly to changes in demand, supply, or external factors. It involves the capability to adjust production, distribution, and logistics processes efficiently to meet changing customer needs or unexpected events, such as natural disasters.

Disaster relief operations involve the coordinated efforts of various organizations, including government agencies, non-governmental organizations (NGOs), and humanitarian aid providers, to provide immediate assistance and support to affected populations during and after a natural disaster. These operations aim to deliver essential supplies, including food, water, medical aid, and shelter, to affected areas and ensure their efficient distribution.

The research study you mentioned likely examines the impact of supply chain visibility on the flexibility performance of disaster relief operations during Cyclone Idai in Zimbabwe. It may involve collecting and analysing data related to supply chain visibility practices, response time, resource allocation, coordination, and overall performance during the relief operations. The findings of the study can provide insights into the importance of supply chain visibility in enhancing flexibility and improving the effectiveness of disaster relief efforts.

Flexibility performance in humanitarian logistics refers to the ability of humanitarian organizations to adapt and respond quickly to changing circumstances and demands in disaster or crisis situations. It involves the capability to adjust logistics processes, resources, and activities in a timely and efficient manner to meet the evolving needs of affected populations. Flexibility performance in humanitarian logistics emphasizes the importance of a rapid and timely response

to crises or disasters. Humanitarian organizations need to have well defined emergency response plans and procedures in place to quickly mobilize resources, deploy personnel, and initiate relief operations. Additionally, flexibility in humanitarian logistics requires the ability to scale up or down operations based on the changing needs and scale of the crisis. This involves having the capacity to quickly ramp up the procurement, storage, and distribution of relief supplies when demand surges, and to scale down operations as the situation stabilizes. A flexible humanitarian supply chain is designed to adapt to the unique challenges and constraints of disaster or crisis scenarios. It involves having pre-established relationships with suppliers, pre-positioned stocks, and flexible sourcing options to ensure the availability and timely delivery of essential relief items.

In addition, flexibility in humanitarian logistics relies on effective coordination and collaboration among various stakeholders involved in relief operations, including government agencies, NGOs, donors, and local communities. This involves information sharing, joint planning, and cooperation to optimize the allocation of resources and avoid duplication of efforts. Timely and accurate information management is crucial for flexibility in humanitarian logistics. Having real-time data on the needs of affected populations, available resources, and logistics constraints enables organizations to make informed decisions and allocate resources efficiently.

Flexibility performance promotes partnerships and networks, that is building partnerships and networks with local organizations, community groups, and private sector actors can enhance flexibility in humanitarian logistics. These collaborations can provide access to local knowledge, resources, and infrastructure, enabling faster and more effective response to crises.Embracing innovative solutions and leveraging technology can significantly contribute to flexibility in humanitarian logistics. Technologies such as mobile applications, data analytics, and remote sensing can improve supply chain visibility, enable better decisionmaking, and enhance operational efficiency.

By focusing on flexibility performance in humanitarian logistics, organizations can effectively navigate the complexities and uncertainties of disaster situations, adapt to changing needs, and ensure the timely and efficient delivery of life saving assistance to affected populations.The extent to which supply chain visibility influences flexibility performance in such contexts has garnered significant attention from scholars and practitioners alike. During disaster events, such

as Cyclone Idai in Zimbabwe, the ability to quickly adapt and respond to changing circumstances is paramount for effective relief efforts (Kovács&Spens, 2021). However, the success of these operations often hinges on the visibility of critical resources and the coordination among various stakeholders involved in the relief supply chain (Tomasini& Van Wassenhove; 2022, Besiou, M., Pedraza-Martinez & Van Wassenhove, 2021).

In recent years, the importance of supply chain visibility in disaster relief operations has been underscored by numerous studies highlighting its impact on operational efficiency and responsiveness. Research conducted in 2021 by Johnson et al. emphasized the role of real-time information sharing and visibility technologies in enhancing the agility and resilience of supply chains during crisis situations. Similarly, a study by Chen and Paul (2022) highlighted the significance of visibility tools such as GPS tracking and RFID technology in improving the speed and accuracy of resource allocation in disaster-affected areas.

The context of Cyclone Idai in Zimbabwe serves as a compelling case study to explore the relationship between supply chain visibility and flexibility performance within disaster relief operations. Cyclone Idai resulted in widespread devastation and humanitarian crises, underscoring the critical need for efficient and agile supply chain management in emergency response efforts (Govindan et al., 2023). However, despite the inherent challenges posed by such disasters, opportunities exist to leverage supply chain visibility technologies and practices to enhance the effectiveness of relief operations.

Furthermore, the aftermath of Cyclone Idai offers valuable insights into the dynamics of supply chain visibility and flexibility performance in resource-constrained environments. Research by Khan et al. (2023) highlights the role of collaborative partnerships and information sharing among humanitarian organizations, government agencies, and private sector entities in improving supply chain visibility and response coordination. By examining the experiences and outcomes of relief efforts during Cyclone Idai, this study aims to contribute to the growing body of literature on disaster resilience and supply chain management.

Additionally, understanding the factors that influence supply chain visibility and flexibility performance in the context of disaster relief operations is crucial for informing future planning and preparedness efforts. As highlighted by Lai et al. (2022), the integration of advanced technologies such as blockchain and artificial intelligence can further enhance supply chain

visibility and enable more proactive and adaptive response strategies. By investigating the specific challenges and opportunities encountered during Cyclone Idai, this research seeks to identify best practices and recommendations for improving supply chain resilience in similar disaster scenarios.

Moreover, the study aims to fill a gap in the literature by providing empirical evidence on the relationship between supply chain visibility and flexibility performance within the context of disaster relief operations in Zimbabwe. By analysing data collected from stakeholders involved in Cyclone Idai response efforts, including humanitarian organizations, government agencies, and local communities, this research seeks to elucidate the mechanisms through which supply chain visibility influences the ability to effectively respond to dynamic and unpredictable disaster scenarios. Ultimately, the findings of this study are expected to inform policy decisions and managerial practices aimed at enhancing the resilience and responsiveness of supply chains in the face of natural disasters and humanitarian crises.

### 1.2 Statement of the problem

Despite the recognized importance of supply chain visibility in disaster relief operations, there remains a lack of empirical evidence regarding its specific impact on flexibility performance, particularly within the context of Cyclone Idai in Zimbabwe. While theoretical frameworks and anecdotal evidence suggest that enhanced visibility can lead to improved responsiveness and adaptability in supply chain operations, there is a dearth of comprehensive studies examining this relationship in real-world disaster scenarios, Amponsah, K. D. (2022).Furthermore, the unique challenges posed by Cyclone Idai, including infrastructure damage, communication disruptions, and resource constraints, present an opportunity to explore the practical implications of supply chain visibility on flexibility performance within a complex and dynamic humanitarian context. Thus, understanding the extent to which supply chain visibility influences the ability to effectively manage and coordinate relief efforts during disasters such as Cyclone Idai is critical for informing decision-making and improving disaster resilience in similar contexts.

### 1.3 Research objectives

i. To investigate the extent to which supply chain visibility technologies and practices were utilized during the relief operations following Cyclone Idai in Zimbabwe.
ii. To assess the impact of supply chain visibility on flexibility performance within the context of Cyclone Idai relief operations.
iii. To recommend on some policy measure that can be adopted to improve the flexibility and visibility in supply chain management in disaster hit areas.

## 1.4 Research questions

i. To what extent do supply chain visibility technologies and practices were utilized during the relief operations following Cyclone Idai in Zimbabwe.
ii. What is the impact of supply chain visibility on flexibility performance within the context of Cyclone Idai relief operations?
iii. What recommendations can be put for policy makers to implement in order to improve the flexibility and visibility in supply chain management in disaster hit areas?

## 1.5 Research hypotheses

**Null Hypothesis (H0):** Supply chain visibility positively and significantly impact flexibility performance in the context of Cyclone Idai relief operations.

**Alternative Hypothesis (H1):** Supply chain visibility negatively and significantly improves flexibility performance in the context of Cyclone Idai relief operations.

## 1.6 Significance of the study

Zimbabwe's experience with Cyclone Idai provides a valuable real-world example to explore this relationship. By examining how well relief organizations could track and manage supplies, researchers can gain insights into the impact of visibility on flexibility during disaster response. The significance of the study lies in its potential to contribute valuable insights and practical implications to both academia and practice in the field of disaster management and supply chain resilience. Firstly, the study addresses a critical gap in the literature by empirically examining the relationship between supply chain visibility and flexibility performance within the context of

disaster relief operations, using Cyclone Idai in Zimbabwe as a case study. By providing empirical evidence on this relationship, the study offers a deeper understanding of the mechanisms through which supply chain visibility influences the effectiveness of relief efforts in disaster-stricken areas.

Secondly, the findings of the study can inform decision-making and policy development processes aimed at enhancing disaster resilience and response capabilities in Zimbabwe and similar disaster-prone regions globally. By identifying critical success factors, challenges, and best practices associated with the integration of supply chain visibility technologies and practices in relief operations, the study offers practical recommendations for improving supply chain resilience and agility in future disaster scenarios. These recommendations can guide stakeholders, including humanitarian organizations, government agencies, and private sector entities, in developing more effective strategies for managing and coordinating relief efforts during emergencies.

Moreover, the study contributes to advancing theoretical knowledge in the fields of disaster management and supply chain resilience by validating existing theories and frameworks within the context of real-world disaster scenarios. By testing hypotheses related to the impact of supply chain visibility on flexibility performance and exploring the underlying factors influencing this relationship, the study enriches the theoretical foundation of disaster resilience and supply chain management literature.

Furthermore, the significance of the study extends beyond academic research to practical applications in disaster preparedness, response, and recovery efforts. By disseminating the findings and recommendations to relevant stakeholders, the study can help improve the efficiency, effectiveness, and coordination of relief operations, ultimately leading to better outcomes for affected communities and enhanced resilience to future disasters. Overall, the study's significance lies in its potential to inform evidence based decisionmaking, policy formulation, and operational practices aimed at mitigating the impact of disasters and improving the overall resilience of supply chains in disaster-prone regions.

### 1.6.1 To the Author

The research is crucial to the researcher because it sheds light on how important it is to ascertain how supply chain visibility affect flexibilityperformance. Additionally, this study will deepen the student's understanding of how all these affect economic growth.

### 1.6.2 To the University

The fact that this research will expand the university's e-learning resources and enhance the university's reputation makes it crucial for Bindura University's educational mission. The study will provide empirical data on the examination of exports and economic growth in Zimbabwe and as a result, other students will benefit from this study. By analysing the results, the research institutions will gain from this study. Researchers will assess the suggestions to see whether supply chain risk management has significantly improved. Other research institutions will pursue the suggested topics of additional research to expand their understanding of supply chain management.

### 1.6.3 Policy Makers

Policymakers in both the private and public sectors will gain from this study's conclusions and suggestions, which they can utilize to improve organizational performance by implementing sensible supply chain risk management techniques. The identification of variables that contribute to supply chain disruptions and the recommendation of mitigation solutions can enhance the performance of both public and private entities.

## 1.7Assumptions

i) Primary data collection will not be biased.
ii) The study will be completed on the stipulated time set by the department.
iii) Findings from the research will be bias free.
iv) Dataset used in this research is accurate and reliable.

## 1.8 Definition of Terms

**1.8.1 Supply Chain Visibility:** Involves having clear and real-time information about the flow of goods, resources, and information throughout the supply chain. This includes knowing the location, status, and quantity of relief supplies at any given time.

**1.8.1 Flexibility Performance:** The ability of the supply chain to adapt to changing needs and disruptions. In disaster relief, this might involve rerouting supplies due to damaged infrastructure or adjusting distribution plans based on evolving needs of affected populations.Disasters are inherently unpredictable, and relief efforts require a high degree of flexibility. Understanding how supply chain visibility can enhance flexibility is crucial for improving the effectiveness of disaster response.

**1.8.2 Supply chain:**It is a system of organizations, people, activities, information, and resources involved in transferring a good or service from a supplier to a client, according to Lyson (2006). Natural resources, raw materials, and component parts are transformed through supply chain operations into a final product that is shipped to the final consumer.

**1.8.3 Supply Chain Management:**According to Christopher and Peck (2005), lowering supply chain vulnerability overall requires the identification and management of risks for the chain through a coordinated strategy across chain participants.

## 1.9Delimitations

i. The research utilise primary data only.
ii. The study is mainly for the Zimbabwean economy only.

## 1.10 Limitations

Gathering primary information and data for the research is expensive. This may lead to a small sample to be used. However the researcher will be guided by the standard sampling procedures for instance using the Krejcie& Morgan (1970) as right sample size will be drawn from the population.

## 1.11Chapter Summary

The dissertation comprises a comprehensive investigation into the relationship between supply chain visibility and flexibility performance in disaster relief operations, using Cyclone Idai in Zimbabwe as a case study. Chapter 1 introduces the research problem, objectives, and significance of the study, setting the stage for an in depth exploration of the topic. Subsequent chapters delve into the background of the study, research objectives, questions, hypotheses, significance, and delimitations, providing a thorough framework for the analysis of supply chain dynamics in disaster contexts. Through empirical research and critical analysis, this study aims

to contribute valuable insights to academia, practice, and policy in the fields of disaster management and supply chain resilience.

# CHAPTER TWO

# LITERATUTURE REVIEW

## 2.0 Introduction

The theoretical review, empirical research, conceptual framework and hypothesis development, gap analysis, and chapter summary are the main sections that make up this chapter. The chapter also looks at the empirical evidence, which consists of investigations that other academics have done on the same subject. A conceptual framework and hypothesis development are also presented.

## 2.1 Theoretical Framework

This section presents the theoretical literature review related to the study topic.

### 2.1.1 Resource Based Theory

The Resource-Based View (RBV) theory which was proposed by Penrose in 1959 is a strategic management framework that emphasizes the importance of internal resources and capabilities in achieving competitive advantage and superior performance for organizations. It suggests that a firm's unique bundle of resources and capabilities are the primary sources of its sustainable competitive advantage. The RBV theory argues that not all resources are equally valuable, and

firms should focus on developing and leveraging their distinctive resources and capabilities that are rare, valuable, difficult to imitate, and non-substitutable. These resources can include physical assets, such as manufacturing facilities or distribution networks, as well as intangible assets, such as brand reputation, organizational culture, or knowledge and expertise.

According to RBV, the competitive advantage of a firm arises from its ability to accumulate and deploy resources and capabilities in a way that is difficult for competitors to replicate. By leveraging its unique resources, a firm can create barriers to entry, increase market power, and generate superior performance. RBV theory also emphasizes the importance of dynamic capabilities, which refer to a firm's ability to adapt and renew its resources and capabilities over time in response to changing market conditions. This allows the firm to sustain its competitive advantage and remain successful in the long term.

The Resource-Based View theory can be applied in the context of flexibility performance within organizations. Flexibility performance refers to an organization's ability to adapt and respond to changes in its internal and external environment effectively. According to RBV, an organization's resources and capabilities play a crucial role in determining its flexibility performance.

Resource Flexibility: RBV emphasizes that organizations should possess flexible resources that can be easily adapted and reconfigured to meet changing demands. These resources can include physical assets, technology infrastructure, and human capital. For example, having modular production systems or cross-functional teams can enhance an organization's ability to quickly adjust its operations in response to market shifts. RBV highlights the importance of dynamic capabilities, which are a firm's ability to sense, seize, and reconfigure resources and capabilities to address changing market conditions. Dynamic capabilities enable organizations to proactively identify and exploit new opportunities or mitigate threats. For instance, the ability to rapidly learn and develop new skills or the capacity to quickly reorganize teams to tackle emerging challenges can enhance flexibility performance.

It also suggests that organizations should possess unique and valuable resources that are difficult for competitors to imitate. This resource heterogeneity enhances an organization's flexibility performance by providing it with a competitive advantage. For example, having a highly skilled and specialized workforce or proprietary technology can enable an organization to adapt more quickly and effectively to changing circumstances.RBV underscores the importance of resource complementarity, which refers to the synergistic combination of resources and capabilities within an organization. Complementary resources can enhance flexibility performance by enabling organizations to leverage multiple resources in a coordinated and efficient manner. For instance, combining flexible production facilities with a responsive supply chain can enhance an organization's ability to meet changing customer demands.

In summary, RBV theory suggests that an organization's resources and capabilities are fundamental to its flexibility performance. By possessing flexible resources, developing dynamic capabilities, leveraging resource heterogeneity, and fostering resource complementarity, organizations can enhance their ability to adapt and respond effectively to changes in their environment, thereby improving their flexibility performance.

### 2.1.2 Resilience Theory

Resilience theory focuses on an organization's ability to adapt and recover from disruptions. Organisations that exhibit resilience in their supply chain management practices, such as flexibility, redundancy, and agility, are better positioned to withstand supply chain risks and maintain performance levels. Resilience Theory is a multidisciplinary theoretical framework that focuses on understanding how individuals, communities, and systems can effectively adapt, recover, and thrive in the face of adversity, shocks, and disturbances. It seeks to explain why some individuals or systems are better able to bounce back and maintain functionality in the face of challenges, while others struggle or experience long-lasting negative effects.

Resilience refers to the capacity of individuals, communities, or systems to withstand, adapt to, and recover from adversity. It encompasses the ability to bounce back, maintain functionality, and even grow stronger in the face of challenges. Resilience is not a fixed trait but rather a dynamic process influenced by multiple factors.

Adaptive Capacity: Adaptive capacity is a central concept in Resilience Theory. It represents the ability of individuals, communities, or systems to adjust, learn, and respond effectively to changing circumstances and stressors. Adaptive capacity involves factors such as flexibility, learning, social capital, diversity, and the availability of resources and options for adaptation.

Complex Systems Perspective: Resilience Theory takes a complex systems perspective, recognizing that individuals, communities, and ecosystems are interconnected and influenced by multiple interacting factors. It considers the interactions and feedback loops between different components of a system and examines how changes in one part of the system can have ripple effects throughout the system.

Multiple Pathways and Trajectories: Resilience Theory acknowledges that there are multiple pathways and trajectories of resilience. Different individuals, communities, or systems may employ diverse strategies, resources, and adaptive responses depending on their unique circumstances, characteristics, and context.

Resilience Theory incorporates the concept of anarchy, which refers to the nested, hierarchical relationships between different scales and levels of organization. It recognizes that resilience operates at multiple scales, from individuals to communities, organizations, and larger socio-ecological systems. Changes and disruptions at one level can affect the resilience and dynamics of other levels.

Individual factors include personal characteristics, coping strategies, self-efficacy, optimism, problem-solving skills, and emotional intelligence. Personal resilience can be influenced by factors such as genetic predispositions, early life experiences, social support networks, and access to resources and opportunities.

Community Factors: Community factors encompass social networks, social capital, trust, collaboration, community cohesion, and collective action. Communities with strong social ties, supportive institutions, and effective governance structures are often more resilient in the face of challenges.

Organizational Factors: Organizational factors include leadership, organizational culture, communication, adaptability, learning capacity, and resource availability. Resilient organizations

are characterized by flexible structures, diverse skill sets, effective crisis management strategies, and the ability to learn from past experiences.

Socio-Ecological Factors: Socio-ecological factors recognize the interdependence between human systems and the natural environment. Resilience is influenced by factors such as ecosystem health, resource availability, climate change, land use practices, and the capacity to manage environmental risks and vulnerabilities.

Resilience Theory has been applied in various fields, including psychology, sociology, disaster management, community development, and environmental sustainability. Some practical applications include: Resilience Theory provides insights for designing disaster management systems that focus on building preparedness, response capabilities, and recovery strategies that enhance resilience at individual, community, and organizational levels. Resilience Theory guides community development approaches that foster community empowerment, social capital, and the creation of supportive environments that enable communities to better withstand and recover from adversity. Resilience Theory informs strategies for building organizational resilience, including crisis management plans, flexible structures, diversification of resources, and the development of adaptive capacities to respond to disruptions. Resilience Theory contributes to understanding the resilience of socio-ecological systems and guides efforts to promote sustainable development, manage natural resources, and address the impacts of climate change.

Resilience Theory offers a valuable perspective for understanding how individuals, communities, and systems can effectively navigate challenges and adapt to changing circumstances. By identifying the factors that enhance resilience, researchers and practitioners can develop strategies and interventions to promote resilience and well-being in various contexts.

### 2.1.3 Contingency Theory

Contingency theory which was developed by Fred Edward Fiedler in 1964 is a management theory that suggests there is no one best way to organize or manage an organization. Instead, the most effective approach depends on the specific circumstances or contingencies faced by the organization. Developed in the 1960s and 1970s by management scholars such as Joan Woodward, Tom Burns, and G.M. Stalker, Contingency Theory emphasizes the importance of fit

or alignment between organizational practices and the environment in which the organization operates.

Contingency refers to the idea that different situations or contexts require different organizational approaches. The effectiveness of an organizational practice or structure is contingent upon the specific circumstances faced by the organization, such as its industry, technology, size, and external environment. Contingencies can include factors like uncertainty, complexity, volatility, and resource availability. Contingency Theory argues that the success of an organization depends on achieving a fit or alignment between its internal characteristics and the external contingencies it faces. This means that organizations should design their structures, processes, and strategies to match the specific demands and challenges of their environment. For example, an organization operating in a stable and predictable environment may benefit from a hierarchical and formal structure, while an organization operating in a dynamic and uncertain environment may require a more flexible and decentralized structure.

Contingency Theory identifies specific variables or factors that influence the choice of organizational practices and structures. These contingency variables include technology, size, environment, strategy, culture, and life cycle stage. For example, organizations with complex and uncertain technologies may benefit from a more organic and flexible structure, while organizations in stable environments may require a more mechanistic and formal structure. Contingency Theory suggests that organizations should adopt different approaches and practices based on the contingencies they face. This means that there is no universal best practice or one-size-fits-all approach to managing organizations. Instead, organizations should carefully analyze their environment, identify the relevant contingencies, and tailor their practices accordingly. This can involve adjusting organizational structure, decision-making processes, leadership styles, reward systems, and communication channels to match the specific contingencies.

Contingency Theory has been applied in various areas of management and organizational studies. It has been used to explain the effectiveness of different organizational structures, leadership styles, decision-making processes, and human resource practices in different contexts. It has also been applied to understand the relationship between strategy and structure, and the impact of environmental factors on organizational performance. Contingency Theory provides a

framework for managers to assess their organization's fit with the environment and make informed decisions regarding the design and management of their organizations.

In the context of the effect of supply chain visibility on flexibility performance in disaster relief operations during Cyclone Idai in Zimbabwe, Contingency Theory can provide insights into how organizations should adapt their supply chain practices based on the specific contingencies they face. Contingency Theory recognizes that environmental uncertainty is a key contingency that affects organizational practices. In the case of disaster relief operations during Cyclone Idai, the environment is characterized by high uncertainty due to the unpredictable nature of the disaster and the dynamic needs of affected areas. Contingency Theory suggests that in uncertain environments, organizations should adopt flexible and responsive supply chain practices to enhance their flexibility performance. This includes having supply chain visibility to gather real-time information about the availability and movement of resources. Another contingency highlighted by Contingency Theory is technology. In disaster relief operations, technology plays a crucial role in facilitating supply chain visibility. Organizations can leverage technology such as real-time tracking systems, satellite imagery, and communication tools to gain visibility into the location, status, and demand for relief resources. Contingency Theory suggests that organizations should align their technology infrastructure with the contingencies they face. In this case, having the appropriate technology for supply chain visibility is essential for improving flexibility performance.

Contingency Theory also acknowledges the importance of resource dependence in shaping organizational practices. In disaster relief operations, organizations depend on external resources, including supplies, equipment, and personnel, to deliver aid effectively. By having supply chain visibility, organizations can better manage their resource dependencies by tracking the availability and movement of resources. This allows them to make informed decisions regarding resource allocation, identify potential bottlenecks or shortages, and coordinate with resource providers. Contingency Theory suggests that organizations should align their supply chain practices, such as visibility systems, with their resource dependencies to enhance flexibility performance. Contingency Theory promotes a contingency approach, which implies that organizations should adapt their practices based on the specific contingencies they face. In the case of disaster relief operations during Cyclone Idai, organizations should analyse the

environmental uncertainties, technology requirements, and resource dependencies they encounter. Based on this analysis, they can tailor their supply chain practices to enhance visibility, coordination, and responsiveness. This may involve implementing real-time tracking systems, establishing communication channels with partners and stakeholders, and integrating data from different sources to improve decision-making and flexibility performance.

By applying Contingency Theory, organizations involved in disaster relief operations during Cyclone Idai in Zimbabwe can better understand the importance of adapting their supply chain practices based on the specific contingencies they face. This includes leveraging supply chain visibility to enhance flexibility performance by effectively managing environmental uncertainty, aligning with technology requirements, and addressing resource dependencies.

## 2.2 Related Terms

### *Supply Chain Reslience*

Supply chain visibility refers to the ability to track and monitor the movement of products, materials, and information across the various stages of a supply chain, from the sourcing of raw materials to the delivery of finished goods to end customers. It involves capturing and sharing real-time data and information about inventory levels, production status, transportation, and other relevant activities within the supply chain network.

Supply chain visibility provides organizations with a comprehensive view of their supply chain operations, enabling them to make informed decisions and respond effectively to changes and disruptions. Real-time Information: Supply chain visibility allows organizations to access real-time data and information about the status, location, and condition of products and materials throughout the supply chain. This includes information on inventory levels, production schedules, transportation routes, and delivery timelines. Real-time information enables organizations to quickly identify issues, anticipate potential bottlenecks, and take proactive measures to address them, leading to improved operational efficiency. Supply chain visibility facilitates collaboration and communication among different stakeholders within the supply chain network. By sharing relevant information, organizations can coordinate their activities, synchronize their operations, and align their goals. This collaboration leads to improved visibility and transparency, reduced delays, and enhanced overall supply chain performance.

With supply chain visibility, organizations can closely monitor customer demand and align their supply accordingly. By analyzing real-time data on customer orders, inventory levels, and production capacity, organizations can optimize their production and distribution processes to meet customer demands more efficiently. This helps reduce stockouts, minimize excess inventory, and improve customer satisfaction. Supply chain visibility enables organizations to identify and mitigate risks effectively. By monitoring the movement of goods and information, organizations can detect potential disruptions, such as delays in transportation, supplier issues, or natural disasters. Early identification of risks allows organizations to implement contingency plans, explore alternative sources, or reroute shipments to minimize the impact of disruptions and ensure continuity in supply chain operations.

Supply chain visibility contributes to improved customer service by providing accurate and up-to-date information on order status, shipment tracking, and delivery schedules. This allows organizations to proactively communicate with customers, manage their expectations, and provide timely updates. Improved visibility and transparency in the supply chain enhance customer trust and loyalty. By analyzing the data and insights derived from supply chain visibility, organizations can identify areas for improvement and implement continuous process enhancements. This includes optimizing inventory management, streamlining transportation routes, reducing lead times, and identifying opportunities for cost savings and efficiency gains.

Overall, supply chain visibility plays a crucial role in enabling organizations to optimize their supply chain operations, enhance collaboration, mitigate risks, and deliver superior customer service. It provides organizations with the necessary information and insights to make data-driven decisions and adapt to changing market dynamics, leading to improved overall supply chain performance.

***Flexibility Performance***

Flexibility performance in the context of disaster relief operations refers to the ability of organizations and supply chains to respond rapidly and effectively to the unique challenges and uncertainties posed by natural disasters or humanitarian crises. In disaster relief operations, flexibility performance becomes critical in ensuring timely and appropriate delivery of aid to affected areas.

Flexibility performance in disaster relief operations involves the ability to rapidly mobilize resources and personnel to the affected areas. This includes quickly assessing the situation, coordinating with relevant stakeholders, and activating emergency response plans. Organizations with high flexibility performance can establish communication channels, preposition emergency supplies, and mobilize teams to initiate relief efforts promptly. Scalability is also important under this flexibility performance. Flexibility performance requires the capacity to scale up or down relief operations based on the evolving needs and conditions on the ground. This involves having the flexibility to adjust the quantity and type of relief supplies, deploy additional manpower, and expand or contract logistics and transportation networks as required. Being able to scale operations efficiently ensures that relief efforts can adapt to changing circumstances and effectively address the needs of affected populations.

Resource Coordination, flexibility performance in disaster relief operations relies on effective coordination and collaboration among multiple stakeholders, including government agencies, non-governmental organizations (NGOs), and international aid agencies. This coordination includes sharing information, aligning objectives, and pooling resources to avoid duplication, optimize efficiency, and maximize the impact of relief efforts. Flexibility performance enables organizations to coordinate resources effectively and ensure a cohesive and synchronized response.

Flexibility performance requires designing supply chains that can quickly adapt to the unique challenges posed by disaster relief operations. This includes establishing flexible sourcing strategies, diversifying suppliers, and ensuring redundancy in critical supply chain components. Organizations with high flexibility performance also consider alternative transportation routes and modes, implement real-time tracking systems, and leverage technology to enhance visibility and expedite the flow of relief goods.Flexibility performance involves actively engaging and collaborating with local communities, government agencies, and community-based organizations in disaster-affected areas. This collaboration allows for a better understanding of local needs, cultural sensitivities, and available resources. By involving local stakeholders in relief efforts, organizations can leverage their knowledge and expertise, build trust, and ensure that relief operations are tailored to the specific context and needs of the affected communities.

Flexibility performance in disaster relief operations requires a commitment to continuous learning and improvement. Organizations should conduct post-disaster evaluations, gather feedback from stakeholders, and analyze the effectiveness of their response. This information can inform future preparedness efforts, enhance response capabilities, and enable organizations to refine their strategies and processes to be better equipped for future disaster relief operations.By focusing on flexibility performance in disaster relief operations, organizations can enhance their ability to respond rapidly, adapt to changing conditions, and effectively deliver aid to affected populations. This results in more efficient and impactful relief efforts, ultimately helping to save lives, alleviate suffering, and support the recovery and resilience of affected communities.

## 2.2 Empirical Literature Review

Supply chain visibility refers to the ability to track and monitor the flow of goods and information throughout the network Martin (2016). This includes real-time data on inventory levels, transportation status, and potential disruptions. Improved visibility empowers organizations to be more agile and adaptable in responding to changes in demand or unexpected events. Cyclone Idai, which devastated Zimbabwe in 2019, exemplifies the challenges faced in disaster relief supply chains. Damaged infrastructure, communication breakdowns, and fluctuating needs for aid necessitate a highly flexible response.

Chari et al. (2020) highlight the positive impact of humanitarian supply chain cooperation on flexibility. By sharing information and coordinating activities, organizations could adapt their operations to meet the evolving needs of affected populations. This collaboration enhances visibility across the supply chain, fostering a more agile response. The increased frequency of occurrence and complexity of disasters, the world over, have called for increased cooperation amongst stakeholders to deliver humanitarian aid. Their objective was as a result of the growing interest focussed on creating and implementing cooperation to facilitate management of supply chain-related activities in the humanitarian sector and their study therefore sought to gain a better understanding of the effectiveness of supply chain cooperation in aid delivery performance variables, specifically in the context of Cyclone Idai humanitarian relief operations in Zimbabwe.

They used a pragmatic research paradigm was adopted, where the researchers took a mixed approach informed by both quantitative and qualitative research tools. Their findings showed a significant and positive impact of humanitarian supply chain (HSC) cooperation in achieving output, resource and flexibility performance in the delivery of aid.

Ahimbisibwe et al (2016)'s research aimed at examining the relationships between supply chain visibility, supply chain velocity, supply chain alignment and supply chain relief agility using a case of humanitarian agencies in responding to Bududa Land Slide disasters in Eastern Uganda. The study was motivated by the fact that although several humanitarian agencies responded by delivering aid to those in need during the aftermath of Bududa landslides in 2010, their humanitarian supply chains were not fast and agile enough to respond to the sudden onset disaster. A cross sectional data was collected from a sample of sixteen (16) humanitarian agencies that were involved in responding to landslide disasters in Bududa district in Eastern Uganda region. A total of 135 usable questionnaires were collected which were used for data analysis. The results indicate significant positive relationships between supply chain visibility, supply chain velocity, supply chain alignment and supply chain relief agility. Their findings also revealed that supply chain visibility and supply chain alignment are significant predictors of humanitarian supply chain relief agility. The study has both practical and theoretical implications which are discussed.

Altay et al (2018) examined the effects of supply chain agility and supply chain resilience on performance under the moderating effect of organizational culture. They used the dynamic capability view to conceptualize our theoretical models for different phases of humanitarian supply chain (pre-disaster and post-disaster phases). These phases do not have clear boundaries, but overlap chronologically, as well as in terms of ongoing activities. They used partial least squares (PLS) to examine our proposed research hypotheses using 335 responses gathered from organizations in India using survey based questionnaires designed for a single respondent. Their results suggest that SCAG and SCRES are two important dynamic capabilities of supply chain, have significant effects on pre-disaster performance (PRE-DP). Moreover, the control orientation does not have significant effect on the path joining SCAG and PREDP. However, the control orientation has a significant interaction effect on the path joining SCRES and PRE-DP. Similarly, SCRES has significant effect on post-disaster performance (POST-DP) but SCAG has

no significant effect on POST-DP. In contrast to control orientation, the flexible orientation has significant moderation effects on the paths SCAG/SCRES and POST-DP.

Rasyidi, &Kusumastuti (2020) presented an evaluation of the supply chain agility of the Indonesian humanitarian organization *AksiCepatTanggap* (ACT). Their paper discussed the flexibility, responsiveness and effectiveness of ACT's supply chain.The supply chain agility metrics were assessed based on interviews with representatives from ACT and the National Agency for Disaster Management (*BadanNasionalPenanggulanganBencana* [BNPB]). Recommendations were made based on the assessment results.Their findings indicated that ACT's supply chain agility maturity was at level 2 or repeatable. This meant that ACT's humanitarian supply chain (HSC) had demonstrated agility only on limited occasions. ACT's supply chain agility can be improved by enhancing the flexibility component.

Beamon &Balcik (2008) compared performance measurement in the humanitarian relief chain with performance measurement in the commercial supply chain, develop performance metrics for the humanitarian relief chain, and presented a framework that can be used as a basis for a performance measurement system in the relief sector.The performance measurement analysis was developed through extensions on an existing performance measurement framework. Details regarding relief chain system were obtained through off-site and on-site interviews with relief professionals from World Vision International.Their paper found that this work yielded: a comparison of performance measurement in the humanitarian relief chain with performance measurement in the commercial supply chain, new performance metrics for the humanitarian relief chain, and a performance measurement framework for the relief chain.

### 2.3 Research Gap

The effect of supply chain visibility on flexibility performance, evidence from disaster relief operations during Cyclone Idai in Zimbabwe explores the relationship between supply chain visibility and flexibility performance in the context of disaster relief operations specifically during Cyclone Idai in Zimbabwe. While specific research on this exact topic may not be readily available as of my knowledge, I can identify a potential research gap based on the given context. Limited empirical evidence exists on the specific impact of supply chain visibility on flexibility performance in disaster relief operations, particularly in the context of Cyclone Idai in

Zimbabwe. Although supply chain visibility and flexibility performance are recognized as critical factors in disaster relief, there is a need for in-depth research that examines the relationship between these two variables within the specific context of Cyclone Idai and its relief operations in Zimbabwe.

## 2.4 Conceptual Framework

The conceptual framework presented in Figure 1 predicts that the supply chain visibility will either positively or negatively flexibility performance in the cyclone hit area. The dependent variable is the flexibility performance and the independent variables are sub sections of supply chain visibility as indicated in figure 1.

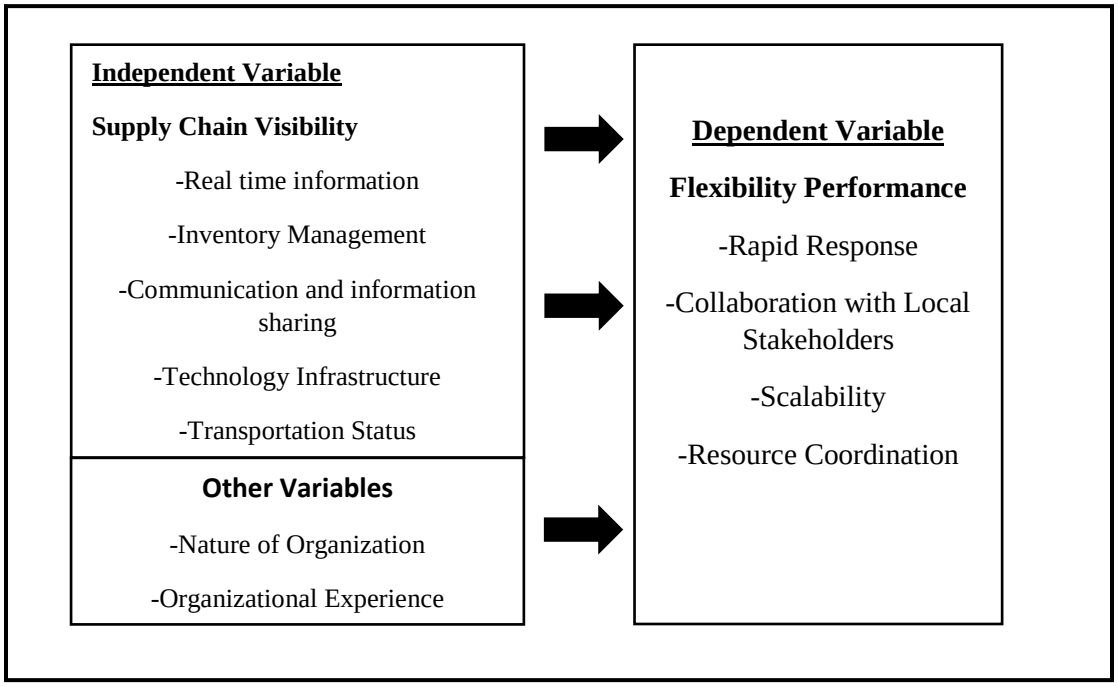


**Figure 1: Conceptual Framework**

## 2.5 Chapter Summary

This chapter presented the theoretical review, empirical studies, conceptual framework and hypothesis development, gap analysis, and a chapter summary. The chapter also looks at the

empirical evidence, which consists of investigations that other academics have done on the same subject. A conceptual framework and hypothesis development are also presented. It also presents a detailed conceptual framework and hypothesis development. Finally, the chapter concludes with a gap analysis and a summary of its contents. The next chapter is the methodology section.

# CHAPTER THREE

# METHODOLOGY

## 3.0 Introduction

The methodology chapter plays a crucial role in research studies as it outlines the systematic approach adopted to investigate and analyze the research problem. This chapter provides a detailed explanation of the research design, data collection methods, data analysis techniques, and the overall framework employed to study the effect of supply chain visibility on flexibility performance in the context of disaster relief operations during Cyclone Idai in Zimbabwe. The purpose of this chapter is to offer transparency and credibility to the research process, ensuring that the findings are reliable and valid.

## 3.1 Research design

Research design is a thorough method of collecting data for an evidence-based research project (Neuman, 2018). It acts as a guide for empirical study that targets specific concerns and research aims, according to Azevedo et al. (2011). A case study was employed as the research methodology. This made it possible for the researcher to provide a comprehensive analysis. This

is in line with Rebolj's (2017) claim that case studies let researchers collect thorough and relevant data and examine how causal meanings function.

### 3.2 Research Approach

In order to quantify and explain the impact effect of supply chain visibility on flexibility performance. Evidence from disaster relief operations during cyclone Idai in Zimbabwe, the study used a mixed research technique. It was also helpful to establish a sample size using both quantitative and qualitative survey methods in order to do statistical analysis.

#### 3.2.1 Deductive approach

A deductive approach is concerned with developing a hypothesis based on existing theory, and then designing a research strategy to test the hypothesis (Wilson, 2010). Therefore, deductive means reasoning from the particular to the general. A deductive design might test to see if this relationship or link did obtain on more general circumstances. Deductive approach can be explained by the means of hypotheses, which can be derived from the propositions of the theory. In other words, deductive approach is concerned with deducting conclusions from premises or propositions. According to Gulati (2009) deduction begins with an expected pattern that is tested against observations, whereas induction begins with observations and seeks to find a pattern within them.Deductive approach offers the following advantages namely possibility to explain causal relationships between concepts and variables, possibility to measure concepts quantitatively and possibility to generalize research findings to a certain extent. Alternative to deductive approach is inductive approach.

Deductive research approach explores a known theory or phenomenon and tests if that theory is valid in given circumstances. It has been noted that the deductive approach follows the path of logic most closely (Babbie, 2010). The reasoning starts with a theory and leads to a new hypothesis. This hypothesis is put to the test by confronting it with observations that either lead to a confirmation or a rejection of the hypothesis.Moreover, deductive reasoning can be explained as reasoning from the general to the particular, whereas inductive reasoning is the opposite. In other words, deductive approach involves formulation of hypotheses and their subjection to testing during the research process, while inductive studies do not deal with hypotheses in any ways. Wilson (2010) is of the view that in studies with deductive approach,

the researcher formulates a set of hypotheses at the start of the research. Then, relevant research methods are chosen and applied to test the hypotheses to prove them right or wrong.

Deductive approach was adopted in study following stages; deducing hypothesis from theory, Formulating hypothesis in operational terms and proposing relationships between two specific variables, testing hypothesis with the application of relevant method. These are quantitative methods such as regression and correlation analysis, mean, mode and median and others, and finally examining the outcome of the test, and thus confirming or rejecting the theory. When analyzing the outcome of tests, it is important to compare research findings with the literature review findings.

### 3.2.2 Inductive approach

Inductive approach, also known in inductive reasoning, starts with the observations and theories are proposed towards the end of the research process as a result of observations (Pelissier, 2008). Inductive research involves the search for pattern from observation and the development of explanations theories for those patterns through series of hypotheses. It is important to stress that inductive approach does not imply disregarding theories when formulating research questions and objectives. This approach aims to generate meanings from the data set collected in order to identify patterns and relationships to build a theory; however, inductive approach does not prevent the researcher from using existing theory to formulate the research question to be explored. Inductive reasoning is based on learning from experience. Patterns, resemblances and regularities in experience (premises) are observed in order to reach conclusions (or to generate theory).

Inductive reasoning begins with detailed observations of the world, which moves towards more abstract generalizations and ideas. Snieder and Larner (2009) contends that when following an inductive approach, beginning with a topic, a researcher tends to develop empirical generalizations and identify preliminary relationships as he progresses through his research. No hypotheses can be found at the initial stages of the research and the researcher is not sure about the type and nature of the research findings until the study is completed, hence the study did not consider this approach as it does not fit the well.

### 3.3 Research paradigm

A research paradigm refers to model, method or a pattern for carrying out a research (Bird, 2010). In another words, a research paradigm refers to a set of beliefs, assumptions, and principles that guide the way research is conducted within a particular field or discipline. It provides a framework for understanding and approaching research questions, data collection, analysis, and interpretation. Different research paradigms offer distinct perspectives and methodologies, shaping the overall approach to knowledge creation. The three commonly recognized research paradigms are:

Positivist Paradigm: The positivist paradigm is rooted in the belief that knowledge can be obtained through objective observation, measurement, and experimentation. It emphasizes the use of quantitative methods and aims to establish causal relationships between variables. Positivist researchers typically adhere to the principles of objectivity, replication, and generalizability, seeking to produce knowledge that is valid and reliable.

Interpretivist Paradigm: The interpretivist paradigm, also known as the constructivist or qualitative paradigm, focuses on understanding the subjective meanings and interpretations individuals assign to their experiences. It emphasizes the context, social interactions, and the subjective nature of reality. Interpretivist researchers employ qualitative methods such as interviews, observations, and textual analysis to explore the complexity of human experiences and phenomena.

Pragmatic Paradigm: The pragmatic paradigm recognizes the value of both positivist and interpretivist approaches and seeks to integrate them, depending on the research question and context. Researchers operating within the pragmatic paradigm are concerned with finding practical solutions to real-world problems. They may utilize a mixed methods approach, combining quantitative and qualitative methods, to gain a comprehensive understanding of the research topic.

The study has a set of values, beliefs and ideas which theories and practices can function. Therefore, the paradigm derived is the pragmatism. This is so because it is oriented toward solving practical problems in real world rather than on assumptions about the nature of knowledge.

### 3.4 Population

Nueman (2011) states that the population is the total number of study able elements. The population is the researcher's group of interest, and it is from this group that the study's findings were extrapolated (Parker 2012). The study population is drawn from the Chimanimani CylconeIdai affected region.

#### 3.4.1 Target population of the Study

The target research population consisted of the affected families, humanitarian organisations, government departments in Chimanimani. Interviews and questionnaires were used by the researcher in collecting qualitative data. Focus Group Discussions and Key Informant Interviews were used to collect qualitative data.

### 3.5 Sample size Determination

The sample size was determined using Krejcie and Morgan (1970) model. This means the minimum sample required to a true representation of the population is 234 respondents for the quantitative data from a population of around 600.

### 3.6 Sampling Method

A sample encompasses elements of the population considered for the definite inclusion in the research (Creswell, 2012). Sampling benefited this study as it enabled feasibility. The process of sampling convoluted non-probability together with the probability sampling methods, this allowed the researcher to use both own personal judgment and statistics of who to take in the sample.

#### 3.6.1 Sampling Techniques

Probability sampling methods were used for quantitative data collection whilst non-probability sampling was used for qualitative data collection. Stratified sampling was used by first grouping those form a common characteristic, for instancethose from humanitarian organizations forms a stratum, and those the government departments in Chimanimani also fall into one stratum. Random sampling will then be done in each strata and come up with a sample more than 234.

### 3.7 Data Collection Sources, Instruments and Methods

#### 3.7.1 Data Collection Source

Primary data was collected using semi-structured questionnaires. Primary data was collected to allow the researcher to control the amount of error for accuracy to be made (Kumar, 2005).

### 3.7.2 Data Collection Instruments and Methods

#### 3.7.2.1 Questionnaires

A questionnaire is tool of data gathering containing a series of standardized questions in line to the study subject be completed in writing by the participants as a systematic compilation of questions that are aimed at a sample of population from which relevant and reliable information is desired Bloomberg (2011) weighs in and describe a questionnaire as a framework which encompasses a set of questions as well as gauges architecture to generate primary data. In this regard the respondents read and interpret the questions and write down answers for themselves, with some help if need be. The researcher used both open-ended and closed questions. These were engaged as they are ideal in administering them in limited time. The respondents were made to fill in the details and this type of a tool was directed at the general public. A Likert type scale was used in scoring responses in the questionnaire, as these ranged from either yes and no or One (1) up to Five (5) with the respondents ticking on appropriate response. These technique was advantageous as it enabled the researcher to explore and expose data which is found within the mind, heart and feelings by the people. The open and closed ended questions helped in enabling the study participants to fully express oneself, these also were answered in the same framework so that they could be comparable with one another. Correspondingly, Parker (2016) describes the Likert scale as measure of the responses used in questionnaires to retrieve the gravity of agreement by participants to a given subject matter.

#### 3.7.2.2 In-depth Interviews

An interview is a face-to-face interaction between two or more individuals with a specific goal in mind (Myers and DeWall, 2015). Through one-on-one interviews, this data collection strategy allows the researcher to gain valuable insights as people are more willing to share their thoughts and throw light on certain issues. The researcher avoided distortions such asking leading questions in an attempt to get rich data which boosts validity and reliability from the participants. An interviewer should be properly trained to get information from respondents (Singleton and Straits, 2010).

### 3.8 Data Analysis

Data is presented in three forms namely descriptive, diagrammatic and tabular. A simple linear regression is also used for quantitative data analysis. These presentation approaches are helpful and effective as they help the study to communicate important takeaways, gives valuable information and guide important business decisions (Yin, 2019). Over and above these data presentation procedures are relevant to the study as they are useful for translating facts and statistics into actionable knowledge.

### 3.9 Model

#### 3.9.1 Multiple Regression Model

To analyse the relationship between Flexibility Performance (dependent variable) and supply chain visibility and other control variables, this research applies a simple linear regression model guided by the following model specification. The formula for regression equation with multiple variables is as follows;

*Flexibility Performance =* ***a*** *+* ***b1*** *Real time information+* ***b2*** *Inventory Management+* ***b3****Communication and information sharing +* ***b4****Technology Infrastructure +* ***b5****Transportation Status + error term*

Where the dependent variable is flexibility performance. The dependent variables are real time information, inventory management, communication and information sharing, technology infrastructure, transportation status. **a, b1, b2, b3, b4,** and **b5** are parameters. The error term is also included in the equation.

### 3.10 Validity and Reliability of Results

Reliability is the level to which results are consistent over time, Joppe cited in (Golafshani, 2003). The researcher tested the reliability of the results using Cronbach's Alpha. Cronbach's (Sekaran and Bougie 2019). The researcher carried out content validity to ensure that the questions in the questionnaire were in line with the objectives of the research study. Also, pilot study was conducted in order to test the face validity of the study. The pilot study was carried out to make sure that the questionnaire is adjusted if there are any issues raised by the respondents as well as testing the perceived validity and reliability of the questionnaire.

### 3.11 Ethical and Legal Considerations

The researcher followed standard ethical and legal procedures. Prior to collecting data or conducting interviews with individuals involved in disaster relief operations, it was essential to obtain informed consent. Participants were fully informed about the purpose of the research, the potential risks and benefits, and their rights to withdraw participation at any time without consequences. Protecting the privacy and confidentiality of participants is crucial. The researcher ensured that any personal information collected is anonymized and stored securely. Participation in the research was voluntary, and individuals did not face any form of coercion or pressure to participate. It was clearly communicated that participation is optional and that refusal to participate will not result in any negative consequences.

Also, the study was not duplicated from any person nor plagiarized. Plagiarism is taking someone's work or ideas and presenting them as your own (Ezikiel, 2008). The entire literature and structure which was used in this study was referenced and listed on the section of references. Therefore, the study was wholly carried out by the researcher.

### 3.12 Chapter Summary

The chapter looked at the methodology in which the study employed to carry out data gathering collection processes. The chapter touched on various areas such as research design, which identified the case study as a design. Target population and sampling techniques for the study are also established in this section. The chapter discussed the methods of methods of data collection and analysis as well as the ethical standards that were adhered to during the data collection process in detail. The next chapter focuses on study findings from the generated data processes and analysis.

# CHAPTER IV

# DATA ANALYSIS AND RESULTS PRESENTATION

## 4.0 Introduction

This chapter presents a thorough summary of the findings, conclusions, and contributions that have been made, responding to the main aim of the research, which is to effect of supply chain visibility on flexibility performance, evidence from disaster relief operations during Cyclone Idai in Zimbabwe. This chapter not only summarizes the findings, but also offers an analysis of the data and their correlation with prior researches conducted on the same subject.

## 4.1 Descriptive data analysis

Table 1 presents the descriptive statistics of the main variables examined in this study. The dependent variable is*flexible performance* and was measured using a Likert scale ranging from 1 to 5, with 1 being the minimum value and 5 being the maximum value. The mean value for the variable *flexible performance* is 4.27, whereas the mean value for the variable *Real Time Information* is 4.34. The independent variables are *real time information, inventory management, communication and information, technology infrastructure, transport status andnature of organisation*range from a minimum of 1 to a maximum of 5, with mean values of 3.01, 4.06, 3.66, 4.64, 4.28 and 3.01 respectively. *Organisational experience* has a minimum of 1 and a maximum of 28 years and a mean of 7.73. The study utilized a total of 258 observations, as shown in table 1. The next section presents the correlations results.

Table 1:Descriptive Statistics

| Descriptive Statistics | | | | | |
|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Std. Deviation |
| Flexibility Performance | 237 | 1 | 5 | 4.27 | 1.145 |
| Real Time Information | 237 | 1 | 5 | 3.01 | 1.342 |
| Inventory Management | 237 | 1 | 5 | 4.06 | 1.141 |
| Communication and | 237 | 1 | 5 | 3.66 | 1.432 |

| | | | | | |
|---|---|---|---|---|---|
| information | | | | | |
| Technology Infrastructure | 237 | 1 | 5 | 4.64 | 1.334 |
| Transportation Status | 237 | 1 | 5 | 4.28 | 1.155 |
| Nature of Organization | 237 | 1 | 2 | 3.01 | 1.230 |
| Organizational Experience | 237 | 1 | 28 | 7.73 | 13.267 |

**4.2 Correlation Matrix**

Table 2 displays the relationships among several pairs of variables utilized in this study using the correlation matrix. The table shows the absence of multicollinearity across all explanatory factors. However, the dependent variable, *flexibility performance*exhibits strong correlations with all independent variables, indicating the existence of a causal relationship between flexibility performance and *real time information, inventory management, communication and information, technology infrastructure, transport status, nature of organisation* are 87%, 60%, 84%, 74%, 88%, 79% and 76% respectively.

Table 2: Correlation matrix with flexibility performance as the dependent variable

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Flexibility Performance | 1.000 | | | | | | | |
| 2 | Real Time Information | 0.867 | 1.000 | | | | | | |
| 3 | Inventory Management | 0.592 | 0.025 | 1.000 | | | | | |
| 4 | Communication and information | 0.846 | 0.081 | 0.033 | 1.000 | | | | |
| 5 | Technology Infrastructure | 0.743 | 0.056 | 0.087 | 0.066 | 1.000 | | | |
| 6 | Transportation Status | 0.880 | 0.046 | -0.342 | 0.021 | 0.405 | 1.000 | | |
| 7 | Nature of Organization | 0.786 | 0.072 | 0.093 | 0.342 | 0.043 | -0.009 | 1.000 | |
| 8 | Organizational Experience | 0.760 | 0.103 | 0.075 | 0.467 | 0.048 | 0.348 | 0.373 | 1.000 |

### 4.3: Linear regression model results

The main simple linear regression results are presented in table 3 with the dependent variable as flexible performance.

Table 3: Linear regression model results with response time as the dependent variable

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| VARIABLES | **Flexibility Performance** | **Flexibility Performance** | **Flexibility Performance** | **Flexibility Performance** | **Flexibility Performance** | **Flexibility Performance** |
| Real Time Information | 0.178*** | 0.069** | | | | |
| | (0.081) | (0.678) | | | | |
| Inventory Management | 0.089** | | 0.094 | | | |
| | (0.056) | | (0.034) | | | |
| Communication and information sharing | 0.206* | | | 0.190* | | |
| | (0.015) | | | (0.053) | | |
| Technology Infrastructure | 0.253** | | | | 0.229 | |
| | (0.434) | | | | (0.034) | |
| Transportation Status | 0.063* | | | | | 0.056* |
| | (0.024) | | | | | (0.034) |
| Nature of Organization | 0.023 | 0.033** | 0.041* | 0.038** | 0.031*** | 0.021*** |
| | (0.046) | (0.064) | (0.026) | (0.075) | (0.034) | (0.086) |
| Organizational Experience | 0.093*** | 0.071* | 0.069* | 0.066* | 0.071* | 0.091* |
| | (0.017) | (0.019) | (0.021) | (0.023) | (0.043) | (0.034) |
| Constant | 7.938*** | 7.048*** | 8.273*** | 7.384*** | 8.463*** | 8.243*** |
| | (0.574) | (0.653) | (0.452) | (0.360) | (0.536) | (0.932) |
| | | | | | | |
| Observations | 237 | 237 | 237 | 237 | 237 | 237 |
| R-squared | 0.564 | 0.393 | 0.325 | 0.497 | 0.564 | 0.456 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Dependent variable is Flexibility Performance

*Flexibility Performance* = **7.94** + **0.18** *Real time information* + **0.09** *Inventory Management*+ **0.21** *Communication and information sharing* + **0.25** *Technology Infrastructure* + **0.06** *Transportation Status* + **0.02***Nature of Organization* + **0.09***Organizational Experience*.

The main findings of the linear regression using flexibility performance as the dependent variable are shown in Table 3. A simple OLS regression was used to analyse the relationship between flexibility performance and the dependent variables, *real time information, inventory management, communication and information, technology infrastructure, transport status* and*nature of organisation*. As presented in table 3, the findings indicatea positive and significant relationship between real time information and flexibility performance.As shown in table 3 column 1, at 1 percent level of significance, real time information positively affect response time

by around 18%. The results shows that is very important to improve flexibility performance by improving the real time information. These results are supported by many previous writers who found a positive relationship between supply chain visibility and flexibility performance, (Singagerda et al, 2022; Tarli et al, 2017; Srinivasan et al, 2018).

As presented in table 3, the findings indicate a positive and significant relationship between inventory management and flexibility performance. As shown in table 3 column 1, at 5 percent level of significance, inventory management positively affect flexibility performanceby around 9%. The results shows that is very important to improve flexibility performance by improving the inventory management. These results are supported by many previous writers who found a positive relationship between supply chain visibility and flexibility performance, (Singagerda et al, 2022; Tarli et al, 2017; Srinivasan et al, 2018).

As presented in table 3, the findings indicate a positive and significant relationship between communication and information sharing and flexibility performance. As shown in table 3 column 1, at 10 percent level of significance, communication and information sharing positively affect flexibility performanceby around 20%. The results shows that is very important to improve flexibility performance by improving the communication and information sharing. These results are supported by many previous writers who found a positive relationship between supply chain visibility and flexibility performance, (Singagerda et al, 2022; Tarli et al, 2017; Srinivasan et al, 2018). Also as presented in table 3, the findings indicate a positive and significant relationship between technology infrastructure and flexibility performance. As shown in table 3 column 1, at 5 percent level of significance, technology infrastructure positively affect flexibility performanceby around 25%. The results shows that is very important to improve flexibility performance by improving the technology infrastructure. These results are supported by many previous writers who found a positive relationship between supply chain visibility and flexibility performance, (Singagerda et al, 2022; Tarli et al, 2017; Srinivasan et al, 2018).From the results above it is clear that transport infrastructure has the biggest magnitude in affecting flexibility performance

As presented in table 3, the findings indicate a positive and significant relationship between transportation status and flexibility performance. As shown in table 3 column 1, at 10 percent level of significance, transportation status positively affect flexibility performanceby around 6%.

The results shows that is very important to improve flexibility performance by improving the Transportation Status. These results are supported by many previous writers who found a positive relationship between supply chain visibility and flexibility performance, (Singagerda et al, 2022; Tarli et al, 2017; Srinivasan et al, 2018).

### 4.4 Discussion

Greater supply chain visibility, enabled by technologies like real-time tracking and data sharing, can significantly improve a company's operational flexibility and responsiveness. Some key benefits include: Demand forecasting that is visibility into real-time demand, inventory levels, and consumption patterns allows for more accurate demand forecasting. This helps companies be better prepared to handle fluctuations in demand. Also visibility into supply constraints, lead times, and disruptions enables companies to quickly adjust production schedules, inventory levels, and distribution to meet changing customer needs.

Supplier Collaboration: Transparency across the supply chain facilitates better collaboration with suppliers. This allows companies to be more nimble in sourcing, procurement, and managing supplier relationships. Visibility into potential risks and disruptions along the supply chain allows companies to proactively prepare contingency plans and execute alternative sourcing or logistics strategies when needed. Real-time data on inventory, capacity, and asset performance enables companies to optimize the utilization of their resources to respond flexibly to changes.

### 4.5 Chapter Summary

This chapter presented the findings from the research on the impact of supply chain visibility of flexibility performance. The results provided a comprehensive overview and analysis of the findings obtained from the research study. The main results indicates that supply chain visibility positively and significantly affect flexibility performance.The next chapter presents the summary, conclusion and policy recommendations related to the results obtained.

# CHAPTER V

# SUMMARY, CONCLUSION AND POLICY RECOMMENDATIONS

## 5.0 Introduction

This chapter provides a concise overview of the main discoveries from the research on how supply chain resilience affect the organisational performance of humanitarian organisations, a case of Cyclone Idai, Zimbabwe.

## 5.1 Summary of the study

The chapter begun with an introduction to the topic of supply chain visibility and its importance on improving flexibility performance. It highlights the devastating impact of Cyclone Idai in Zimbabwe and the subsequent challenges faced by humanitarian organizations in providing relief efforts. The second chapter focused on the existing literature related to supply chain visibility and flexibility performance in the humanitarian context. It explored the theoretical and empirical literature review, and the conceptual framework guiding the study. The research gap was also presented in the same chapter.

The third chapter outlined the research methodology employed in the study. It describes the research design, data collection techniques, and the sample size and selection process. The chapter also explained the data analysis methods utilized, including statistical techniques and qualitative analysis, and in this case, the the linear regression method and the qualitative analysis. The fourth chapter presented the results and shows that disaster preparedness, supply chain agility and cross sectorial collaboration all positively affect organisational performance of the humanitarian organisations. The performance was measured using the response rate and delivery flexibility.

## 5.2 Conclusion

The study aimed to find the effects of supply chain visibility on flexibility performance of humanitarian organisations, a case of cyclone Idai, Zimbabwe. Using the linear regression

model, the research concluded that supply chain visibility positively affect flexibility performance

### 5.3 Policy recommendations

The devastating impact of natural disasters often necessitates effective disaster relief operations, where timely and flexible response is crucial. Supply chain visibility plays a vital role in enhancing the flexibility performance of disaster relief operations. This policy recommendation focuses on leveraging supply chain visibility to improve flexibility performance based on evidence from the Cyclone Idai disaster relief operations in Zimbabwe. The following policy measures are recommended:

***Strengthen Information Sharing Mechanisms***

Promote the establishment of a centralized information-sharing platform that integrates all relevant stakeholders involved in disaster relief operations. This platform should facilitate real-time data sharing and collaboration between government agencies, non-governmental organizations (NGOs), humanitarian organizations, and private sector entities. The platform should be accessible to all stakeholders and enable the exchange of critical information, such as inventory levels, transportation routes, and available resources. Robust information sharing will enhance visibility across the supply chain and enable better coordination and decision-making.

***Invest in Technology Infrastructure***

Allocate resources to develop and maintain a robust technological infrastructure that supports supply chain visibility in disaster relief operations. This includes implementing advanced technologies such as Internet of Things (IoT) sensors, satellite imagery, and geographic information systems (GIS). These technologies can provide real-time data on inventory levels, location tracking of relief supplies, road conditions, and weather updates. By investing in technology infrastructure, decision-makers can gain accurate and up-to-date information, allowing for more effective planning, allocation, and distribution of relief resources.

***Enhance Inter-Agency Collaboration***

Promote collaboration and coordination between government agencies, NGOs, humanitarian organizations, and private sector entities involved in disaster relief operations. Establish formal

mechanisms, such as joint task forces or coordination committees, to facilitate information sharing, joint planning, and decision-making. Encourage regular meetings and drills to enhance preparedness and foster relationships among stakeholders. Effective inter-agency collaboration will ensure a unified and coordinated response, resulting in improved flexibility during relief operations.

***Develop Supply Chain Risk Management Strategies***

Integrate supply chain risk management strategies into disaster relief operations. Conduct risk assessments to identify potential vulnerabilities and develop contingency plans to mitigate risks. These plans should address potential disruptions in transportation, communication, and access to affected areas. Additionally, explore the possibility of pre-establishing agreements with logistics providers, warehouses, and transportation companies to ensure rapid response and access to key resources during emergencies. By proactively managing risks, the supply chain can maintain flexibility and responsiveness during disaster relief operations.

***Promote Training and Capacity Building***

Invest in training programs and capacity building initiatives for supply chain professionals, emergency responders, and volunteers involved in disaster relief operations. These programs should focus on supply chain management principles, information systems utilization, and coordination techniques. By equipping personnel with the necessary skills and knowledge, they will be better prepared to handle the challenges associated with disaster relief operations. Additionally, encourage cross-training and knowledge sharing among different organizations to foster a comprehensive understanding of the supply chain and promote collaboration.

## 5.4 Suggestion for further study

As area for further study, the extension of this research could increase the sample size and include other regions which were affected by Cyclone Idai which are in Mozambique and Malawi. This will improve the reliability of the results.

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## Appendices

### Research Questionnaire

### Impact of Supply Chain Visibility on Flexibility Performance in Disaster Relief Operations

Thank you for taking the time to participate in this research study investigating the impact of supply chain visibility on flexibility performance in disaster relief operations. Your valuable insights and experiences will contribute to a deeper understanding of the dynamics of supply chain management during critical humanitarian efforts, such as those undertaken in response to Cyclone Idai in Zimbabwe.The purpose of this questionnaire is to gather information about the utilization of supply chain visibility technologies and practices during Cyclone Idai relief operations, as well as their influence on flexibility performance. Your responses will help identify critical success factors, challenges, and recommendations for improving supply chain resilience and responsiveness in future disaster scenarios.

Please tick the appropriate boxes and provide any additional comments or insights where applicable. Your participation is voluntary, and all responses will remain confidential. Your input is highly appreciated and will be instrumental in advancing knowledge in the fields of disaster management and supply chain resilience.

Thank you for your valuable contribution to this research endeavour.

Warm regards,

**[JUDITH N. KACHENA. STUDENT #B226399A]**

**Section A**

**1.1 Nature of Organisation**

| | |
|---|---|
| Local | |
| National | |
| International or global | |

**1.2 Length of operation of the firm in years**

| | |
|---|---|
| Less than 10 years | |
| 10-20 Years | |
| 21-30 Years | |
| 31-40 Years | |
| More than 40 Years | |

**1.3 Experience in Years …….**

**Part A: Supply ChainVisibility**

- **Flexible Performance measured by Rapid response**

Indicate the extent to which you agree or disagree.

Use a scale of 1. Strongly agree 2. Agree 3. Not sure 4. Disagree 5. Strongly disagree

| | **ICT Adoption items** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|---|
| | real time information positively affect rapid response | | | | | |
| | Inventory Management positively affect rapid response | | | | | |
| | Communication and information sharing positively affect rapid response | | | | | |
| | Technology Infrastructure positively affect rapid response | | | | | |
| | Transportation Status positively affect rapid | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | response | | | | | |
| | Nature of Organizationpositively affect rapid response | | | | | |
| | Organizational Experience positively affect rapid response | | | | | |

**Part B: Supply Chain Visibility**

- **Flexible Performance measured by response**

Indicate the extent to which you agree or disagree.

Use a scale of 1. Strongly agree 2. Agree 3. Not sure 4. Disagree 5. Strongly disagree

| | **ICT Adoption items** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|---|
| | real time information positively affect Resource Coordination | | | | | |
| | Inventory Management positively affect Resource Coordination | | | | | |
| | Communication and information sharing positively affect Resource Coordination | | | | | |
| | Technology Infrastructure positively affect Resource Coordination | | | | | |
| | Transportation Status positively affect Resource Coordination | | | | | |
| | Nature of Organizationpositively affect Resource Coordination | | | | | |
| | Organizational Experience positively affect Resource Coordination | | | | | |

**Part C: Supply Chain Visibility**

- **Flexible Performance measured by** Scalability

Indicate the extent to which you agree or disagree.

Use a scale of 1. Strongly agree 2. Agree 3. Not sure 4. Disagree 5. Strongly disagree

| | ICT Adoption items | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | real time information positively affect Scalability | | | | | |
| | Inventory Management positively affect Scalability | | | | | |
| | Communication and information sharing positively affect Scalability | | | | | |
| | Technology Infrastructure positively affect Scalability | | | | | |
| | Transportation Status positively affect Scalability | | | | | |
| | Nature of Organizationpositively affect Scalability | | | | | |
| | Organizational Experience positively affect Scalability | | | | | |

**Part D: Supply Chain Visibility**

- **Flexible Performance measured by Collaboration with Local Stakeholders**

Indicate the extent to which you agree or disagree.

Use a scale of 1. Strongly agree 2. Agree 3. Not sure 4. Disagree 5. Strongly disagree

| | ICT Adoption items | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| | real time information positively affect Collaboration with Local Stakeholders | | | | | |
| | Inventory Management positively affect Collaboration with Local Stakeholders | | | | | |
| | Communication and information sharing positively affect Collaboration with Local Stakeholders | | | | | |
| | Technology Infrastructure positively affect Collaboration with Local Stakeholders | | | | | |
| | Transportation Status positively affect Collaboration with Local Stakeholders | | | | | |
| | Nature of Organizationpositively affect Collaboration with Local Stakeholders | | | | | |
| | Organizational Experience positively affect Collaboration with Local Stakeholders | | | | | |

**Part C**

**In your opinion rating from 0 to 100%, to what extent do you think supply chain visibility affect the flexibility performance……%**